

FAMILY ANTHOPHORIDAE

The family Anthophoridae is a large and somewhat heterogeneous group of bees. Usually there are three submarginal cells in the front wing, but there are several exceptions to this rule, a few species in several genera having but two, and in *Neolarra* there is but one. The mouth parts are similar in general to those in the Megachilidae, with the glossa and the two more basal segments of the labial palpi much elongated. In the non-parasitic genera the pollen-collecting scopal hairs are located on the hind tibiae and basitarsi, but there are many parasitic groups in which the scopa is absent and the hind legs are relatively slender and wasp-like. There is usually a well defined pygidial plate at the apex of the abdomen in both sexes. In the males six sternal plates are exposed, with the 7th and 8th retracted and modified.

KEY TO GENERA

1. Front wing with but one submarginal cell, the marginal cell very small, the bounding vein extremely thick and heavy *Neolarra* (p. 490)
- Front wing with two or three submarginal cells, the marginal cell of normal size 2
2. Front wing with but two submarginal cells 3
- Front wing with the usual three submarginal cells 4
3. Very small (5 mm. or less); antennae very close to upper margin of clypeus, much below mid transverse line of face *Holcopasites* (p. 486)
- Much larger; antennae considerably removed from margin of clypeus, near or only slightly below mid-line of face . . . 8
- 4(2). Second submarginal cell equalling or exceeding either the first or the third in length; stigma very small, length subequal to breadth; tip of marginal cell extending only slightly beyond apex of third submarginal 5
- Second submarginal cell usually shorter than both the first and the third submarginal; either the stigma well developed or the marginal cell extending considerably beyond apex of third submarginal 6
5. Scopa plumose; jugal lobe of hind wing about half as long as the vannal lobe; second submarginal cell exceeding the first and third in length *Centris* (p. 333)
- Scopa simple; jugal lobe very short; second submarginal cell subequal to the third *Anthophora* (p. 323)
- 6(4). Marginal cell very short, its apex barely attaining the apex of the third submarginal cell; scopa absent 7
- Marginal cell relatively long, its apex definitely extended beyond apex of third submarginal cell; scopa present or absent 8
7. Inner ramus of tarsal claws on mid and hind legs long and slender; maxillary palpi with 5 or 6 segments; abdominal terga chiefly black, without bands or spots of pale tomentum *Melecta* (p. 492)
- Inner ramus of mid and hind tarsal claws short, lobe-like; maxillary palpi with 3 or 4 segments; abdominal terga with conspicuous spots or bands of cream-colored tomentum *Xeromelecta* (p. 493)
- 8(6). Thorax and abdomen with red or yellow integumental maculations; scopa absent; pubescence very short and inconspicuous *Nomada* (p. 338)
- Integumental maculations absent or limited to the face; ornamentation of thorax or abdomen usually due to patterns of pubescence (if integumental bands present on abdomen, then pubescence is long and conspicuous) 9
9. Thorax and abdomen ornamented with bands and patches of dense appressed and very short yellowish or silvery tomentum, giving an appearance of integumental maculations; scopa absent 10
- Thorax and abdomen more or less clothed in longer and more erect pubescence . . . 12
10. Abdomen in female sharply pointed at apex, without the false pygidium on fifth tergum; abdomen in male without a distinct pygidial plate *Ericrocis* (p. 497)
- Abdomen in female rounded apically, fifth tergum with a more or less well developed false pygidium; pygidial plate in male well developed 11
11. Maxillary palpi 2-segmented; fifth abdominal tergum of female with an apical silvery lunule or pseudopygidial area; marginal cell about as long as distance from its tip to apex of wing *Epeolus* (p. 438)

- Maxillary palpi 3-segmented; fifth abdominal tergum of female with a quite extensive pseudopygidium; marginal cell considerably longer than distance from its tip to apex of wing *Triepeolus* (p. 459)
- 12(9). Vertex convex; male clypeus entirely black 13
Vertex flattened or concave between eyes and ocelli; male clypeus yellow at least in part 15
13. Scopa absent; apex of marginal cell obliquely truncate; basal segment of flagellum in male subequal in length to second segment .. *Epeoloides* (p. 490)
Scopa present; apex of marginal cell acute, slightly removed from costa; basal segment of flagellum in male exceeding segments 2-3 combined in length. 14
14. Pulvilli (arolia) present *Melitoma* (p. 242)
Pulvilli absent *Ptilothrix* (p. 240)
- 15(12). Third submarginal cell about as broad as it is long, and only slightly exceeding the second submarginal in length *Emphoropsis* (p. 331)
Third submarginal cell considerably longer (measured along cubitus) than broad and distinctly longer than second submarginal cell 16
16. Clypeal margin trilobed *Cemolobus* (p. 249)
Clypeal margin entire 17
17. Stigma well developed, much longer than broad; jugal lobe of hind wing short, less than half the length of vannal lobe *Exomalopsis* (p. 235)
Stigma small, little if any longer than broad 18
18. Males 19
Females 26
19. Basal segment of flagellum at least equal in length to segment 2 20
Basal segment of flagellum much shorter than segment 2 21
20. Clypeus laterally distinctly separated from margin of eye *Xenoglossa* (p. 246)
Clypeus contiguous with eye laterally .. *Anthedonia* (p. 251)
- 21(19). Sternum 7 with an apical protuberance terminating a median ridge *Florilegus* (p. 253)
Sternum 7 neither protuberant nor ridged 22
22. Tergum 7 with a pair of robust, basal spines on each extreme side *Melissodes* (p. 263)
Tergum 7 not spinose 23
23. Tergum 6 with pronounced lateral angles or spines; clypeus laterally contiguous with eye 24
Tergum 6 neither angulate nor spined; lateral margins of clypeus usually somewhat separated from margin of eye .. 25
24. Gonostyli of genital armature equal to gonocoxites in length; maxillary palpi 5 or 6-segmented. *Xenoglossodes* (p. 311)
Gonostyli straight, shorter than gonocoxites; maxillary palpi 3 or 4-segmented *Svastra* (p. 255)
- 25(23). Antennae relatively short, length of median segments no more than twice the breadth *Peponapis* (p. 244)
Antennae elongate, length of median segments fully three times the breadth .. *Tetralonia* (p. 312)
- 26(18). Mandible bidentate apically *Peponapis* (p. 244)
Mandible simple or entire apically 27
27. Mandible with an angle or tooth on inner margin, either toward base or toward apex 28
Mandible entirely simple along inner margin 29
28. Mandible with a sub-basal angle about one-third from base *Xenoglossa* (p. 246)
Mandible with a small, subapical tooth or angle *Florilegus* (p. 253)
- 29(27). Clypeus laterally distinctly separated from margin of eye, the resulting space greater than malar space 30
Clypeus laterally contiguous with margin of eye 32
30. Maxillary palpi 6-segmented *Tetralonia* (p. 312)
Maxillary palpi 5-segmented 31
31. Clypeus and labrum entirely black *Peponapis* (p. 244)
Clypeus apically and entire labrum, yellow *Xenoglossa* (p. 246)
- 32(29). Scopa plumose 33
Scopa simple, or at least not visibly plumose 34
33. Metanotum with a median dense tuft of elongate hairs, the more lateral hair shorter *Svastra* (p. 255)
Metanotum rather thinly pubescent, without a median tuft *Melissodes* (p. 263)

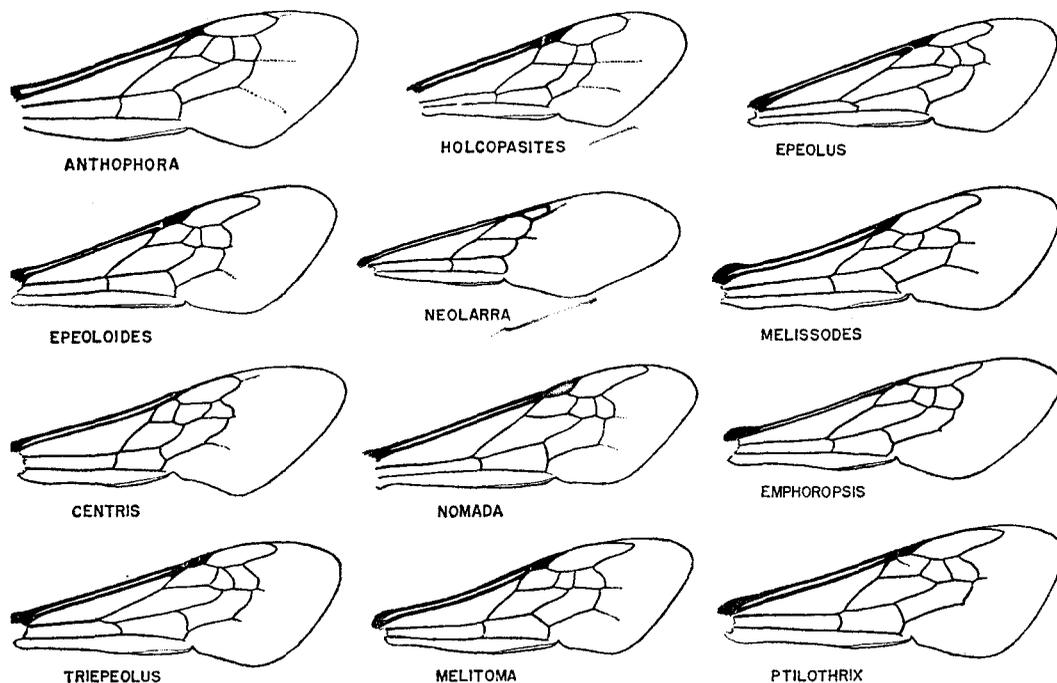


Figure 67—Venation of front wing in genera of the Anthophoridae.

- 34(32). Tegulae strongly constricted anteriorly, the outer margin of anterior half slightly incurved. *Melissodes* (p. 263)
 Tegulae broadly rounded not at all constricted anteriorly 35
35. Abdominal fasciae terminal on each tergum *Xenoglossodes* (p. 311)
 Abdominal fasciae usually median in position *Anthedonia* (p. 251)

Exomalopsis Spinola
 (Fig. 69)

Exomalopsis Spinola, 1853. Accad. Sci. Torino Mem. (2) 13, p. 89. Type: (*Exomalopsis fulvopilosa* Spinola) = *Exomalopsis aureopilosa* Spinola. Desig. by Taschenberg, 1883.
Anthophorula Cockerell, 1897, N. Mex. Agr. Exp. Sta. Bul. 24, p. 44. Type: *Anthophorula compactula* Cockerell. Monob.
Diadasiella Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 64. Type: (*Diadasiella coquilletti* Ashmead) = *Synhalonia albicans* Provancher. Monob. and orig. desig.
 ?*Epimonispractor* Holmberg, 1903. Buenos Aires Mus. Nac. de Hist. Nat. An. (3) 2, p. 426. Type: *Epimonispractor gratiosus* Holmberg. Orig. desig.
Exomalopsis subg. *Pachycerapis* Cockerell, 1922. Amer. Mus. Novitates 47, p. 4.
 Type: *Exomalopsis cornigera* Cockerell. Orig. desig.

Exomalopsis Timberlake, 1947. N. Y. Ent. Soc. Jour. 55, pp. 85-106. (revision)
Exomalopsis Michener and Moure, 1957. Amer. Mus. Nat. Hist. Bul. 112, pp. 427-434. (subgenera).

This genus of small anthophorid bees is primarily neotropical in distribution but is rather well represented in the Western United States, and four species have been collected in the eastern states. It differs from most other anthophorid bees in having a quite flat clypeus, this black in females, yellow or white in males of some species. Also, the well developed stigma is unusual. The marginal cell is quite large and elongate, the apex bent obliquely away from the coastal margin of the wing. The 2nd submarginal cell is much shorter than the 1st or 3rd. The hind tibiae and basitarsi have a very dense and conspicuous scopa of densely plumose hairs.

KEY TO SPECIES

1. Females 2
 Males 5
2. Mesopleura dull, punctures close and rather coarse; stigma of front wing nearly or quite as long as length of marginal cell on wing margin 3

- Mesopleura shining, punctures either very minute or quite widely separated; stigma of front wing much shorter than length of marginal cell on wing margin 4
3. Scutellum and posterior portion of scutum shining and nearly impunctate; scopal hairs on hind basitarsi black ..
..... *pulchella* Cresson (p. 238)
- Scutellum and posterior margin of scutum closely and finely punctate; scopal hairs on hind basitarsi pale yellow....
..... *similis* Cresson (p. 239)
- 4(2). Punctures of clypeus and mesopleura very minute and sparse, no coarser than those of face above antennae and dorsum of thorax
..... *micheneri* Timberlake (p. 237)
- Punctures of clypeus and mesopleura quite coarse, close and deep, much coarser than those on face above and on dorsum of thorax.. *asteris* new species (below)
- 5(1). Clypeus entirely yellow; mid antennal segments distinctly longer than broad
..... *asteris* new species (below)
- Clypeus dark at least in part 6
6. Clypeus with an apical, triangular, cream-colored maculation; length and breadth of median flagellar segments about equal .. *micheneri* Timberlake (p. 237)
- Clypeus entirely black, with rather copious and elongate pale pubescence; median flagellar segments somewhat longer than broad 7
7. Scutellum and posterior portion of scutum shining and nearly impunctate; mid and hind tibiae with some elongate black hairs toward base
..... *pulchella* Cresson (p. 238)
- Scutellum and posterior margin of scutum closely and finely punctate; pubescence of mid and hind tibiae entirely pale ..
..... *similis* Cresson (p. 239)

Exomalopsis (Anthophorisca) asteris
new species

(Fig. 68)

FEMALE—Length 6.5 mm., breadth of abdomen 2.5 mm.; black, the antennal flagellum brownish, mandibles dark red, apical tarsal segment testaceous, spurs pale yellow; tegulae black; wings hyaline, veins testaceous to brownish; cheeks slightly narrower than eyes; clypeus rather flat, its median length nearly half the distance between eyes below; eyes slightly convergent below; mandibles simple; labrum quite broadly rounded apically, its median length about half the basal width; basal segment of flagellum slightly longer than

pedicel, slightly shorter than segments 2 and 3 combined, median segments about as broad as long; lateral ocelli about equally distant from eyes and each other; basitibial plate very small, broadly rounded, much broader than long; basal abdominal tergum not carinate basally; surface in general smooth and shining, punctures very minute and sparse on vertex and face above antennae, rather coarse and close on clypeus, those on scutum quite deep, distinct and rather close anteriorly, becoming minute and very sparse posteriorly, minute and rather sparse also on scutellum and propodeum, but pleura with quite coarse, close and deep punctures; abdominal terga shining, the punctures very minute and rather widely separated on 1 and 2, uniformly very fine and close on basal halves of 3-5, apical halves slightly depressed and more minutely punctate beneath the pale tomentum; pygidium subtriangular, apex rather narrowly rounded; pubescence quite short but rather copious over head and thorax, entirely pale, quite dense across face just above antennae, copious on pleura, on scutellum posteriorly and to some degree on scutum anteriorly, tinged with yellow on dorsum of thorax, more whitish laterally and below, entirely pale on front and mid pair of legs, the hind tibial scopa whitish, becoming fuscous on basitarsi, hairs quite densely plumose; pubescence of abdominal terga largely pale, rather copious and erect but short on basal abdominal tergum anteriorly, very short and inconspicuous on the discs medially, apical impressed areas of terga 3 and 4 completely whitish tomentose, forming broad, whitish fasciae, that on tergum 2 broadly interrupted medially, basal tergum with a tomentose patch on each extreme side, discal pubescence very thin and hardly evident; apical fascia of tergum 5 formed of more elongate, yellowish hairs; and tergum 6 brownish pubescent on each side of pygidium.

MALE—Length 6-6.5 mm., breadth of abdomen 2 mm.; black, antennal flagellum testaceous beneath, brownish above, mandibles piceous, clypeus and labrum yellow, apical tarsal segments testaceous, spurs pale yellow, tegulae black; wings hyaline, veins testaceous to brownish; cheeks slightly narrower than eyes; clypeus rather flat, its median length slightly more than half the distance between eyes below; eyes convergent below; mandibles simple; labrum broadly rounded apically, its median length about half the basal width; basal segment of flagellum slightly shorter than pedicel, and slightly shorter than segment 2, following segments somewhat more elongate; lateral ocelli very slightly nearer eyes than to each other; basal abdominal tergum not carinate basally; surface in general smooth and shining, punctures very minute and sparse over

most of head, but closer around antennae, those on scutum fine and sparse, those on scutellum and pleura closer and coarser, those on propodeum very minute and well separated; abdominal terga less shining, punctures closer and deeper, very fine and well separated on basal tergum, but becoming quite coarse and almost crowded on the more apical terga, apical margins of all broadly but very shallowly depressed; pubescence quite short but rather copious over head and thorax, entirely pale, copious on pleura, on scutellum posteriorly, and to some degree on scutum, tinged with yellow on dorsum of thorax, more whitish laterally and below, entirely pale on legs; pubescence of abdominal terga darker in color and largely pale, rather copious and erect on basal abdominal tergum anteriorly, very short and inconspicuous on discs medially, apical impressed areas of terga 3 and 4 covered with white tomentum, forming broad, whitish fasciae, that on 2 broadly interrupted medially; sterna 7 and 8 and genital armature as shown (fig. 68).

TYPES—Holotype: Female, Brazos Co., Texas, October 10, 1954 (A. H. Alex, on *Aster*). Allotype: topotypical [both Tex. Agr. Exp. Sta.]. Paratypes: 5 ♀♀, 2 ♂♂,

topotypical; 1 ♀, Hovey Lake Ent. Recon. Station 17, Indiana, Oct. 3, 1958 (L. C. Chandler).

Paratypes are in the Texas Agricultural Experiment Station, and in collections of Purdue University, P. H. Timberlake and the author.

Exomalopsis (Anthophorisca)
micheneri Timberlake

Exomalopsis (Anthophorula) micheneri Timberlake, 1947. N. Y. Ent. Soc. Jour. 55, p. 105. ♀ ♂.

FEMALE—Length 6.5 mm., breadth of abdomen 2.5 mm.; black, the antennae and mandibles becoming somewhat more brownish-testaceous apically, the apical tarsal segments brownish-testaceous, spurs pale yellow; tegulae yellowish-hyaline; wings subhyaline, veins testaceous to brownish; cheeks considerably narrower than eyes; clypeus slightly protuberant, its median length not much more than one-third the distance between eyes below (fig. 69); eyes very slightly convergent below; mandibles simple; labrum quite broadly rounded apically, its median length about half the basal width; basal segment of flagellum subequal to the robust pedicel, about equal to 2 and 3 combined, median segments about as broad as long; lateral ocelli slightly nearer eyes than to each other; basitibial plate rounded and quite short, somewhat broader than long; surface in general smooth and shining, punctures very minute and sparse over entire head, those on scutum quite deep, distinct and rather close anteriorly, becoming minute posteriorly, the scutellum, propodeum and pleura with very minute and quite sparse punctures; abdominal terga shining, the punctures very minute, somewhat more distinct and rather widely separated on basal tergum basally, very minute on the following terga, becoming somewhat more distinct and densely crowded on the more apical terga; pygidium subtriangular, apex rather narrowly rounded; pubescence quite short but rather copious over head and thorax, entirely pale, quite dense across face just above antennae, copious on pleura above, on scutellum, and to some degree on scutum where it is considerably shorter, tinged with yellow on dorsum of thorax, more whitish laterally and below, entirely pale on legs, the hind tibial scopa whitish, hairs quite densely plumose; pubescence of abdominal terga largely pale, rather copious and erect but short on basal abdominal tergum anteriorly, very short and inconspicuous on the discs medially, apical impressed areas of terga 3 and 4 completely whitish tomentose and that on tergum 2 whitish tomentose at extreme sides but broadly

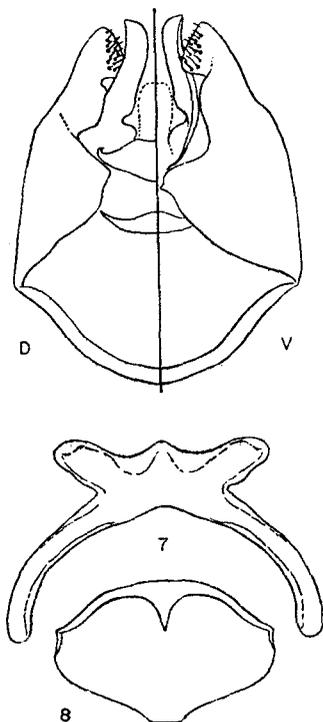


Figure 68
Genital armature and sterna 7 and 8 of
Exomalopsis asteris.

bare or sparsely pubescence medially, the discal pubescence very thin and somewhat dark; tergum 5 with somewhat yellowish pubescence, with some more elongate whitish hairs laterally, not definitely fasciate; and tergum 6 brownish pubescent on each side of pygidium.

MALE—Length 5 mm.; black, the labrum and triangular apical maculation of clypeus cream-color; flagellum testaceous beneath, piceous above, median segments with length and breadth about equal, segment 2 very short, segment 1 about twice as long as segment 2; cheeks narrower than eyes; surface of head smooth and shining, finely and sparsely punctate; thorax shining, minutely and sparsely punctate; tegulae yellowish-hyaline; wings hyaline, veins and stigma testaceous; thoracic pubescence thin but erect, entirely whitish, rather long on scutellum, that on head entirely pale, rather long and erect on vertex and above antennae, shorter on cheeks and below antennae, quite dense on clypeus, but surface not obscured; abdominal terga shining, finely and regularly punctate, interspaces much greater than diameter of punctures on the more basal segments, becoming more close and deep on basal part of the more apical segments; basal segments of legs black, the tarsi becoming yellowish apically, pubescence entirely pale; spurs pale yellowish.

DISTRIBUTION—Mississippi, in October.

FLOWER RECORD—*Gerardia*.

***Exomalopsis (Exomalopsis) pulchella*
Cresson**

Exomalopsis pulchella Cresson, 1865. Ent. Soc. Phil. Proc. 4, p. 191. ♀ ♂.

FEMALE—Length 6.5 mm., breadth of abdomen 2.8 mm.; black, antennal flagellum piceous; mandibles testaceous apically; tarsal segments 2-5 testaceous; spurs yellowish; tegulae piceous; wings subhyaline, infuscated apically, stigma brownish, veins pale yellowish; cheeks narrower than eyes; clypeus quite flat; mandibles simple; labrum broadly rounded, median length about one-third the breadth; basal segment of flagellum slightly longer than segment 2, median segments slightly longer than broad; space between lateral ocelli about twice that between ocelli and eyes; hind basitibial plate quite large, rounded, length about equal to basal width; surface of face smooth but rather dull, punctures sparse but deep and distinct on clypeus; cheeks more shining, punctures sparse, minute and obscure; dorsum or thorax smooth but rather dull, punctures fine and rather close but deep and distinct on scu-

tum anteriorly and laterally, very minute and sparse over posterior half and on scutellum, quite close and rather coarse but deep and distinct on pleura anteriorly and below, becoming minute and sparse posteriorly; lateral faces of propodeum dull, punctures close but minute and obscure, posterior face shining above, becoming finely, closely and distinctly punctate on each side; basal abdominal tergum smooth and impunctate, with a distinct basal carina separating the anterior and dorsal surfaces, following segments impunctate apically, segment 2 at least minutely and sparsely punctate basally; sterna quite closely and deeply punctate; pubescence short, thin and entirely pale on face and cheeks, more copious and entirely pale on thorax laterally and beneath, fuscous on scutum and scutellum, but becoming pale on scutum anteriorly, scutellum with a dense marginal fringe of pale yellowish hairs; legs pale pubescent, but hind tibial scopa with some dark hairs at base, and basitarsal scopa blackish or piceous; abdominal terga largely bare, but with some short, whitish pubescence laterally and across base of tergum 1, terga 2-4 with lateral, oblique and rather narrow lines of pale tomentum; tergum 5 quite densely covered with pale yellowish, plumose hairs, following terga and pygidium not exposed.

MALE—Length 6 mm., breadth of abdomen 2.3 mm.; black, including clypeus and labrum, mandibles becoming testaceous apically; antennal flagella brownish beneath, piceous above; tarsi becoming yellow apically, spurs yellowish-hyaline; tegulae and the more basal segments of legs more brownish-piceous; wings hyaline basally, becoming somewhat infuscated at apex, stigma and veins testaceous; cheeks considerably narrower than eyes which are very slightly convergent below; median segments of flagella distinctly longer than broad, basal segment slightly broader than long, only slightly exceeding pedicel; lateral ocelli separated from margin of vertex by much less than their diameter, considerably nearer eyes than to each other; concavity of basal abdominal tergum small, not noticeably carinate; surface of clypeus and of face below ocelli smooth but rather dull, clypeus with a few scattered, very fine punctures, vertex and cheeks more shining, cheeks with minute, scattered and sparse punctures; scutum anteriorly rather dull but smooth, with well separated, quite deep and distinct punctures, posterior third and scutellum shining and impunctate; pleura with scattered, rather coarse punctures which are well separated in general; lateral faces of propodeum rather dull, with quite deep, distinct and rather close punctures, posterior face becoming smooth and shining, dorsal area indefinite, very finely punctate; basal abdominal

tergum somewhat shining and smooth, with scattered, very minute punctures, these becoming somewhat more distinct at each extreme side; basal areas of terga 2-5 finely and quite closely and distinctly punctate, apical impressed areas quite broadly smooth, with only very minute, scattered and sparse punctures evident; apical margin of tergum 7 sharply reflexed beneath, the resulting ventral surface polished and impunctate; posterior two-thirds of scutum and anterior margin of scutellum with erect but rather thin black pubescence; mid and hind tibiae with some black hairs on outer surface toward base; pubescence of head and thorax otherwise entirely pale ochraceous, quite dense around antennae and over lower part of face, more copious and elongate on thorax laterally and beneath, scutellum with a quite dense marginal fringe of elongate pale pubescence; basal tergum pale pubescent basally and laterally, median posterior area with some extremely short, suberect, obscure, black pubescence; basal areas of terga 2-4 with some very short and obscure, suberect, black pubescence, 2 with a pair of slightly oblique, narrow, pale fasciae on each side, widely separated medially, 3-5 with transverse, pale ochraceous fasciae separating the basal and apical areas, 6 rather densely pale pubescent apically.

DISTRIBUTION—Jamaica and Cuba to Florida.

A female of this species, and another of the following species, were collected at Homestead, Florida on April 1, 1939 by J. C. Bradley.

Exomalopsis (Exomalopsis) similis
Cresson

Exomalopsis similis Cresson, 1865. Ent. Soc. Phil. Proc. 4, p. 191. ♀.

FEMALE—Length 6 mm., breadth of abdomen 2.8 mm.; black, antennae more piceous; mandibles becoming testaceous apically; tarsal segments 2-5 testaceous; spurs yellowish; tegulae dark posteriorly, becoming pale yellowish anteriorly; wings subhyaline, faintly clouded apically, stigma brownish, veins testaceous to piceous; cheeks much narrower than eyes; clypeus quite flat; labrum broadly rounded, median length about one-third the breadth; mandibles simple; median segments of flagellum about as broad as long, basal segment slightly longer; lateral ocelli considerably nearer eyes than to each other; hind basitibial plate large, slightly longer than basal width, subtriangular, apex narrowly rounded; clypeus and labrum somewhat shining, with rather coarse, sparse punctures; cheeks, vertex and face above antennae more shining,

with fine and rather close punctures on cheeks and across face, but these fading out toward the impunctate vertex; dorsum of thorax shining, punctures quite close and coarse across anterior half of scutum, becoming sparse over posterior half, but hind margin and scutellum with very minute and close punctures; pleura closely punctate and dull anteriorly, becoming somewhat shining posteriorly, punctures more minute and sparse; propodeum closely, finely and quite uniformly punctate; basal abdominal tergum with a restricted area on each extreme side that is closely and finely punctate, the broad median area shining and impunctate, with a distinct basal carina separating the dorsal and anterior surfaces; tergum 2 finely and closely punctate laterally and across base, the punctures more minute and sparse medially and apically; following terga covered by preceding plates or by dense tomentum; punctures of basal sterna sparse and minute, becoming quite close on the more apical sterna; pubescence pale in general, quite copious between eyes and antennae, across face above antennae, on cheeks, and a fringe behind vertex; pubescence pale ochraceous and quite copious on pleura, somewhat shorter on scutum, pale anteriorly, but disc with very short, thin and obscure dark pubescence; scutellum with a dense and erect ochraceous fringe, propodeum with short and rather thin, whitish hairs; legs chiefly pale pubescent, whitish basally, more or less yellowish on tarsi, mid tibiae with a patch of fuscous hairs, scopa on hind legs yellow, with a fringe of fuscous hairs just below basitibial plate; basal tergum narrowly pale pubescent on each side and across base, otherwise bare; tergum 2 with a pair of oblique tomentose fasciae laterally which are widely separated medially, apical margin entirely bare; exposed apical areas of following terga densely ochraceous tomentose, apical margins of 3 and 4 narrowly exposed.

MALE—Length 5.5 mm., breadth of abdomen 2 mm.; black, including clypeus and labrum, mandibles becoming brownish-testaceous apically, antennal flagella testaceous beneath, brownish-piceous above; tegulae yellowish-hyaline, legs basally brownish-piceous, becoming more yellowish apically, tarsi and spurs pale yellow; wings clear hyaline, stigma and veins pale testaceous; cheeks much narrower than eyes; eyes slightly convergent below; median segments of flagella slightly longer than broad, basal segment with length and breadth about equal, slightly shorter than pedicel; lateral ocelli much nearer eyes than to each other, separated from margin of vertex by less than their diameter; concavity of basal abdominal tergum very small, not noticeably carinate; clypeus and lower part of face quite smooth, somewhat shining, clypeus with a few, very mi-

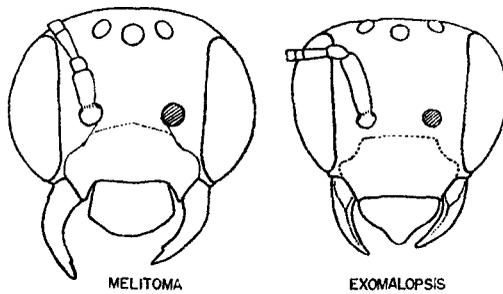


Figure 69
Facial view of head in females of
Exomalopsis and *Melitoma*.

nute punctures, upper part of face shining, with scattered, exceedingly minute and obscure punctures; vertex and cheeks shining, with barely distinguishable, scattered punctures; scutum and scutellum somewhat shining, punctures quite deep and distinct, rather fine, well separated but not sparse over anterior two-thirds, becoming rather sparse posteriorly, those on scutellum somewhat finer and quite close; punctures of pleura rather coarse but shallow, well separated but not sparse, propodeum laterally smooth and shining, with punctures rather coarse and close posteriorly, becoming fine and sparse anteriorly, posterior face smooth and shining medially, dorsal area rather indefinite, with quite close, fine punctures; basal abdominal tergum well covered with fine but quite deep and distinct, slightly separated punctures, these becoming somewhat closer at each extreme side; terga 2-6 quite closely, deeply and finely punctate basally, the broadly impressed apical margins yellowish-hyaline, with only exceedingly minute and obscure punctures evident; apical margin of tergum 7 reflexed, the resulting ventral surface smooth and shining; pubescence of head and thorax quite short, entirely pale, somewhat more copious on face below and around antennae, on thorax laterally and across posterior margin of scutellum; pubescence of legs entirely yellowish-white; abdominal terga with no evident dark pubescence, the basal tergum with rather short, dense pubescence across base and at each extreme side, 2-5 with rather vague, transverse fasciae of whitish pubescence separating the basal and apical areas, but overlying much of the apical area of each tergum; tergum 6 with some pale, more apical pubescence.

DISTRIBUTION—Costa Rica to Cuba and Florida.

Ptilothrix Smith

(Fig. 67)

Ptilothrix Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 131. Type: *Ptilothrix plumatus* Smith. By monotypy.

Ptilothrix Marschall, 1873. Nomenclator Zoologicus, p. 269. Emend.

Emphor Patton, 1879. U. S. Geol. Geog. Surv. Bul. 5, p. 476. Type: *Melissodes bombiformis* Cresson. Monob. and orig. desig.

Energoponus Holmberg, 1903. Mus. Nac. Buenos Aires An. (3) 2, p. 406. Type: (*Energoponus strenuus* Holmberg) = *Ptilothrix plumatus* Smith. Desig. by Sandhouse, 1943.

In *Ptilothrix* the vertex is broadly convex (as in *Melitoma*, fig. 69), the clypeus is black in both sexes, and in the front wing the marginal cell is acute apically, slightly bent away from the coastal margin. There are three submarginal cells, the 2nd shorter than the 1st or the 3rd. The basal segment of the flagellum is shorter than the scape, and barely equal to segments 2 and 3 combined, in both sexes. The arolia are absent. In the female, the scopa on the hind tibiae and basitarsi is of finely plumose, elongate hairs.

Ptilothrix bombiformis (Cresson)

Melissodes bombiformis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30, p. 219. ♀ ♂.

Emphor bombiformis Patton, 1879. U. S. Geol. Geog. Surv. Bul. 5, p. 476.

Emphor bombiformis Robertson, 1890. Canad. Ent. 22, p. 217. (biology)

Emphor bombiformis Knab, 1911. Ent. Soc. Wash. Proc. 13, p. 170. (biology)

Emphor bombiformis Grossbeck, 1911. N. Y. Ent. Soc. Jour. 19, p. 238. (biology)

Emphor fuscojubatus Cockerell, 1913. Psyche 20, p. 107. ♀. New synonymy

Emphor fuscojubatus Nichols, 1913. Psyche 20, p. 107. (biology)

Emphor bombiformis Robertson, 1914. Ent. News 25, p. 70. (biology)

Emphor bombiformis Robertson, 1918. Canad. Ent. 50, p. 320. (biology)

Emphor bombiformis Robertson, 1925. Psyche 32, p. 278. (biology)

Emphor bombiformis Davis, 1926. Brooklyn Ent. Soc. Bul. 21, p. 127. (biology)

Emphor bombiformis Robertson, 1929. Flowers and insects, Lancaster, Pa., Science Press. (flower records)

Emphor bombiformis Rau, 1930. Brooklyn Ent. Soc. Bul. 25, p. 28. (biology)

Emphor bombiformis Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 222. (biology)

Emphor bombiformis Michener, 1947. Amer. Midland Nat. 38, p. 451. (biology)

Ptilothrix bombiformis Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1075. (larva)

FEMALE—Length 13-17.5 mm., breadth of abdomen 5-7 mm.; black, including mandibles, antennae and legs, spurs brownish-testaceous, tegulae yellowish-hyaline; wings uniformly, rather lightly infuscated, veins brownish to piceous; cheeks somewhat narrower than eyes; clypeus somewhat protuberant, its median length considerably greater than half the distance between eyes; eyes subparallel; mandibles with a small, inner, subapical angle, apical half largely testaceous on outer surface in some specimens; basal segment of flagellum slightly longer than segments 2 and 3 combined, these no longer than broad; punctures of clypeus quite coarse and deep, rather sparse medially, becoming somewhat finer and closer at each extreme side; median length of labrum about half the breadth, rather broadly rounded apically, margin much thickened, surface shining between rather fine, deep, slightly separated punctures, these becoming crowded laterally and apically; lateral areas of face below antennae shining, very minutely punctate, punctures somewhat separated, median area much more coarsely and closely punctate, upper part of face below level of ocelli shining, punctures quite coarse, deep, well separated but hardly sparse on each side, becoming somewhat closer medially below anterior ocellus; surface between lateral ocelli and eyes shining and impunctate; vertex rather closely punctate posterior to ocelli, the punctures becoming finer and more sparse on the shining cheeks posteriorly; punctures of scutum fine but deep and distinct, quite uniformly close throughout; pleura somewhat shining between coarser, deeper, slightly separated punctures, these becoming closer above; posterior face of propodeum shining, punctures fine and quite sparse, dorsal area with minute and quite uniformly close punctures, lateral faces finely and rather deeply punctate, the punctures quite close anteriorly, rather sparse and minute posteriorly and below; discs of abdominal terga very minutely and closely punctate throughout, only the very narrow, apical rims impunctate; pygidium elongate triangular, apex rather narrowly rounded; pubescence rather short and erect on head and thorax, pale yellowish above antennae and along margin of eyes, clypeus largely bare, labrum with a quite dense, yellowish, apical fringe, vertex with more elongate pale ochraceous pubescence, and cheeks with rather elongate hairs below; entire thorax quite densely covered with pale ochraceous pubescence, obscuring the surface in large part; legs largely black pubescent, but front femora with a posterior fringe of elongate, pale ochraceous hairs; hind tibial scopa black, the hairs short plumose; basal

abdominal tergum with some very obscure, rather short, pale pubescence anteriorly, disc otherwise covered with short, suberect, fuscous or blackish pubescence; remaining terga quite densely covered with very short, erect, entirely black pubescence, that on the more apical terga becoming somewhat elongate laterally.

MALE—Length 12.5-17.5 mm., breadth of abdomen 5-6.5 mm.; black, the mandibles more or less yellowish-testaceous apically, spurs brownish-testaceous, tegulae testaceous-hyaline; wings rather uniformly infuscated, veins brownish to blackish; cheeks subequal to eyes in width; clypeus only slightly protuberant, its median length somewhat less than half the distance between eyes; eyes subparallel; outer margin of mandibles somewhat angulated at base, without distinct inner teeth; median length of labrum slightly more than half the width, broadly rounded apically, margin slightly thickened; basal segment of flagellum as long as segments 2 and 3 combined; clypeus and labrum somewhat shining, quite finely and closely punctate; lateral areas of face below level of antennae very minutely and quite closely punctate, surface above rather uniformly, finely punctate, punctures slightly separated below ocelli, becoming minute and sparse above, space between ocelli and eyes shining and nearly impunctate, vertex minutely and rather closely punctate; cheeks shining, with minute, rather widely separated punctures; scutum and scutellum somewhat shining beneath dense pubescence, punctures very fine and rather close, punctures of pleura quite deep and distinct but very fine and close throughout; posterior face of propodeum below somewhat shining, punctures minute, rather widely separated, dorsal area somewhat less shining, punctures closer, becoming very close at extreme sides, lateral surfaces shining, punctures fine but rather deep and distinct, well separated but hardly sparse; abdominal terga quite uniformly, closely and very minutely punctate throughout, the apical, impressed areas obscurely yellowish-hyaline beneath dark pubescence; pubescence short but rather dense over most of face, entirely pale ochraceous; quite dense between antennae and posterior to ocelli, somewhat thinner across vertex and on cheeks anteriorly; thorax uniformly, densely covered with short, pale ochraceous pubescence; coxae and trochanters largely pale pubescent, but legs otherwise with short blackish pubescence; basal abdominal tergum with very short, dense, pale ochraceous pubescence anteriorly, this becoming brownish dorsally, darker toward apical margin, the following terga densely covered with very short, erect, black pubescence; sterna 7 and 8 and genital armature as shown (fig. 70).

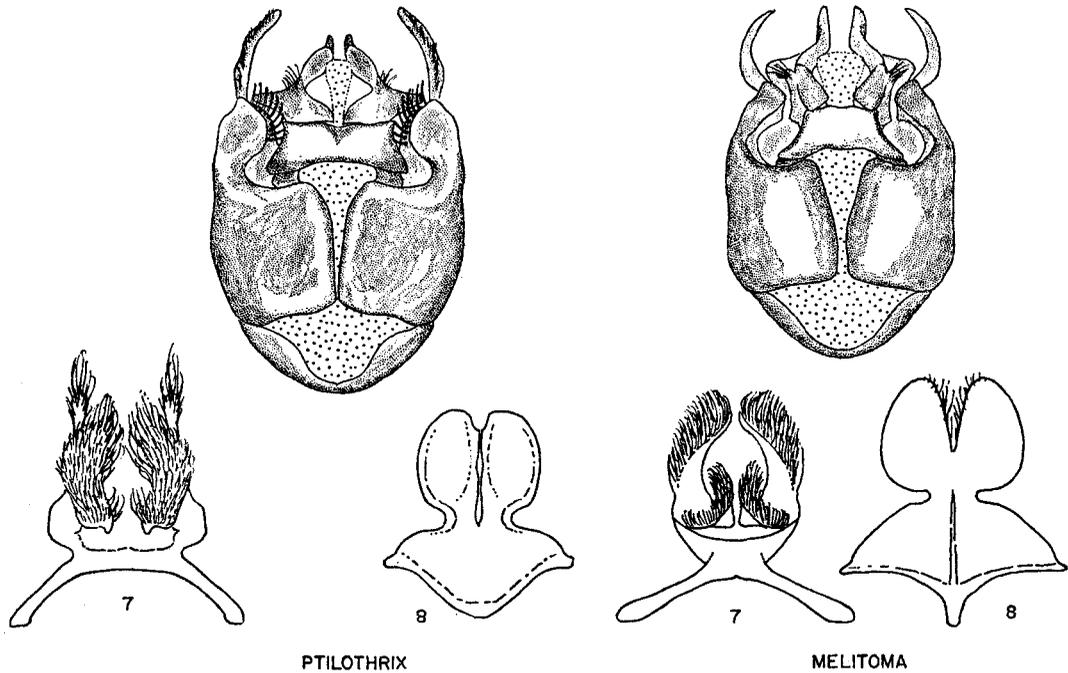


Figure 70—Genital armature and sterna 7 and 8 in males of *Melitoma taurea* and *Ptilothrix bombiformis*.

DISTRIBUTION—Kansas to New Jersey, south to Texas and Florida, June to August.

FLOWER RECORDS—*Hibiscus*. Robertson (1929) records this species on *Cephalanthus*, *Cirsium*, *Ipomoea*, *Verbena* and *Vernonia*.

Cockerell (1913) separated *fuscojubatus* from *bombiformis* on very unreliable characters, chiefly on color of pubescence on face and vertex. This tends to be somewhat paler in specimens from the more southern states, darker in specimens from the middle Atlantic states, but is not entirely constant, and all degrees of intergradation can be found. It seems hardly justified, therefore, to recognize *fuscojubatus* even as a subspecies.

Melitoma Lepeletier and Serville

(Figs. 67 & 69)

Melitoma Lepeletier and Serville, 1828. Encycl. Meth. Hist. Nat. Ins. 10, p. 529. Type: *Melitoma euglossoides* Lepeletier and Serville. Monob.

Entechnia Patton, 1879. U. S. Geol. and Geog.

Surv. Bul. 5, p. 476. Type: *Anthophora taurea* Say. Monob. and orig. desig.

Meliphila Schrottky, 1902. Buenos Aires Mus. Nac. de Hist. Nat. An. 7, p. 310. Type: (*Meliphila ipomoeae* Schrottky) = *Melitoma euglossoides* Lepeletier and Serville. Monob. and orig. desig.

Melitoma resembles *Ptilothrix* in wing venation, in the entirely black clypeus of both sexes, and in the broadly convex vertex (fig. 69). The basal segment of the flagellum is nearly equal to the scape and to segments 2-4 combined in both sexes. It differs from *Ptilothrix* in having distinct arolia between the claws. The scopal hairs on the hind tibiae and basitarsi of the female are rather elongate and very finely plumose.

Melitoma taurea (Say)

(Fig. 70)

Anthophora taurea Say, 1837. Boston Jour. Nat. Hist. 1, p. 410. ♂ ♀.

Anthophora taurea Walsh, 1868. Amer. Ent. 1, p. 10. (biology)

Entechnia (*Anthophora*) *taurea* Ashmead, 1894. Psyche 7, p. 25.

Podalirius taureus Dalla Torre, 1896. Cat. Hym. 10, p. 291.

Entechnia taurea Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 175. (biology)

Entechnia taurea Rau, 1929. Psyche 36, p. 155. Hym. 10, p. 291.

Melitoma taurea Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Entechnia taurea Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 222. (biology)

FEMALE—Length 10-12.5 mm., breadth of abdomen 4-5.5 mm.; entirely black, including antennae, legs, spurs and tegulae, only the mandibles with an obscure, subapical, testaceous infusion; wings whitish-hyaline, veins testaceous to blackish; cheeks slightly narrower than eyes; clypeus rather strong protuberant, its median length slightly less than half the distance between eyes (fig. 69); eyes subparallel; mandibles with an obscure, inner subapical angle; breadth of labrum considerably greater than median length, apical margin somewhat thickened, very slightly outcurved; basal segment of flagellum slightly longer than segments 2-4 combined; punctures of clypeus coarse and deep, slightly separated above, becoming quite close apically and laterally, those of labrum deep, distinct and uniformly close; lateral surface of face below antennae shining, very minutely punctate, the more median punctures above deep and distinct, rather fine and close, becoming minute and well separated toward margin of eye, surface between eyes and lateral ocelli polished and largely impunctate; cheeks shining, with rather fine, well separated but distinct punctures beneath the rather sparse pubescence; scutum somewhat shining between coarse, deep and close punctures, these becoming somewhat more shallow and close along anterior margin; scutellum with much finer, very close punctures throughout; pleura somewhat shining, punctures quite coarse and deep, slightly separated, becoming rather fine and close anteriorly; posterior face of propodeum rather dull, punctures very fine, indistinct, slightly separated, dorsal area impunctate but dull and finely tessellate, lateral faces somewhat shining, finely and indistinctly punctate below; discs of abdominal terga with very fine and close punctures, apical margin of basal tergum rather broadly impunctate, the shallowly impressed apical area of tergum 2 much more minutely but closely and fully punctate, terga 3-5 not noticeably impressed apically; pygidium small, very narrow, elongate, apex very narrowly rounded; pubescence of head and thorax rather short but quite copious, whitish on face and cheeks, with some erect, elongate, fuscous hairs below ocelli and across vertex, but this fringed posteriorly with shorter white hairs; scutum with fine, densely plumose pubescence anteriorly, this extended along mid-line nearly to posterior margin, the

lateral margins and posterior border quite densely pale pubescent, with a broad arcuate band of fuscous pubescence separating the areas of light pubescence, originating in close proximity to a tuft of fuscous hairs on tubercles; scutellum largely fuscous pubescent, but with a narrow posterior fringe of pale hairs that are continuous with similar pubescence on propodeum; lateral surfaces of propodeum and pleura in large part fuscous pubescent, anterior faces of pleura pale pubescent, and a smaller tuft of whitish pubescence posteriorly; legs largely black pubescent, but front femora with a posterior fringe of whitish hairs, some pale hairs on outer surface of the front tibiae; mid tibiae and basitarsi with some pale pubescence on outer face; hind tibial scopa entirely black, hairs very finely plumose; basal abdominal tergum with some short, greyish pubescence basally, this broadened on each side to occupy the entire lateral margin; terga 2-4 with very narrow, dense, white, apical fasciae, discs otherwise covered with very short, inconspicuous but rather dense black pubescence; terga 5 and 6 entirely black pubescent, hairs somewhat more elongate.

MALE—Length 9.5-12 mm., breadth of abdomen 4-5 mm.; black, antennal flagellum, mandibles and tibial spurs somewhat more piceous, apical tarsal segments becoming brownish, tegulae black; wings whitish-hyaline, veins testaceous to piceous; cheeks somewhat narrower than eyes; clypeus quite strongly protuberant, its median length half the distance between eyes; eyes subparallel; mandibles slender and simple, rather strongly reflexed; breadth of labrum considerably greater than its median length, apical margin thickened, broadly subtruncate medially; punctures of clypeus rather coarse, somewhat finer and closer along mid-line, becoming more distinctly separated on each side, those on labrum rather uniformly deep and close; punctures of face very minute and indistinct laterally, becoming quite deep and somewhat coarser medially, rather coarse between antennae and ocelli, surface between ocelli and eyes smooth and shining, very sparsely punctate; cheeks shining, punctures quite coarse, deep and distinct along posterior margin, becoming minute and indefinite toward margin of eye; punctures of scutum quite coarse and deep, slightly separated medially on posterior half, becoming finer and quite close anteriorly; scutellum shining, punctures uniformly fine and close; pleura somewhat shining between deep and rather coarse punctures, these somewhat separated medially, becoming finer and closer anteriorly; posterior face of propodeum rather smooth and shining medially, dorsal area becoming dull, densely tessellate and impunctate across upper margin, with only a few scatter-

ed, minute punctures on posterior face below, lateral faces somewhat shining between rather fine, deep and distinct, slightly separated punctures; abdominal terga minutely and quite closely punctate throughout, basal tergum rather broadly impunctate across apical margin; broad apical impressed area of tergum 2 somewhat more minutely punctate than basal area; terga 3-6 not noticeably impressed apically, disc of each quite uniformly, finely and closely punctate; pubescence of head and thorax quite copious and dense but rather short, face and cheeks with largely whitish or pale yellowish pubescence, vertex with some erect, fuscous hairs, and a few similar hairs below level of ocelli on each side; scutum with fine, densely plumose pubescence anteriorly, this extended along mid-line nearly to posterior margin, lateral margins and posterior border quite densely pale pubescent, with a broad arcuate band of fuscous pubescence separating the areas of light pubescence, originating in close proximity to a tuft of fuscous hairs on tubercles; scutellum largely fuscous pubescent, but with a narrow posterior fringe of pale hairs that are continuous with similar pubescence on propodeum; pleura and propodeum largely pale pubescent, but propodeum with a tuft of elongate, more fuscous hairs just posterior to wing bases on propodeum; pubescence of front and middle legs largely pale, basitarsi with dark brownish or fuscous pubescence beneath, more brownish on outer face; hind coxae, trochanters and femora largely pale pubescent, tibiae with short, appressed pale hairs on outer face except toward apex but with more elongate and erect fuscous pubescence on inner face, basitarsi largely fuscous or brownish pubescent; terga 2-4 with very narrow, dense, white, apical fasciae, discs otherwise covered with very short, inconspicuous but rather dense, black pubescence; tergum 5 with a narrow, dense, white, apical fascia, the disc black pubescent, and tergum 6 white tomentose apically, the fascia somewhat less definite, discs black pubescent but with some pale hairs across base; sterna 7 and 8 and genital armature as shown (fig. 70).

DISTRIBUTION — Kansas to Virginia and Florida, March to May in Florida, June to September elsewhere.

FLOWER RECORDS — *Ipomoea*. A few specimens have been collected on *Clitoria* and *Oenothera*, but no pollen-collecting activity was observed. Robertson (1929) includes collections on *Asclepias*, *Cirsium*, *Convolvulus* and *Hibiscus*.

Peponapis Robertson

Peponapis Robertson, 1902. Canad. Ent. 34, p. 324. Type: *Macrocera pruinosa* Say. Orig. desig.

This genus is related to *Xenoglossa* and also commonly visits squash blooms. These bees are smaller, but the venation of the front wing is quite similar. The clypeus is slightly separated from the margin of the eye, the resulting space little if any greater than the narrow malar space. In the female the clypeus is black, that of the male black basally, with a more or less extensive yellow maculation apically. The female mandibles are bidentate at apex, and the scopal hairs of the hind tibiae and basitarsi are simple. The basal segment of the flagellum in the female approximates the combined length of segments 2 and 3, but in the male the basal segment is short, about a third the length of segment 2, the following segments about twice as long as broad. Terga 6 and 7 in the male are simple, lacking any lateral angles or spines.

Peponapis pruinosa pruinosa (Say)

(Figs. 71 & 72)

Macrocera pruinosa Say, 1837. Boston Jour. Nat. Hist. 1, p. 405. ♂ ♀.

Macrocera Philadelphica Lepeletier, 1841. Hist. Nat. Ins., Hym. 2, p. 110. ♂.

Xenoglossa pruinosa Patton, 1879. U. S. Geol. and Geog. Surv. Bul. 5, p. 473.

Xenoglossa spriuna Howard, 1901. Insect Book, Pl. VII. fig. 2 (error?).

Peponapis pruinosa Robertson, 1902. Canad. Ent. 34, p. 324.

Xenoglossa pruinosa var. *lutzi* Cockerell, 1923. Canad. Ent. 55, p. 205. ♀ ♂.

Xenoglossa pruinosa Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7), p. 34. (biology)

Peponapis pruinosa Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12.5-14 mm., breadth of abdomen 5-5.5 mm.; black, the mandibles obscurely yellowish toward apex, apical tarsal segments brownish-testaceous, spurs pale yellowish, tegulae yellowish-hyaline; wings subhyaline, veins piceous to black; cheeks much narrower than eyes; clypeus rather strongly protuberant, its median length about half the distance between eyes (fig. 71); eyes subparallel; mandibles obscurely bidentate at apex; basal segment of flagellum about equal to segments 2 and 3 combined; punctures of clypeus coarse and contiguous, becoming slightly separated along upper margin; labrum quite

coarsely and closely punctate throughout, apical margin subtruncate, very shallowly emarginate medially; supraclypeal area rather sparsely punctate medially, lateral surfaces of face below level of antennae quite deeply, closely and rather finely punctate, surface above antennae somewhat more shining, punctures more minute but rather close, a limited area below anterior ocellus polished and impunctate; cheeks very finely and closely punctate beneath the rather dense pubescence; scutum somewhat shining medially, punctures rather coarse, well separated but not sparse, the peripheral punctures somewhat finer and considerably closer; scutellum very finely and closely punctate; pleura dull, punctures shallow and rather vague, somewhat separated in general; posterior face of propodeum polished and largely impunctate, dorsal area becoming rather coarsely reticulate along upper margin, lateral faces finely and closely punctate beneath dense pubescence; basal abdominal tergum with fine punctures across basal half of disc, these becoming very close and more distinct laterally where they nearly reach the apical margin, the median punctures more minute and sparse, apical margin rather broadly impunctate; punctures on discs of terga 2-4 fine and quite close in general, especially at each extreme side, rather well separated medially on 2, but quite uniformly close on 3 and 4, apical impressed areas invaded in part by minute and rather close punctures, the rims narrowly impunctate; pygidium triangular, apex rather narrowly rounded; pubescence of head, thorax and legs entirely pale ochraceous, somewhat more fulvous on dorsum of thorax, quite copious and elongate on head, somewhat shorter but dense on thorax; hind tibial scopa pale ochraceous, the hairs elongate and rather sparsely plumose; basal abdominal tergum with copious, erect and elongate, pale ochraceous pubescence basally and laterally, the rather narrow apical margin bare; tergum 2 pale pruinose across base, this largely hidden by basal tergum, apical impressed area covered in part by pale tomentum, forming a rather broad but indefinite fascia, the apical rim bare; apical half of terga 2 and 3 largely covered with pale tomentum, forming a broad fascia, basal areas of terga very finely and thinly short pubescent, somewhat pruinose on 3 and 4; apical half of tergum 5 densely covered with long, pale fulvous hairs, and 6 fulvous pubescent on each side of pygidium.

MALE—Length 11-13 mm., breadth of abdomen 4-4.5 mm.; black, the median, apical area of clypeus yellow (fig. 71), face otherwise black; labrum somewhat tinged with yellowish medially; mandibles obscurely yellowish toward apex; legs piceous to black basally, tarsal segments more or less brownish-testaceous, spurs pale yellowish, tegulae yellowish-

hyaline; wings subhyaline, veins testaceous to piceous; cheeks considerably narrower than eyes; clypeus strongly protuberant, its median length slightly greater than half the distance between eyes; eyes subparallel; mandibles obscurely bidentate at apex; basal segment of flagellum rather short, but much longer than pedicel, segment 3 twice as long as basal segment, segment 2 longer than 3; punctures rather coarse, slightly separated on upper half of clypeus, becoming somewhat finer and closer apically, quite obscure on each side; labrum shining, punctures quite deep and distinct but rather fine, slightly separated, median length considerably less than basal width, apical margin quite broadly truncate; supraclypeal area rather dull, sparsely punctate medially, lateral surfaces of face below level of antennae rather dull, punctures quite coarse and close, surface above antennae becoming somewhat more shining, punctures quite close, minute and vague; cheeks minutely punctate along margin of eyes, punctures becoming somewhat more distinct and slightly separated posteriorly beneath the rather long pubescence; scutum somewhat shining medially, the punctures quite coarse and well separated, becoming quite close laterally and anteriorly; scutellum rather dull, punctures quite close and rather coarse; pleura dull, the surface tessellate, punctures shallow, vague and rather sparse; propodeal triangle extensive, polished and impunctate below, becoming rather coarsely, and shallowly reticulate along upper margin, lateral surfaces of propodeum dull, very finely and rather closely punctate; basal abdominal tergum finely and quite sparsely punctate medially, becoming quite closely and deeply punctate laterally nearly to the apical margin, the broad apical median area impunctate; punctures of remaining terga deep and distinct, well separated medially on tergum 2, becoming very fine and almost crowded on the more apical terga, the apical impressed areas invaded in part by minute but rather close punctures, only the rather narrow apical rims impunctate; pubescence of head and thorax copious and erect, entirely pale, rather whitish on face and cheeks below,

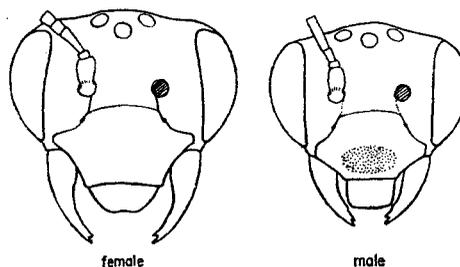


Figure 71
Facial view of head in both sexes of
Peponapis pruinosa.

pale ochraceous on head dorsally and on thorax laterally, somewhat brighter ochraceous or fulvous on dorsum of thorax; legs entirely pale pubescent; basal segment of abdomen with copious, elongate, pale ochraceous pubescence; tergum 2 rather broadly whitish pruinose across base, and apical impressed area thinly pruinose across base, forming a rather distinct greyish-white fascia, intervening area nearly bare, with only exceedingly short, inconspicuous, dark hairs evident; terga 3-6 rather broadly whitish pruinose across apical impressed area, the rims narrowly exposed, discs basally with dark, suberect, more or less elongate pubescence, a few elongate dark hairs overlying the whitish fasciae; tergum 6 not angulate or spinose laterally; median length of pygidial plate much less than basal width, the margins strongly carinate and strongly converging apically to the rather narrowly subtruncate apex; sterna 7 and 8 and genital armature as shown (fig. 72).

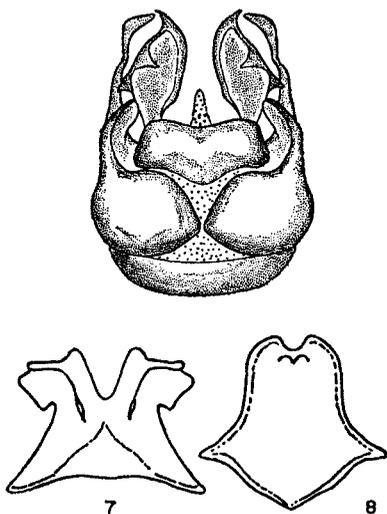


Figure 72
Genital armature and sterna 7 and 8 in male
of *Peponapis pruinosa*.

DISTRIBUTION — Utah and Arizona, eastward to the New England states and Georgia, June to September.

FLOWER RECORDS — *Cucurbita* and *Pontederia*. Recorded by Robertson (1929) on *Asclepias*, *Blephilia*, *Cephalanthus*, *Convolvulus*, *Ipomoea* and *Verbena*.

The subspecific designation of *pruinosa* is made necessary by the recognition of another subspecies in Southern Texas.

Xenoglossa Smith

Xenoglossa Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 315. Type: *Xenoglossa fulva* Smith. Monob.

These are handsome, robust and quite hairy bees. The clypeus is largely yellow in the male, black, at least over the basal half, in the female. In the front wing the marginal cell is elongate, the tip slightly bent away from the costa, and the 2nd submarginal cell is much shorter than the 1st or 3rd. The basal segment of the flagellum is elongate, slightly shorter than segments 2 and 3 combined, in both sexes, the following segments not much longer than broad. The clypeus is somewhat separated from the margin of the eye, the resulting space about equal to the malar space. In the two species that occur east of the Mississippi the mandible in both sexes is to some degree angulate on the inner margin toward the base.

Both of these species are common visitors to squash (*Cucurbita*). They are primarily matinal in their flight, and females can rarely be collected more than an hour or two after sunrise. Males continue activity sometimes until mid-day, but then the closing of the blooms prevents any further visits. These males often become trapped, or remain in the closed blooms for the remainder of the day, and possibly through the night.

KEY TO SPECIES

1. Females 2
Males 3
2. Apical half of clypeus yellow
..... *kansensis* Cockerell (p. 247)
Clypeus entirely black or with a narrow
and rather faint yellowish mark along
apical margin
..... *strenua* Cresson (p. 248)
3. Clypeus with a rather broad band of
black across the upper margin medial-
ly; abdominal pubescence ochraceous;
sub-basal inner angle of mandible ro-
bust and acute
..... *strenua* Cresson (p. 248)
Median area of clypeus along upper mar-
gin with very little black; abdominal
pubescence greyish; sub-basal inner an-
gle of mandibles low and inconspicuous
..... *kansensis* Cockerell (p. 247)

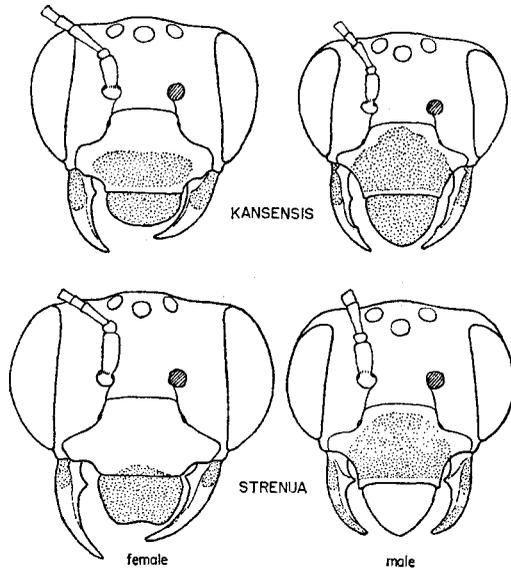


Figure 73

Facial view of head in species of *Xenoglossa*.

Xenoglossa kansensis Cockerell
new combination

(Figs. 73 & 74)

Xenoglossa strenua var. *kansensis* Cockerell,
1905. Psyche 12, p. 104. ♂.

FEMALE—Length 14-16 mm., breadth of abdomen 6 mm.; black, the labrum dull yellowish, mandibles pale yellowish at base, piceous, sometimes with an apical testaceous maculation (fig. 73); apical half of clypeus yellow; legs piceous, mid and hind spurs dull testaceous, tegulae yellowish-hyaline; wings faintly yellowish-brown, veins piceous; cheeks very slightly narrower than eyes; clypeus rather strongly protuberant, its median length half the distance between eyes below; eyes slightly divergent below; mandibles slender and simple apically, with a slight, inner, sub-basal angle; basal segment of flagellum very slightly longer than segments 2 and 3 combined; median length of labrum about two-thirds the basal width, apical margin rather broadly truncate; clypeus closely and rather coarsely punctate, becoming more finely and densely so toward apical margin; labrum somewhat more deeply but finely punctate medially, punctures becoming somewhat coarser but still close laterally; supraclypeal area rather dull, with scattered, rather sparse, shallow punctures, those on lateral surfaces of face below level of antennae shallow and rather close, becom-

ing minute and close above antennae; surface between eyes and ocelli shining, nearly impunctate; cheeks finely and closely but quite distinctly punctate; scutum, scutellum and pleura quite closely and finely punctate throughout, propodeum posteriorly very minutely punctate, lateral faces dull, very finely and closely punctate; abdominal terga 1-3 rather dull, punctures quite deep and distinct, rather fine in general, crowded laterally, becoming well separated medially on 1 and 2, uniformly close on 3 and 4; terga 1-4 narrowly impunctate along apical rims; pygidium subtriangular, apex narrowly rounded; pubescence pale ochraceous, quite dense and elongate on head, thorax, legs, and basal abdominal tergum, rather short but very dense on dorsum of thorax, hiding the surface, dense, copious and elongate on each side of propodeum, somewhat paler and thinner over most of face and on pleura below and posterior face of propodeum; basal tergum largely bare over apical half; terga 2 and 3 largely bare, each with a narrow, basal, greyish tomentose area which is largely covered by the preceding tergum, this narrowly contiguous with a submedian greyish fascia on 3 that fringes the apical impressed area at base but is widely interrupted medially; tergum 4 with a nearly complete, submedian greyish fascia; tergum 5 greyish tomentose across base, with a dense apical fimbria of more ochraceous pubescence.

MALE—Length 14-15 mm., breadth of abdomen 5-6 mm.; black, the clypeus bright yellow in large part, apical margin narrowly testaceous and dorsal margin invaded only slightly with black, if at all (fig. 73); labrum yellowish, mandibles broadly yellowish at base, apex more testaceous or orange; legs brownish-ferruginous to piceous, mid and hind spurs rather dull testaceous; tegulae yellowish-hyaline; wings lightly infuscated, veins piceous to black; cheeks subequal to eyes in width; clypeus quite strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly divergent below; mandibles slender and simple apically, the sub-basal inner angle weakly developed; basal segment of flagellum considerably shorter than segments 2 and 3 combined; punctures of clypeus rather coarse and close, those on labrum somewhat finer; supraclypeal area rather dull, punctures obscure, lateral areas below level of antennae dull, punctures shallow and vague but rather close, becoming somewhat finer and closer above antennae, surface shining between eyes and lateral ocelli; cheeks finely and closely punctate beneath rather dense but short pubescence; scutum, scu-

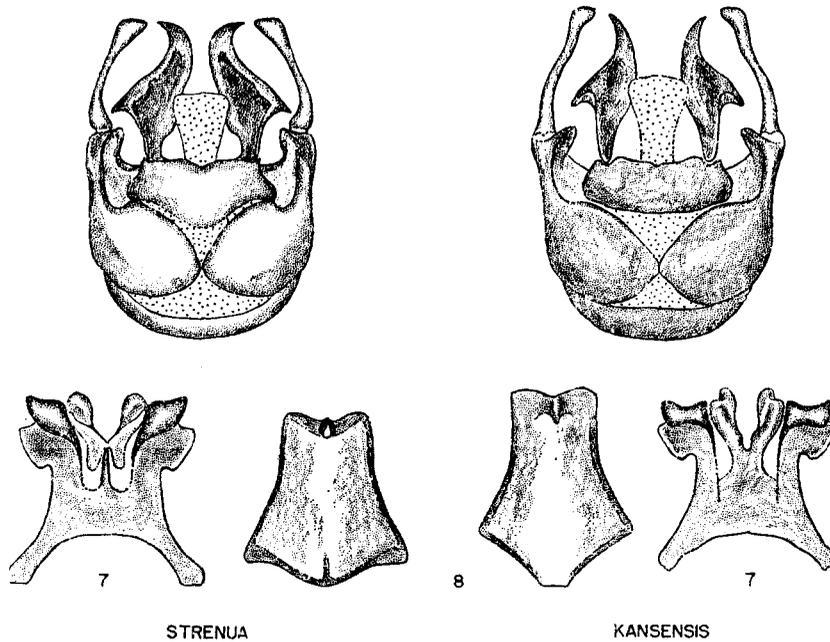


Figure 74—Genital armature and sterna 7 and 8 in males of *Xenoglossa*.

tellum, pleura and propodeum quite dull, punctures rather fine and close, somewhat more minute on posterior face of propodeum; abdominal terga rather dull, punctures well separated medially on 1 and 2, becoming densely crowded at lateral margins, apical impressed areas closely and regularly punctate except for the narrow rims; terga 3-6 finely and closely punctate throughout except for the narrow apical rims, more minutely and densely punctate on the more apical terga; tergum 6 with a robust, sharply acute and slightly curved, posterior spine on each extreme side; pubescence largely pale ochraceous on head and thorax, quite short, dense and somewhat more fulvous on dorsum of thorax, more whitish on face and cheeks below, rather copious and elongate on basal half of basal abdominal tergum; terga 2 and 3 without distinct basal fasciae; apical impressed areas of 3-6 to some degree fringed with greyish tomentum, widely interrupted on 3, discs otherwise largely bare; median length of pygidial plate about equal to basal width, margins subcarinate, converging apically, the apex abruptly flared beneath and broadly rounded; sterna 7 and 8 and genital armature as shown (fig. 74).

DISTRIBUTION—Kansas to North Carolina and Georgia, May to July.

FLOWER RECORDS—*Cucurbita* and *Ipomoea*.

Xenoglossa strenua (Cresson)

(Figs. 73 & 74)

Melissodes strenua Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 213. ♀ ♂.

Xenoglossa cucurbitarum Cockerell, 1896. Canad. Ent. 28, p. 192. ♂ ♀.

Xenoglossa strenua Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 14-18 mm., breadth of abdomen 6-6.5 mm.; black, the labrum yellowish, mandibles pale yellowish at base, more testaceous over apical half; legs brownish-ferruginous, apical tarsal segments somewhat darker, mid and hind spurs dull testaceous; tegulae yellowish-hyaline; wings faintly yellowish-brown, veins piceous; cheeks very slightly narrower than eyes; clypeus rather strongly protuberant, its median length half the distance between eyes below; eyes slightly divergent below; mandibles slender and simple apically, but with an inner, subbasal angle (fig. 73); basal segment of flagellum about equal to segments 2 and 3 combined; median length of labrum about half the basal width, apical margin rather broadly truncate; clypeus closely and rather coarsely punctate, becoming more finely and densely so toward apical margin; labrum somewhat more deeply but finely punctate medially, punctures becoming somewhat coarser but still close laterally; supraclypeal area rather dull, with scattered,

rather sparse, shallow punctures, those on lateral surfaces of face below level of antennae shallow and rather close, becoming minute and close above antennae, the more median punctures being rather coarse and slightly separated; surface between eyes and ocelli shining, nearly impunctate; cheeks finely and closely but quite distinctly punctate; scutum, scutellum and pleura quite closely and finely punctate throughout, propodeum posteriorly very minutely and closely punctate, dorsal triangle somewhat more coarsely so, lateral faces dull, very finely and closely punctate; abdominal terga 1-3 shining, punctures quite deep and distinct, rather fine in general, close laterally, becoming rather sparse medially on 1 and 2, uniformly close on 3 and 4; terga 1-4 narrowly impunctate along apical rims; pygidium rather strongly triangular, apex very narrowly rounded or subacute; pubescence entirely pale ochraceous, quite dense and elongate on head, thorax, legs, and basal abdominal tergum, rather short but very dense on dorsum of thorax, hiding the surface, dense, copious and elongate on each side of propodeum, somewhat paler and thinner over most of face and on pleura below and posterior face of propodeum, basal tergum largely bare over apical half; tergum 2 largely bare medially, with a basal, yellowish tomentose area that is largely covered by the basal tergum, this narrowly contiguous with a submedian yellowish fascia that fringes the apical impressed area at base on each side, widely interrupted medially; impressed area on tergum 3 rather broadly fringed with yellowish tomentum, slightly interrupted medially but much broadened laterally to fill the entire lateral margins; tergum 4 largely covered with pale ochraceous tomentum, only apical rim exposed; tergum 5 largely yellowish tomentose, with a dense apical fimbria of more ochraceous pubescence.

MALE—Length 14-15.5 mm., breadth of abdomen 5.5-6 mm.; black, the clypeus bright yellow in large part, apical margin narrowly testaceous and dorsal margin invaded narrowly with black; labrum yellowish; mandibles broadly yellowish at base, apex more testaceous or orange; legs brownish-ferruginous in large part, mid and hind spurs rather dull testaceous; tegulae yellowish-hyaline; wings subhyaline, veins piceous to black; cheeks subequal to eyes in width; clypeus quite strongly protuberant, its median length somewhat greater than half the distance between eyes below (fig. 73); eyes very slightly divergent below; mandibles slender and simple apically, but with a strong sub-basal inner angle; basal segment of flagellum slightly shorter than segments 2 and 3 combined; punctures of clypeus rather coarse and close, those on labrum somewhat finer, but deeper and more distinct; supraclypeal area rather dull, punctures obscure, lateral areas below level of antennae

dull, punctures shallow and vague but rather close, becoming somewhat finer and closer above antennae, surface shining between eyes and lateral ocelli; cheeks rather finely and closely punctate beneath rather dense but short pubescence; scutum, scutellum, pleura and propodeum quite dull, punctures fine and close throughout, somewhat more minute on posterior face of propodeum; punctures of abdominal terga deep and distinct but rather fine, well separated medially on terga 1 and 2, becoming densely crowded at lateral margins, apical impressed areas punctate in part, the narrow rims shining and impunctate; terga 3-6 finely and closely punctate throughout except for the narrow apical rims, more minutely and densely punctate on the more apical terga; tergum 6 with a robust, triangular, posterior spine on each extreme side; pubescence largely pale ochraceous, quite short, dense and somewhat more fulvous on dorsum of thorax, more whitish on face and cheeks below, rather copious and elongate on basal half of basal abdominal tergum; terga 2 and 3 with pale ochraceous, basal fasciae that may be partially covered by the preceding plates, apical impressed areas to some degree fringed with ochraceous tomentum, widely interrupted on 2, more narrowly so on 3, discs otherwise largely bare; terga 4 and 5 with subapical, quite dense, yellowish fasciae, basal areas thinly yellowish pruinose; tergum 6 densely yellowish tomentose apically; median length of pygidial plate slightly greater than basal width, margins subcarinate, slightly converging apically to the abruptly truncate apex; sterna 7 and 8 and genital armature as shown (fig. 74).

DISTRIBUTION—Specimens of *strenua* are at hand from California, Virginia, North Carolina, Georgia and Florida. The type locality is Texas. It is in flight during June, July and August.

FLOWER RECORDS—*Cucurbita*. Robertson (1929) records it also on *Ipomoea* and *Asclepias*. Probably his identification was correct, but there is a possibility that these records should apply to *kansensis*.

Two females of *strenua* were found in a light trap at Clayton, N. C., on July 5, 1956.

Cemolobus Robertson

Cemolobus Robertson, 1902. Canad. Ent. 34, p. 324. Type: *Xenoglossa ipomoeae* Robertson. Monob. and orig. desig.

The undulate, more or less trilobate clypeal margin will distinguish the single species in this genus from any of the other Anthophoridae. The mandibles are angulate on the outer margin toward the base in

the female, while in the male there is a distinct, submedian tooth on the outer surface. The marginal cell is elongate, and the 2nd submarginal is much shorter than either the 1st or the 3rd. The scopal hairs on the hind tibiae and basitarsi are simple or very obscurely short plumose. In the female the basal segment of the flagellum is slightly shorter than the scape, about equal to segments 2 and 3 combined. In the male, segments 1 and 2 are about equally elongate and very slender, the following segments gradually decreasing in length to the apex.

Cemolobus ipomoeae (Robertson)

(Figs. 75 & 76)

Xenoglossa ipomoeae Robertson, 1891. Amer. Ent. Soc. Trans. 18, p. 65. ♂ ♀.

Cemolobus ipomoeae Robertson, 1902. Canad. Ent. 34, p. 324.

Cemolobus ipomoeae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12.5-14.5 mm., breadth of abdomen 5-6.5 mm.; black, the apical half of mandibles testaceous; legs blackish, apical tarsal segments somewhat more piceous, spurs brownish; tegulae yellowish-hyaline; wings sub-hyaline, veins brownish to piceous; cheeks much narrower than eyes; clypeus quite strongly protuberant, its median length somewhat less than half the distance between eyes below, its apical margin produced medially and laterally, slightly overhanging base of labrum (fig. 75); mandibles with a slight median angle on outer margin slightly basad of mid point; basal segment of flagellum slightly longer than segments 2 and 3 combined; tibial spurs slightly curved at tips; clypeus closely punctate, rather coarsely so above, becoming quite finely and densely so toward apical margin; labrum nearly twice as broad as median length, with a slight median emar-

gination beneath the dense apical pubescence, punctures quite coarse, close and deep; supra-clypeal area somewhat shining, punctures rather fine, slightly separated, lateral surfaces of face below level of antennae finely and quite closely punctate, becoming more minutely but still quite closely punctate above on each side, more coarsely so medially; cheeks very finely and rather closely punctate beneath rather copious pubescence; punctures in central area of scutum deep, distinct and rather coarse, quite close but not crowded, becoming finer and densely crowded peripherally; scutellum rather dull, minutely and very densely punctate; pleura rather dull, punctures shallow but rather coarse and close; posterior face of propodeum quite smooth, dorsal area rather shallowly rugoso-punctate on each side, lateral faces shallowly and rather closely punctate, becoming minutely and densely so anteriorly and below; abdominal terga dull, punctures rather shallow but very close throughout, only the extremely narrow rims impunctate; pygidium subtriangular, apex narrowly rounded; pubescence of head and thorax copious, rather elongate, somewhat whitish on face and cheeks below, more yellowish above, pale ochraceous to whitish on thorax below, becoming fulvous above; legs pale pubescent basally, but tibiae and tarsi more or less fuscous or blackish pubescent, hind tibial scopa fuscous; basal abdominal tergum with some rather copious but rather short pale pubescence across base and the narrow lateral margins, surface otherwise nearly bare; tergum 2 with a pale pruinose band across base, which broadens out to completely cover the lateral margins, disc otherwise largely bare; discs of terga 3 and 4 largely covered with pale, appressed, whitish or greyish tomentum, with a few more elongate, erect hairs toward lateral margins; tergum 5 similarly pale pruinose across base, apical half densely covered with elongate brownish hairs, forming a quite dense fimbria; tergum 6 with dense, brownish or fuscous pubescence on each side of pygidium.

MALE—Length 13-14.5 mm., breadth of abdomen 5-5.5 mm.; black, the apical half of clypeus pale yellow, but margin fuscous and basal half blackish; labrum largely pale yellow, only the extreme lateral margins dark; mandibles yellow basally, apex more narrowly testaceous; antennal flagella brownish-testaceous beneath, piceous above; legs largely blackish or piceous, spurs brownish-testaceous, with tips slightly curved; tegulae yellowish-hyaline; wings subhyaline, veins testaceous to piceous; cheeks slightly narrower than eyes; clypeus quite strongly protuberant, its median length slightly less than half the distance between eyes, apical margin produced medially and laterally, overhanging the margin of lab-

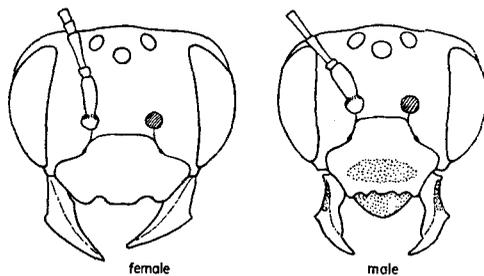


Figure 75

Facial view of head in both sexes of *Cemolobus ipomoeae*.

rum (fig. 75); eyes subparallel; mandibles with a conspicuous median angle on outer margin, with a rounded subapical elevation on inner margin, the apex slightly incised; segments 1 and 2 of flagellum subequal in length; clypeus somewhat shining, the punctures rather coarse, slightly separated medially, quite close on each side, labrum broadly rounded apically, punctures quite close and rather coarse, its median length somewhat more than half the breadth; facial punctures quite close and deep below antennae, becoming more minute but very close above on each side, somewhat coarser medially; cheeks with fine and close punctures throughout, somewhat coarser toward posterior margin; scutum with a median area of distinctly separated punctures, otherwise very densely and finely punctate throughout; scutellum narrowly shining medially, with very fine, and slightly separated punctures, but otherwise densely and minutely punctate and dull; pleura rather dull, punctures somewhat coarser but close and rather vague; posterior face of propodeum smooth but rather dull, dorsal area becoming rather shallowly rugoso-punctate on each side, lateral areas dull, finely and rather closely punctate; abdominal terga closely punctate throughout, the more basal punctures on the basal tergum somewhat more obscure and definitely separated, punctures rather coarse on tergum 2, but becoming progressively finer on the more apical terga, only the very narrow rims impunctate; pubescence copious and rather elongate on head and thorax, pale, ochraceous to whitish on face and cheeks below, more yellowish above and on thorax laterally, becoming densely fulvous above; legs with largely pale pubescence, somewhat more brownish on basitarsi beneath; basal abdominal tergum rather densely pale ochraceous pubescent across base and on lateral margins, otherwise with only extremely short, barely evident pubescence; tergum 2 pale pruinose across base, this broadened laterally to occupy the entire surface, median area largely bare; terga 3-6 rather thinly covered with whitish, appressed tomentum that is rather thin, with no erect hairs in evidence; median length of pygidial plate about equal to the basal width, margins carinate, rather strongly converging apically, apex rather broadly rounded or subtruncate; sterna 7 and 8 and genital armature as shown (fig. 76).

DISTRIBUTION—Illinois to North Carolina and Georgia, June and July.

FLOWER RECORD—*Ipomoea*.

Females of this attractive bee are maternal in their flight, confining their activities

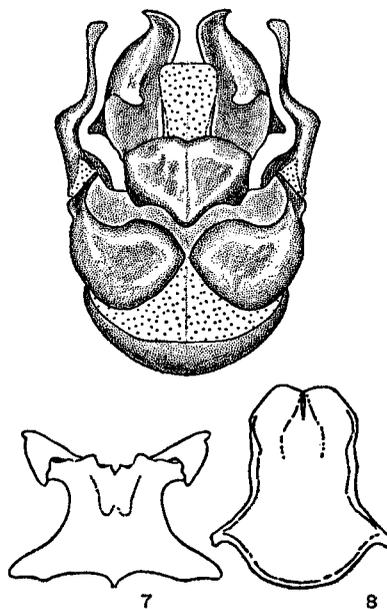


Figure 76

Genital armature and sterna 7 and 8 in male of *Cemolobus ipomoeae*.

to the first hour or two of daylight. Males, however, may be observed until mid afternoon.

Anthedonia Michener

Anthedon Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 53. Preocc. Type: *Melissodes compta* Cresson. Monob.

Anthedonia Michener, 1942. N. Y. Ent. Soc. Jour. 50, p. 282. new name

Abda Sandhouse, 1943. U. S. Nat. Mus. Proc. 92, p. 521. new name unnecessarily proposed.

Bees in this genus are large, hairy and handsome. The clypeus laterally is contiguous with the margin of the eye, and the more or less conspicuous abdominal fasciae are submedian in position. The clypeus is black in the female, yellow in the male. The basal segment of the flagellum is elongate, about equal to segments 2 and 3 in the female, while in the male segment 2 is fully equal to 1, the following segments successively shorter toward the tip, but the apical segment very slender and elongate. The scopal hairs on the hind tibiae and basitarsi are entirely simple but quite copious. The maxillary palpi are 4-segmented.

***Anthedonia compta* (Cresson)**

(Fig. 77)

Melissodes compta Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 199. ♀ ♂.*Anthedon compta* Robertson, 1914. Ent. News 25, p. 72. (biology)*Anthedon compta* Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)*Anthedonia compta* LaBerge, 1955. Kans. Ent. Soc. Jour. 28, p. 132. ♂ ♀.

FEMALE—Length 18 mm., breadth of abdomen 6.5 mm.; black, the apical half of mandibles obscurely testaceous, antennal flagellum piceous beneath, legs piceous, becoming somewhat more brownish apically, mid and hind spurs pale testaceous; tegulae yellowish-hyaline; wings subhyaline basally, becoming faintly infuscated apically, veins testaceous to piceous; cheeks somewhat narrower than eyes; clypeus quite flat, its median length somewhat greater than half the distance between eyes; eyes subparallel; mandibles simple; median length of labrum about half its breadth, rather broadly rounded apically; length of basal segment of flagellum equal to segments 2 and 3 combined; clypeus coarsely and closely punctate above, punctures becoming very fine and densely crowded toward apical margin, those on labrum rather fine and close but quite distinct; punctures of supraclypeal area finer and rather sparse, lateral surfaces below level of antennae very finely, closely and distinctly punctate, punctures above antennae becoming more minute, shallow and obscure laterally, quite distinct medially, surface between ocelli and eyes largely impunctate and somewhat shining; cheeks finely and closely punctate, punctures becoming somewhat more distinct posteriorly; punctures of scutum and scutellum fine and close in general, somewhat more distinctly separated along mid-line, surface shining; pleura somewhat shining between deep, slightly separated punctures; posterior face of propodeum rather dull, punctures rather coarse and close, dorsal area quite fully and closely punctate, surface becoming more rugose along upper margin, lateral faces rather dull, very closely and rather finely punctate; disc of basal abdominal tergum quite closely, finely and distinctly punctate, punctures becoming somewhat closer and finer laterally, apical third of disc impunctate; following terga quite fully and uniformly punctate, punctures fine and close, becoming crowded laterally and on the more apical terga medially, the apical impressed areas quite fully punctate, punctures more minute, rims very narrowly impunctate; pygidium rather broadly triangular, apex narrowly rounded; pubescence quite copious but rather short on head and thorax, pale ochraceous to almost whitish on head, bright ochraceous on thorax dorsally, becoming more whitish below; legs en-

tirely pale pubescent, the hind tibial scopa pale ochraceous, hairs slender and simple; basal abdominal tergum rather copiously pale pubescent across base, and rather narrowly so on lateral margins, disc apically with some very short, obscure, dark pubescence; remaining terga largely covered with short, black pubescence, that on apical impressed areas appressed and very obscure; tergum 2 with a narrow, basal, white fascia, 2 and 3 with narrow, submedian, white fasciae, and 4 with a broader fascia which reaches apical rim toward each side; terga 5 and 6 entirely blackish or fuscous pubescent.

MALE—Length 13-16 mm., breadth of abdomen 5.5-6 mm.; black, the clypeus and labrum entirely pale yellow, mandibles broadly yellow at base; legs piceous to black, apical tarsal segments becoming brownish-testaceous, spurs pale testaceous, tegulae yellowish-hyaline; wings lightly infuscated, veins brownish to piceous; cheeks much narrower than eyes; clypeus slightly protuberant, its median length considerably greater than half the distance between eyes; eyes subparallel; mandibles slender and simple; segments 1 and 2 of flagellum about equal in length, the apical segment attenuate apically; punctures of clypeus rather fine, somewhat separated but not sparse, becoming closer along apical margin, punctures rather vague on the yellow surface; median length of labrum somewhat less than half the breadth, margin broadly rounded, punctures fine and close but distinct; supraclypeal area somewhat shining and sparsely punctate, lateral surfaces below level of antennae very finely, closely and distinctly punctate, punctures becoming more minute above, area between eyes and ocelli shining, punctures exceedingly minute and close; cheeks finely and quite closely punctate beneath dense pubescence; scutum and scutellum shining, punctures quite deep and rather coarse, close in general, slightly separated in center of scutum posteriorly; pleura somewhat shining, punctures fine and quite close throughout; posterior face of propodeum shining, punctures rather fine but deep, distinct and quite close, dorsal area quite fully punctate, the punctures becoming densely crowded across upper margin, lateral faces very closely punctate throughout; abdominal terga quite fully punctate, only the very narrow apical rims impunctate, punctures of apical impressed areas somewhat more minute than those on basal areas; punctures relatively coarser and slightly separated on terga 1 and 2, becoming progressively finer and closer on the more apical terga; pubescence of head and thorax entirely pale, quite copious and dense but not very long, entirely pale ochraceous on head, becoming somewhat whitish on face and cheeks below, brighter ochraceous on dorsum of thorax, pale ochraceous below and posteriorly, legs

entirely pale pubescent; pubescence copious, elongate and entirely pale ochraceous on basal abdominal tergum, with only a few obscure dark hairs toward apex on each side; tergum 2 with a narrow, basal, white fascia and a submedian fascia fringing the apical impressed area, these separated by an area of short, dense, black pubescence, and apical impressed area with very short subappressed black pubescence; terga 3 and 4 black pubescent basally, with a rather broad, submedian white fascia, the apical impressed area thinly black pubescent, with some scattered, erect, long black hairs toward the base of each; terga 5 and 6 largely black pubescent, the hairs long and erect toward base; tergum 5 with a very small amount of appressed, whitish pubescence at each extreme side; tergum 6 with a quite conspicuous, apical, spine-like angle on each extreme side; tergum 7 not angulate, the median length of pygidial plate about equal to basal width, margins carinate, rather strongly convergent apically to the rather broadly subtruncate apex; sterna 7 and 8 and genital armature as shown (fig. 77).

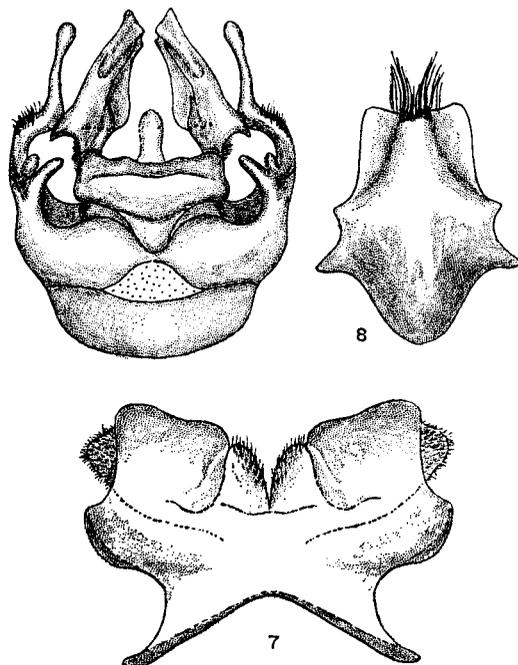


Figure 77

Genital armature and sterna 7 and 8 in male of *Anthedonia compta*.

DISTRIBUTION—Colorado and Texas to New Jersey and Georgia, July and August.

FLOWER RECORDS—Recorded by Robertson (1929) on *Acerates*, *Monarda*, *Oenothera*, *Pycnanthemum* and *Verbena*.

Females of this species visit *Oenothera biennis* primarily and are strictly maternal in their flight. Males are active through a longer period of each day and will visit various other plants.

Florilegus Robertson

Florilegus Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 53. Type: *Melissodes condigna* Cresson. Monob.

Florilegus closely resembles *Melissodes* and may be mistaken for it. The mandibles, however, have a subapical inner angle or tooth in both sexes, and the maxillary palpi are 5-segmented. The clypeus is black and slightly separated from the margin of the eye in the female, while in the male it is yellow and practically contiguous with the eye margin. The scopa is finely plumose. Sternum 7 in the male is distinctive, having a median longitudinal ridge, the apex produced somewhat beyond the margin of the plate. Tergum 6 is distinctly angulate on each side at the base, and tergum 7 is spinose laterally, the pygidial plate entire, the lateral margins not notched.

Florilegus condignus (Cresson)

(Fig. 78)

Melissodes condigna Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 207. ♀.

Melissodes palustris Robertson, 1892. Amer. Nat. 26, p. 273. ♂.

Florilegus condignus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 11-12 mm., breadth of abdomen 4-5 mm.; black, mandibles with an obscure, median, testaceous maculation; median segments of flagella brownish beneath, black above; legs blackish, apical tarsal segments becoming brownish-testaceous, mid and hind spurs pale testaceous; tegulae brownish-hyaline; wings uniformly but very lightly infuscated, veins testaceous to piceous; rims of abdominal terga very narrowly yellowish-hyaline; cheeks much narrower than eyes; clypeus slightly protuberant, its median length half the distance between eyes below; eyes very slightly convergent below; mandibles simple, rather short; basal segment of flagellum slightly longer than segments 2 and 3 combined; punctures of clypeus coarse, deep and slightly separated along upper margin, becoming rather fine and densely crowded apically; median length of labrum considerably less than breadth, apical margin broadly truncate, surface finely and closely punctate; supraclypeal

area somewhat shining between rather coarse and close punctures; lateral areas of face below level of antennae minutely and closely punctate, surface above more shining, the punctures somewhat deeper, more distinct and definitely separated, the more median punctures rather coarse; cheeks rather dull, very finely and closely punctate beneath the quite dense pubescence; scutum shining, punctures quite coarse and deep, rather sparse medially toward posterior margin, becoming rather close and somewhat finer laterally, somewhat separated medially to the anterior margin; scutellum shining, punctures very fine and rather widely separated; pleura rather dull, punctures coarse, deep and quite close; posterior face of propodeum somewhat shining, punctures quite deep and distinct, irregularly scattered, dorsal area polished and impunctate below, becoming rather coarsely rugoso-punctate along upper margin, lateral faces dull, very finely and densely punctate; abdominal terga well punctured nearly to the rims, only the very narrow apical margins impunctate, punctures well separated in general, becoming somewhat closer toward lateral margins, apical impressed areas somewhat more minutely punctate than basal areas, those on terga 4 and 5 densely crowded at least laterally; pygidium subtriangular, apex rather narrowly rounded; pubescence rather copious on head and thorax, whitish on face and cheeks, with some elongate fuscous hairs across vertex, but this fringed posteriorly with whitish hairs; scutum and scutellum largely blackish pubescent, but with some pale hairs along anterior and lateral margins, and scutello-mesothoracic suture narrowly but quite densely pale tomentose; pleura and lateral faces of propodeum fuscous or blackish pubescent in general, but a few pale hairs on pleura above; posterior face of propodeum pale pubescent; legs largely fuscous pubescent basally, the front and mid tibiae with some basal pale pubescence on outer face, their tarsi brownish pubescent beneath; hind tibial scopa pale yellowish, hairs rather sparsely plumose; basal abdominal tergum with intermixed dark and light hairs basally, disc with shorter, suberect, black pubescence which is rather conspicuous if viewed in profile; tergum 2 with a basal, whitish, tomentose band, largely covered by the preceding tergum, disc otherwise with very short, black, suberect pubescence; tergum 3 black pubescent across base, with a median, rather broad, whitish tomentose fascia that is somewhat narrowed or interrupted medially, the impressed apical area largely blackish pubescent; tergum 4 blackish pubescent across base, with some whitish tomentum medially adjacent to the apical impressed area, this densely pale tomentose on each side, bare medially; tergum 5 largely black pubescent, but with a whitish patch on

each extreme side, apical fimbria rather short and more fuscous.

MALE—Length 9.5-12.5 mm., breadth of abdomen 3.5-5 mm.; black, the clypeus bright yellow, labrum and mandibles largely black but mandibles with an apical testaceous maculation; antennal flagella brownish-testaceous beneath, piceous above; legs dark, tarsal segments becoming brownish-testaceous apically, mid and hind spurs pale yellowish; tegulae brownish; wings very faintly infuscated, veins brownish to piceous; rims of abdominal terga very narrowly yellowish-hyaline; cheeks considerably narrower than eyes; clypeus slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes rather strongly convergent below; mandibles with a small, inner, subapical tooth or angle; basal segment of flagellum slightly longer than pedicel, segment 2 about five times longer than shorter side of the 1st; punctures of clypeus quite coarse, deep and somewhat separated along upper margin, becoming more finely and closely punctate apically; median length of labrum considerably less than breadth, rather broadly rounded, slightly emarginate medially, punctures fine, close and deep; supraclypeal area rather dull, punctures irregular but rather well separated; lateral areas of face below antennae dull, very finely and closely punctate, dorsal areas more shining, punctures somewhat coarser, deep and distinct; cheeks very finely and closely punctate beneath rather dense pubescence; scutum shining between quite coarse and deep punctures, these somewhat separated posteriorly near mid-line, closer laterally and anteriorly; scutellum shining, somewhat more finely but uniformly closely punctate; pleura dull, tessellate, punctures rather coarse and close; posterior face of propodeum shining, punctures rather fine but deep and close, dorsal area polished below, becoming rather coarsely, deeply punctate across upper margin, lateral faces rather dull, punctures shallow but very close and rather fine; abdominal terga well punctured throughout, punctures quite coarse and deep but well separated on the more basal terga, becoming much finer and closer laterally, punctures of apical impressed areas only slightly finer than those toward base, somewhat finer and much closer on the more apical terga, being crowded and very fine laterally on 3-6; tergum 6 with a conspicuous apical angle at each extreme side, and tergum 7 with a corresponding, more slender spine; pubescence copious, elongate and quit dense on head and thorax, largely pale ochraceous on head, scutum with considerably fuscous pubescence across posterior half, and a few shorter dark hairs on scutellum medially, otherwise thorax largely pale ochraceous pubescent; legs en-

tirely pale pubescent; basal abdominal tergum with copious, elongate, pale ochraceous pubescence across base, disc with shorter but erect and quite conspicuous black pubescence; tergum 2 with a dense, whitish, basal fascia that is covered in part by the preceding tergum, the disc black pubescent; tergum 3 black pubescent across base, with a quite broad and dense, median, whitish fascia, the apical impressed area black pubescent; tergum 4 with rather copious, elongate and erect, black pubescence, with a dense whitish fascia on each side which is narrowly connected across the disc with some obscure pale tomentum, the median area of the impressed margin black pubescent; tergum 5 broadly white pubescent apically on each side of mid-line, disc with long, erect, black pubescence; terga 6 and 7 entirely black pubescent; median length of pygidial plate somewhat greater than basal width, margins carinate, rather strongly converging to the rather broad, subtruncate apex; sterna 7 and 8 and genital armature as shown (fig. 78).

DISTRIBUTION—Colorado to New Jersey, south to Texas and Florida, May to August, but with early and late records in April and September in Florida.

FLOWER RECORDS — *Melilotus* and *Pontederia*. Recorded by Robertson (1929) on *Asclepias*, *Blephilia*, *Cassia*, *Cephalanthus*, *Dianthera*, *Lippia*, *Lythrum*, *Psoralea*, *Pycnanthemum*, *Teucrium* and *Verbena*.

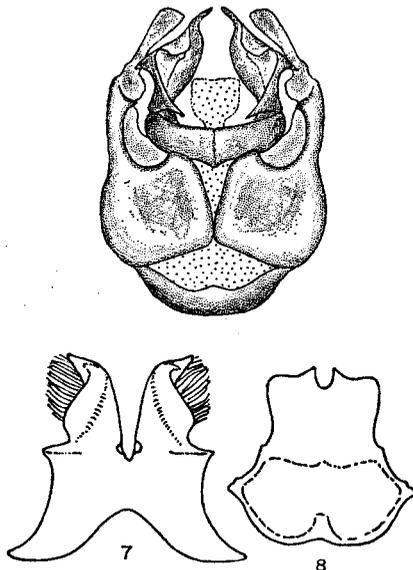


Figure 78

Genital armature and sterna 7 and 8 in male of *Florilegus condignus*.

Svastra Holmberg

Svastra Holmberg, 1884. Acad. Nac. Cienc. Cordoba Actas 5, p. 127. Type: *Svastra bombilans* Holmberg. Orig. desig.

Melissodes subg. *Brachymelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37, p. 926. Type: (*Eucera cressonii* Dalla Torre) = *Melissodes brevicornis* Cresson. Orig. desig.

Epimelissodes Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 63. Type: *Melissodes atripes* Cresson. Monob.

Svastra subg. *Epimelissodes* Moure and Michener, 1955. Dusenya 6, p. 297.

Melissodes subg. *Epimelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37, pp. 932-1027. (revision)

These are robust, hairy bees, some of them approaching in size the queens of *Bombus*. The genus is closely related to *Melissodes*, and only recently have the included species been removed from that genus. As in *Melissodes*, the mandibles are simple in both sexes, the maxillary palpi are 4-segmented, the scopa is plumose, and the clypeus is contiguous with the margin of the eyes laterally, and is black in the female, yellow in the male. Males differ from those in *Melissodes* chiefly in the form of tergum 7 which is not spinose laterally, and the pygidial plate is not distinctly notched laterally, but is more gradually narrowed apically. Tergum 6, however, is conspicuously angulate or spinose laterally. In the female the metanotum bears a conspicuous median tuft of elongate hairs, markedly differing in length from the shorter, more lateral hairs. In both sexes the cheeks are about half width of eyes in profile, clypeus nearly flat.

KEY TO SPECIES

Females

1. Scopal hairs dark, plumose only toward base 2
Scopal hairs pale, densely plumose .. 4
2. Hind tibiae with pale ochraceous hairs along outer surface medially
... *atripes georgica* (Cresson) (p. 259)
Scopal hairs on hind tibiae entirely black 3
3. Abdominal terga 3 and 4 usually with lateral, oblique, whitish fasciae
... *atripes atripes* (Cresson) (p. 257)
Abdominal terga not fasciate, the general aspect black
... *atripes atrimitra* (LaBerge) (p. 259)
- 4(1). Apical half of abdominal terga 2 and 3 densely pale tomentose to the rims ..
..... *petulca* (Cresson) (p. 261)

- 2) Terga 2 and 3 with narrow, submedian, slightly oblique, pale fasciae which are interrupted medially 5
 5. Pleural pubescence entirely pale *aegis* (LaBerge)
 Pleural pubescence largely or entirely black 6
 6. Anterior third of scutum with brownish pubescence; terga 2 and 3 with sub-basal, slightly oblique, pale fasciae, interrupted medially; apical half of tergum 4 largely pale pubescent *obliqua obliqua* (Say) (p. 259)
 Scutum largely or entirely black pubescent; pale fasciae of abdominal terga reduced or absent *obliqua caliginosa* (Cresson) (p. 261)

Males

1. Apical half of abdominal terga 2 and 3 pale tomentose, lacking any area of black pubescence toward the rims *petulea* (Cresson) (p. 261)
 Apical areas of terga 2 and 3 largely black pubescent, the pale tomentose fasciae submedian in position 2
2. Apical areas of terga 2-4 distinctly although finely punctate, the surface shining 3
 Punctures of apical areas of terga 2-4 exceedingly minute and indistinct, the surface dull 5
3. Terga 3 and 4 with entire, white pubescent fasciae, that on 2 narrow and widely interrupted medially *atripes georgica* (Cresson) (p. 259)
 Tergum 4 entirely black, 2 and 3 with at most very narrow, submedian white fasciae that are interrupted medially (2 is densely fasciate across base) 4
4. Terga 2 and 3 usually with narrow submedian white fasciae, these more or less interrupted medially *atripes atripes* (Cresson) (p. 257)
 Fasciae on terga 2 and 3 reduced or absent *atripes atrimitra* (LaBerge) (p. 259)
- 5(2). Mesopleura with dense pale pubescence anteriorly and below which completely hides the surface *aegis* (LaBerge)
 Anterior face of mesopleura only thinly pubescent, the surface exposed 6
6. Abdominal fasciae usually well developed; legs and pleura entirely pale pubescent *obliqua obliqua* (Say) (p. 259)
 Abdominal fasciae reduced or absent; legs and pleura with considerable fuscous pubescence *obliqua caliginosa* (Cresson) (p. 261)

Svastra (Epimelissodes) aegis (LaBerge)

(Fig. 79)

Melissodes (Epimelissodes) aegis LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 959.

Svastra (Epimelissodes) aegis LaBerge, 1958. Kans. Ent. Soc. Jour. 31, p. 273.

FEMALE—Length 14-18 mm., breadth of abdomen 5-6.5 mm.; black, the mandibles over basal half, labrum, and apical margin of clypeus dull testaceous, flagellum beyond segment 2 brownish-testaceous beneath, black above, tegulae testaceous, and apical tarsal segments becoming testaceous; wings quite uniformly pale brownish, veins brownish to piceous; apical margin of tergum 1 narrowly testaceous; median length of clypeus somewhat greater than half the distance between eyes below; eyes subparallel; basal segment of flagellum nearly one and a half times length of segment 2, the latter considerably longer than broad; clypeus dull and tessellate, punctures rather shallow, well separated, becoming finer and very close toward the narrow, impunctate, apical rim, those on labrum closer and deeper; face above antennae more shining, median punctures quite coarse, deep and distinct, becoming exceedingly minute, barely distinguishable between eyes and ocelli; scutum and scutellum with moderately coarse and deep, subcontiguous punctures, pleura more coarsely punctate, punctures well separated in part, surface smooth and shining; propodeum posteriorly dull and densely tessellate, rather shallowly punctate, dorsal surface subreticulate, lateral faces shining anteriorly and below, the punctures obsolescent; dorsal surface of basal abdominal tergum coarsely, deeply and rather closely punctate across basal half, punctures approaching apical margin on each extreme side, apical half of disc rather smooth, punctures invident; terga 2 and 3 dull, very finely, closely and obscurely punctate across base, broad apical areas smooth and microscopically punctate; terga 4 and 5 quite densely rugose or reticulate across base; pygidium subtriangular, apex rather narrowly rounded; pubescence of head entirely pale ochraceous, scutellum and posterior half of scutum with short fuscous pubescence, the scutello-mesothoracic suture densely whitish pubescent, thorax otherwise pale ochraceous pubescent; pubescence of legs pale ochraceous in large part, scopa whitish-yellow, hairs quite densely plumose apically, front basitarsi with some brownish-fuscous pubescence on outer surface; abdominal tergum 2 with a transverse, basal, yellowish-white fasciae, 2 and 3 with lateral, oblique, whitish fasciae that are more or less separated medially; apical half of tergum 4 densely covered with whitish to-

mentum, somewhat thinner medially, the more basal areas of these terga with obscure, sub-appressed, dark pubescence, a few elongate hairs overlying the fasciae; tergum 5 with rather dense, black pubescence basally, more brownish apically, forming a dense apical fimbria.

MALE—Length 14-17 mm., breadth of abdomen 5.5-6.5 mm.; black, the entire clypeus, labrum and basal half of mandibles bright yellow, mandibles piceous apically but with an outer, oblong, orange spot; antennal flagellum brownish-ferruginous beneath, becoming somewhat paler toward base, blackish above; tegulae testaceous, wings uniformly pale brownish or yellowish, veins piceous; apical tarsal segments becoming testaceous, spurs pale yellow; median length of clypeus two-thirds distance between eyes below; eyes very slightly convergent below; segment 2 of flagellum nearly three times length of shorter side of segment 1; punctures of lateral areas of face and around antennae fine but close, deep and distinct beneath the pubescence, vertex becoming smooth and shining between eyes and ocelli, punctures hardly visible, those on clypeus somewhat coarser but very obscure, quite close, coarse, deep and distinct on labrum; scutum, scutellum and pleura with coarse, deep and close punctures, interspaces more or less shining, those on pleura somewhat coarser; propodeum dull and tessellate posteriorly, with rather coarse and close punctures, dorsal face coarsely rugoso-punctate, lateral faces becoming smooth and shining anteriorly and below, the punctures obsolescent; dorsal surface of basal abdominal tergum coarsely, deeply and rather closely punctate across basal half, punctures approaching apical margin on each extreme side, apical half of disc rather smooth, punctures inevident; terga 2 and 3 dull, very finely, closely and obscurely punctate across base, broad apical areas smooth and only microscopically punctate; terga 4 and 5 quite densely rugoso-punctate across base, apical areas with only minute, obscure and hardly visible punctures; pubescence of head entirely pale ochraceous, fuscous on scutellum and posterior half of scutum, the scutello-mesothoracic suture with some fine, pale yellowish, suberect hairs, thorax otherwise with pale ochraceous pubescence, that on legs pale ochraceous to whitish; basal half of abdominal tergum 1 entirely and quite densely pale ochraceous pubescent, apical half practically bare, with only a few dark, sub-appressed hairs toward each extreme side, terga 2-4 with somewhat oblique transverse whitish fasciae which are more or less widely interrupted medially, tergum 2 with a basal, transverse, white fascia, a narrow intervening area with short fuscous pubescence; basal

areas of 3 and 4 with dark, appressed pubescence and scattered, erect, blackish hairs, apical areas of these terga bare; terga 5 and 6 largely black pubescent (pale in some specimens), 5 with a more or less evident, transverse, whitish fascia, usually rather widely interrupted medially, the tergum with a low angle at each extreme side; tergum 6 with a pair of robust lateral spines; median length of pygidial plate about two-thirds basal width, strongly narrowed apically, with a slight notch on each side toward the rather broadly truncate apex; sterna 7 and 8 and genital armature as shown (fig. 79).

DISTRIBUTION—Texas to Florida and North Carolina, July to October.

FLOWER RECORDS—*Chrysopsis*, *Helonium*, *Helianthus* and *Kuhnistera*. LaBerge (1956) also lists *Aster*, *Gaillardia* and *Vernonia*.

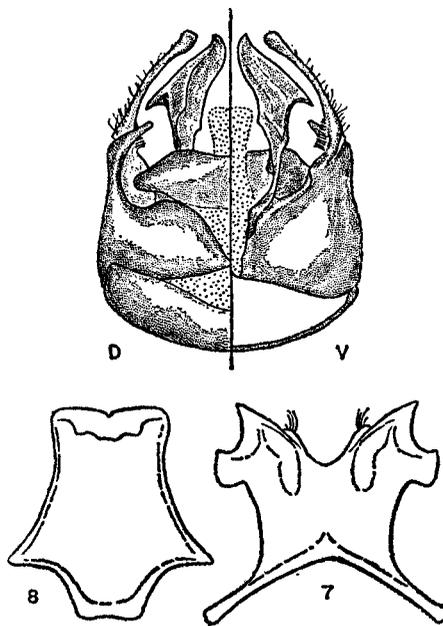


Figure 79
Genital armature and sterna 7 and 8 in male
of *Svaistra aegis*.

Svaistra (Epimelissodes) atripes
atripes (Cresson)

(Fig. 80)

- Melissodes atripes* Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 275. ♀.
Melissodes atripes Robertson, 1898. Acad. Sci. St. Louis, Trans. 8, p. 54. ♀ ♂.
Epimelissodes atripes Ashmead, 1899. Ent. News 10, p. 245.

Epimelissodes atripes Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Svastra (Epimelissodes) atripes Moure and Michener, 1955. *Dusenya* 6, p. 298. (new combination)

Melissodes (Epimelissodes) atripes atripes LaBerge, 1956. *Univ. Kans. Sci. Bul.* 37, p. 948.

Svastra (Epimelissodes) atripes LaBerge, 1958. *Kans. Ent. Soc. Jour.* 31, p. 267.

FEMALE—Length 15-20 mm., breadth of abdomen 6-8 mm.; black, mandibles black basally, red apically, with a yellow maculation along apical half; tegulae testaceous to brownish; wings more or less deeply infuscated and violaceous; basal segment of flagellum nearly twice as long as segment 2, the latter slightly longer than broad; median length of clypeus about half distance between eyes below; eyes subparallel; pleura and dorsum of thorax closely and coarsely punctate, propodeum tessellate, dorsal face finely and densely rugose; discs of abdominal terga closely, finely and distinctly punctate, surface dull, apical rims narrowly impunctate; pubescence of head and thorax largely pale ochraceous, with some dark hairs on face laterally and on vertex behind ocelli, black on mesopleura anteriorly and beneath; legs with black or piceous pubescence; anterior face of basal abdominal tergum black pubescent, dorsal face with copious pale pubescence across basal half, apical half nearly bare; tergum 2 with a basal white fascia, largely covered by apical rim of the preceding disc; terga 3 and 4 usually with oblique, lateral, whitish fasciae; discs of terga otherwise covered with very fine, short, appressed, black hairs that do not obscure surface, but tergum 5 with a dense fimbria of black, plumose hairs; apex of pygidial plate rather broadly rounded.

MALE—Length 13-18 mm., breadth of abdomen 4.5-7 mm.; black, the clypeus, labrum and base of mandibles yellow, mandibles blackened apically but with a broad, outer, more testaceous maculation over apical third; flagellum testaceous beneath, piceous above, but basal segment somewhat more brownish; apical tarsal segments and spurs brownish-testaceous; tegulae testaceous; wings pale yellowish-brown, veins testaceous to brownish; clypeus not markedly protuberant, its median length somewhat greater than half the distance between eyes below; eyes subparallel; shorter side of basal segment of flagellum nearly equal to apical width, segment 2 about three times this length; punctures of clypeus very fine, well but not widely separated and rather obscure, those of labrum somewhat

deeper and more distinct and close; lateral areas of face above clypeus quite closely, finely and deeply punctate, punctures becoming minute on the shining surface between eyes and ocelli; cheeks with minute, slightly separated and obscure punctures; scutum, scutellum and pleura coarsely, deeply and closely punctate, the punctures obscured by dense pubescence; posterior face of propodeum with somewhat finer, more widely separated punctures, dorsal face rather finely rugose, lateral faces more shining, punctures becoming somewhat finer anteriorly and below; abdominal terga closely, deeply and distinctly punctate, the punctures rather coarse across base of each plate, the broad apical impressed areas much more finely and closely, but distinctly punctate, only the narrow apical rims impunctate; tergum 5 slightly angulate at each extreme side, and tergum 6 with a robust, triangular, apical spine at each side; pubescence quite dense and erect, entirely pale ochraceous over entire head and thorax; front legs largely pale pubescent, with a brown patch on tibiae apically, mid and hind legs largely blackish or piceous pubescent; basal abdominal tergum ochraceous pubescent over basal half and on lateral margins, remainder of disc with very short, inconspicuous, suberect, blackish pubescence; tergum 2 with a conspicuous, basal, pale ochraceous or whitish fascia that is covered in part, at least, by tergum 1; terga 2 and 3 with submedian, slightly oblique, narrow, whitish fasciae, interrupted medially and often very poorly developed; discs of all terga otherwise covered with very short and inconspicuous, subappressed, blackish pubescence, sometimes with a few pale hairs laterally, the more apical terga with some elongate, more erect, dark hairs; median length of pygidial plate considerably less than basal width, somewhat narrowed apically, slightly constricted just before the broadly rounded or subtruncate apex; sternum 7 as shown (fig. 80); sternum 8 and genital armature similar to those in *aegis* (fig. 79).

DISTRIBUTION—This typical form is primarily western in its range, occurring from New Mexico and Colorado to Louisiana and Illinois, and is in flight in various parts of this range from March to October.

FLOWER RECORDS—LaBerge (1956) lists the following: *Asclepias*, *Bidens*, *Cassia*, *Cleome*, *Dalea*, *Gaillardia*, *Gonolobus*, *Gossypium*, *Helianthus*, *Ipomoea*, *Lythrum*, *Melilotus*, *Pycnanthemum*, *Thelesperma*, *Verbena* and *Vernonia*.

Svastra (Epimelissodes) atripes atrimitra (LaBerge)

- Melissodes atrifrons* Cockerell, 1906. Amer. Ent. Soc. Trans. 32, pp. 79 & 82. (not Smith)
- Melissodes carolinensis* Brimley, 1938. Insects of North Carolina, p. 462. (not Dalla Torre)
- Melissodes (Epimelissodes) atripes atrimitra* LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 949.
- Svastra (Epimelissodes) atripes atrimitra* LaBerge, 1958. Kans. Ent. Soc. Jour. 31, p. 273.

Females of this form agree in most details with typical *atripes*, but the oblique pale fasciae on terga 2 and 3 are entirely lacking, and the scopal hairs on the hind tibiae and basitarsi are entirely black. In the males also these fasciae are either absent or much reduced.

DISTRIBUTION — Alabama and Georgia to New Jersey, with one record from Indiana, July to November.

FLOWER RECORDS — *Azelia*, *Buddleia*, *Chamaecrista*, *Kuhnistera*, *Monarda* and *Rhus*. LaBerge (1956) also lists *Bradburya*, *Gerardia*, *Gossypium*, *Hibiscus*, *Koellia*, *Passiflora* and *Primula*.

Svastra (Epimelissodes) atripes georgica (Cresson)

- Melissodes georgica* Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30, p. 200. ♂.
- Melissodes (Epimelissodes) atripes georgica* LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 951.
- Svastra (Epimelissodes) atripes georgica* LaBerge, 1958. Kans. Ent. Soc. Jour. 31, p. 273.

The females of this form may be separated from either typical *atripes* or *atrimitra* by the presence of pale hairs in the scopa of the hind tibiae although the basitarsal scopal hairs are entirely black. Usually there are oblique, white fasciae on abdominal terga 3 and 4, but these are sometimes reduced or absent. In males also there is a much greater development of the white fasciae on the abdominal terga with conspicuous, more or less oblique, white fasciae on terga 3 and 4 and usually also 2; and the pubescence of the outer surface of the mid and hind tibiae is considerably paler than in either of the other forms.

DISTRIBUTION—Georgia and Florida, July to October.

FLOWER RECORDS—*Bidens* and *Rhus*.

Svastra (Epimelissodes) obliqua obliqua (Say)

(Fig. 80)

- Macrocera obliqua* Say, 1837. Boston Jour. Nat. Hist. 1, p. 403. ♂.
- Melissodes obliqua* Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 275.
- Epimelissodes obliqua* Robertson, 1918. Ent. News 29, p. 92.
- Melissodes obliqua* Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 34. (biology)
- Epimelissodes obliqua* Robertson, 1928. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
- Melissodes obliqua* Custer, 1928. Canad. Ent. 60, p. 28. (biology)
- Svastra (Epimelissodes) obliqua* Moure and Michener, 1955. Dusenya 6, p. 298. (new combination)
- Melissodes (Epimelissodes) obliqua obliqua* LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 986.

FEMALE—Length 14.5-16 mm., breadth of abdomen 6-6.5 mm.; black, labrum and narrow margin of clypeus somewhat more brownish, mandibles with a large orange maculation apically, segment 2 of flagellum more ferruginous, the segments beyond paler brownish beneath, black above, tegulae more testaceous but largely covered with fuscous pubescence; wings quite uniformly lightly infuscated, veins brownish to piceous, basal abdominal tergum narrowly rimmed with yellowish; median length of clypeus slightly more than half the distance between eyes below; eyes sub-parallel; basal segment of flagellum somewhat less than twice the length of segment 2, shorter side of 2 about equal to the breadth; clypeus dull, punctures rather coarse and close but not crowded, labrum somewhat more shining, punctures somewhat deeper and more distinct, but about equal in diameter to those of clypeus; upper part of face more shining, punctures minute but rather close between eyes and ocelli; scutum and scutellum somewhat shining between close, deep and distinct punctures, those on scutellum somewhat finer; punctures of pleura somewhat more coarse and shallow; posterior face of propodeum dull, tessellate, punctures rather fine and sparse, dorsal face rather densely rugoso-punctate, lateral faces becoming somewhat smooth and shining below, punctures otherwise very fine and close; basal abdominal tergum quite coarsely and closely punctate across basal half of disc, punctate area reaching apical margin at extreme sides, the broad apical area smooth, with only microscopic punctures that are barely visible at high magnification; terga 2 and 3 with narrow basal areas that are finely and quite closely punc-

tate, the broad apical area smooth, similar to that of tergum 1; basal areas of terga 5 and 6 rather finely rugoso-punctate, apical areas obscured by pubescence; pygidium triangular, with narrowly rounded apex; pubescence of head largely ochraceous, with only a few fuscous hairs on vertex laterally and above eyes; scutellum and posterior half of scutum with copious short, erect, blackish or fuscous pubescence, and pleura and lateral faces of propodeum entirely black pubescent, anterior half of scutum, pronotum including tubercles, a narrow fringe on the scutello-mesothoracic suture, a posterior fringe around margin of scutellum, and posterior face of propodeum, pale ochraceous pubescent; pubescence of legs largely blackish or piceous, more brownish fuscous on outer surface of mid tibiae, but scopa pale yellowish-ochraceous, the hairs strongly plumose apically; basal half of tergum 1 ochraceous pubescent, but anterior face with copious fuscous pubescence; tergum 2 with a basal, transverse, pale ochraceous fascia which is largely covered by disc of tergum 1; terga 2 and 3 with narrow, oblique, pale ochraceous fasciae that are rather widely interrupted medially, with some short fuscous or blackish pubescence between these and base; tergum 4 with a broad, dense, apical, transverse, ochraceous fascia, the basal area black pubescent; and tergum 5 black pubescent basally, more fuscous apically, forming a dense fimbria of long fuscous hairs.

MALE—Length 14.5-16 mm., breadth of abdomen 5.5 mm.; black, the clypeus, labrum and base of mandibles bright yellow, mandibles darker apically but with a subapical orange maculation; antennal flagellum more brownish beneath, blackish above; apical tarsal segments becoming reddish-testaceous, spurs pale testaceous or yellowish; tegulae testaceous; wings very uniformly lightly infuscated, veins brownish to piceous; apical rim of basal abdominal tergum very narrowly yellowish-hyaline; median length of clypeus about two-thirds breadth between eyes below; eyes very slightly convergent below; shorter side of basal segment of flagellum about equal to its apical width, segment 2 nearly three times this length; punctures of clypeus very fine, shallow and obscure, well separated, those on labrum much more deep, distinct and close; upper part of face becoming smooth and shining, punctures between eyes and ocelli very fine and well separated, somewhat closer and coarser toward margin of clypeus below; scutum and scutellum somewhat shining between deep and distinct punctures, those on scutum somewhat more coarse and sparse than those on scutellum which are close but not crowded; pleura with rather coarse, slightly separated but rather shallow punctures;

posterior face of propodeum dull and tessellate, punctures rather coarse but shallow and rather sparse, dorsal face very densely tessellate, median punctures very shallow and widely separated, becoming finer and very close laterally, lateral faces becoming smooth and shining below and anteriorly, the punctures obsolescent; disc of basal abdominal tergum quite coarsely and deeply punctate, the more median punctures well separated, becoming closer laterally where they approach the apical margin, apical third smooth, somewhat shining and only microscopically punctate; basal areas of terga 2-4 rather closely and distinctly punctate, apical areas smooth and only microscopically punctate; terga 5 and 6 densely and finely punctate across base, 5 with small but rather distinct lateral angles, 6 with a pair of triangular, lateral, apical spines; scutellum and posterior half of scutum with copious, erect but rather short, fuscous pubescence, otherwise entire head, thorax, legs and basal abdominal tergum with copious, pale ochraceous pubescence; tergum 2 with a broad, basal, pale ochraceous fascia and a pair of narrower oblique fasciae which are only slightly separated; terga 3 and 4 with transverse, slightly oblique, pale ochraceous fasciae, basal area of each with some more erect, darker pubescence; tergum 5 with largely pale pubescence, with a transverse, submedian, rather narrow, ochraceous fascia; pubescence of tergum 6 largely pale, long and erect; median length of pygidial plate very slightly less than basal width, subtriangular, rather abruptly but slightly constricted toward apex which is broadly rounded or sub-

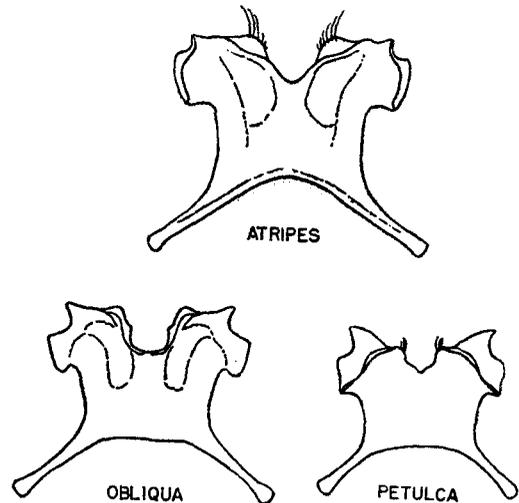


Figure 80
Sternum 7 in males of *Svastra*.

truncate; sternum 7 as shown (fig. 80); sternum 8 and genital armature similar to those in *aegis* (fig. 79).

DISTRIBUTION — Mexico to Montana, east to Quebec, New Jersey, Tennessee and Florida, April to October. From Georgia to Maryland it is largely replaced by *caliginosa*.

FLOWER RECORDS — LaBerge (1956) lists one or more species of each of the following: *Abutilon*, *Ambrosia*, *Asclepias*, *Aster*, *Bidens*, *Elephia* (?), *Boltonia*, *Carduus*, *Cassia*, *Cephalanthus*, *Chrysopsis*, *Cirsium*, *Cleome*, *Coreopsis*, *Echinacea*, *Erigeron*, *Euphorbia*, *Gaillardia*, *Gossypium*, *Grindelia*, *Helenium*, *Helianthus*, *Heliopsis*, *Ipomoea*, *Kuhnistera*, *Lacinaria*, *Lactuca*, *Lobelia*, *Lythrum*, *Medicago*, *Melilotus*, *Monarda*, *Nepeta*, *Oenothera*, *Petalostemum*, *Prionopsis*, *Psoralea*, *Pycnanthemum*, *Ratibida*, *Rudbeckia*, *Schrankia*, *Silphium*, *Solidago*, *Teucrium*, *Trifolium*, *Verbena*, *Vernonia*, *Verbesina* and *Zinnia*.

***Svastra (Epimelissodes) obliqua caliginosa* (Cresson)**

Melissodes caliginosa Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 192. ♀ ♂.

Melissodes (Epimelissodes) obliqua caliginosa LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 984.

Svastra (Epimelissodes) obliqua caliginosa LaBerge, 1958. Kans. Ent. Soc. Jour. 31, p. 273.

FEMALE—This is a black pubescent form of *obliqua* that averages slightly longer than the typical form in the East, ranging from 15 to 17 mm. in length. Except for some inconspicuous pale hairs in the scutello-mesothoracic suture, the pubescence of the entire head, thorax, legs and basal abdominal tergum is black, and there is a total lack of pale pubescent fasciae. Only the tibial scopa is pale ochraceous, copiously plumose as in typical *obliqua*, but the hairs on the hind basitarsi apically become largely blackish; the tegulae are black but the wing color is similar to *obliqua*, and the mandibles and spurs resemble that form in color.

MALE—The differences in this sex also are chiefly in color of pubescence, the pleura, lateral faces of propodeum and anterior face of basal abdominal tergum being largely black pubescent. The front legs are largely pale pubescent, but the mid and hind legs are covered with darker, more fuscous or piceous hairs, with some pale intermixture; the basal

fascia of tergum 2 is more or less diluted with blackish and the oblique fasciae of terga 2-4 are reduced or absent.

Varying degrees of intergradation between these two forms are of common occurrence.

DISTRIBUTION — Georgia to New Jersey, June to November.

FLOWER RECORDS — *Borrichia*, *Cirsium*, *Cucurbita*, *Helenium*, *Helianthus* and *Vernonia*.

***Svastra (Epimelissodes) petulca petulca* (Cresson)**

(Fig. 80)

Melissodes petulca Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 201. ♀.

Melissodes illinoensis Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 126. ♀ ♂.

Epimelissodes illinoensis Robertson, 1918. Ent. News 29, p. 92.

Epimelissodes illinoensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Svastra (Epimelissodes) petulca Moure and Michener, 1955. Dusenya 6, p. 298. (new combination)

Melissodes (Epimelissodes) petulca petulca LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1012.

FEMALE—Length 12.5-14.5 mm., breadth of abdomen 5-5.5 mm.; black, labrum yellow, mandibles somewhat yellowish toward base but dark over apical two-thirds, with an elongate orange maculation extending over apical half; segments of flagellum beyond the 2nd brownish-piceous beneath, black above, basal segments darker; tarsal segments of legs becoming testaceous, and spurs testaceous; tegulae testaceous posteriorly, with a covering of dark, dense pubescence over anterior half; wings hyaline basally, becoming very faintly clouded apically, veins brownish to piceous; apical margin of basal abdominal tergum narrowly yellow; median length of clypeus about half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum fully twice as long as shorter side of segment 2, the latter very slightly shorter than the apical width; clypeus rather dull, punctures deep, close and rather coarse, labrum somewhat more shining, punctures deeper, subcontiguous and more distinct; face shining between ocelli and antennae, punctures exceedingly minute and barely evident; scutum and scutellum with deep, distinct, close and moderately coarse punctures, those on pleura considerably coarser and somewhat more widely separated; propodeum rather dull and tessellate posteriorly, becom-

ing somewhat more shining below, punctures rather coarse and distinct, slightly separated, dorsal face more densely rugoso-punctate, lateral faces becoming smooth and shining anteriorly and below, the punctures obsolescent; basal abdominal tergum rather closely and coarsely punctate across basal half, the punctures becoming quite sparse and obscure toward the shining, impunctate, apical half, lateral areas more fully punctate; terga 2 and 3 with only exceedingly minute, scattered punctures over apical half, these barely visible, basal areas more closely and deeply but still rather obscurely punctate; tergum 4 finely rugose across basal half; pygidium triangular, narrowly rounded at apex; pubescence of head entirely pale, more ochraceous on vertex, whitish on face and cheeks; scutellum and posterior two-thirds of scutum with dense fuscous pubescence, the scutello-mesothoracic suture with a dense, pale ochraceous fascia, thorax otherwise ochraceous pubescent, becoming somewhat more whitish below and posteriorly; legs entirely pale pubescent, yellowish in large part, the scopa pale yellowish, hairs quite densely plumose; basal half and lateral margins of basal abdominal tergum quite copiously ochraceous pubescent; tergum 2 with a basal, transverse, pale ochraceous fascia, and apical halves of terga 2-4 completely covered with quite dense, appressed, whitish tomentum to the rims, basal half of each with very short, subappressed, fuscous pubescence, becoming suberect laterally, 4 with numerous erect fuscous hairs which overly in part the apical white tomentose area; tergum 5 with dense fuscous to blackish tomentum basally, this forming a quite dense apical fimbria which is dark medially, becoming more or less pale laterally.

MALE—Length 11-13 mm., breadth of abdomen 4-5 mm.; black, entire clypeus, labrum and base of mandibles bright yellow, mandibles darker apically but with a subapical, more orange maculation; flagellum brownish-testaceous beneath, more piceous above (paler in some specimens); tegulae yellowish-hyaline posteriorly, anterior half densely pale pubescent; wings subhyaline, very faintly clouded apically, veins brownish-testaceous; apical tarsal segments becoming testaceous; spurs pale yellow; apical margins of abdominal terga more or less yellowish-hyaline; median length of clypeus considerably more than half the distance between eyes below, about half the distance between eyes above, the eyes thus somewhat convergent below; segment 2 of flagellum nearly three times the shorter side segment 1; punctures of clypeus fine, well separated and distinct; labrum much more closely and deeply punctate; face above clypeus quite closely and deeply punctate, vertex

becoming smooth and shining with barely perceptible, minute punctures; punctures of scutum, scutellum and pleura deep and distinct, rather coarse, quite well separated in center of disc of scutum posteriorly, somewhat finer and closer on scutellum, rather close, coarse, deep and distinct on pleura; propodeum posteriorly dull and tessellate, punctures shallow but rather coarse, dorsal face becoming rather coarsely rugoso-punctate laterally, lateral faces narrowly shining anteriorly and below, punctures otherwise quite coarse and close; basal abdominal tergum quite deeply and distinctly punctate over anterior half, the punctures well separated medially, becoming quite close laterally, median apical area impunctate; basal areas of terga 2-4 with fine, close, rather distinct punctures, the broad apical area with only exceedingly minute, hardly evident punctures; tergum 5 finely and densely rugose across base, slightly angulate at each extreme side; tergum 6 with robust, lateral, triangular spines; pubescence entirely pale on head, somewhat tinged with yellow on vertex, otherwise white; scutellum and posterior half of scutum with dense, rather copious and erect, fuscous to brownish pubescence, the scutello-mesothoracic suture quite densely pale tomentose, pubescence of thorax otherwise pale ochraceous, that along anterior face of mesopleura becoming densely appressed and quite strongly yellowish; pubescence of legs largely whitish; basal abdominal tergum with copious, long and erect, pale ochraceous pubescence, this lacking over the apical third medially; tergum 2 with a transverse, basal, whitish fascia that is largely covered by the preceding tergum, and terga 2 and 3 largely covered over apical half with appressed whitish pubescence that nearly reaches the apical rims; terga 4 and 5 with transverse, whitish fasciae that are subapical but usually complete, basal areas of these discs largely covered with short, subappressed, dark pubescence and with numerous, more or less erect, longer hairs, these pale in part; median length of pygidial plate slightly less than basal width, rather strongly narrowed apically, slightly incurved on each side toward the broadly rounded apex, but not notched; sternum 7 as shown (fig. 80); sternum 8 and genital armature similar to those in *aegis* (fig. 79).

DISTRIBUTION—Texas to Kansas, east to Florida and New Jersey, April to September.

FLOWER RECORDS—LaBerge (1956) lists the following: *Borrichia*, *Coreopsis*, *Gaillardia*, *Gossypium*, *Helenium*, *Helianthus*, *Lepachys*, *Lithospermum*, *Monarda*, *Pycnanthemum*, *Pyrrhopappus*, *Ratibida*, *Rudbeckia* and *Verbesina*.

Table 8—Distribution of species of *Exomalopsis*, *Ptilothrix*, *Melitoma*, *Peponapis*, *Xenoglossa*, *Cemolobus*, *Anthedonia*, *Florilegus* and *Svastra* by states.

	New England					North Central					Mid Atlantic						South-eastern										
	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
Exomalopsis																											
asteris									X																		
micheneri																							X				
pulchella																											X
similis																											X
Ptilothrix																											
bombiformis								X		X	X		X		X			X			X		X	X	X	X	X
Melitoma																											
taurea								X	X	X	X							X		X	X	X	X	X	X	X	X
Peponapis																											
pruinosa	X	X	X				X	X	X			X	X	X				X		X	X					X	
Xenoglossa																											
kansensis																					X					X	
strenua								X										X		X		X			X	X	
Cemolobus																											
ipomoeae								X													X					X	
Anthedonia																											
compta								X	X												X					X	
Florilegus																											
condignus								X	X			X									X			X	X	X	X
Svastra																											
aegis																					X	X	X	X	X	X	X
atripes									X																		
a. atrimitra									X			X		X				X		X	X			X	X		
a. georgica																										X	X
obliqua							X	X	X	X		X	X							X			X	X		X	X
o. caliginosa												X		X				X			X	X			X		
petulca								X				X								X	X	X	X	X	X	X	X

LaBerge (1956) considers *suffusa* Cresson in the West a subspecies of *petulca*, thus making the subspecific designation of this typical form desirable.

Melissodes Latreille
(Fig. 67)

Melissodes Latreille, 1829. In Cuvier, Règne Animale, ed. 3, v. 5, p. 354. Type: *Melissodes leprieuri* Blanchard, 1849. First included species.

Melissodes Cockerell, 1905. Amer. Ent. Soc. Trans. 31, pp. 328-330.

Melissodes Cockerell, 1906. Amer. Ent. Soc. Trans. 32, pp. 74-92.

Melissodes LaBerge, 1956. Univ. Kans. Sci. Bul. 37, pp. 911-1194. (revision—part 1)

Melissodes LaBerge, 1956. Univ. Kans. Sci. Bul. 38, pp. 533-578. (revision—part 2)

Melissodes LaBerge, 1961. Univ. Kans. Sci. Bul. 42, pp. 283-663. (revision—part 3)

This is a large genus of moderately robust hairy bees. The mandibles are simple in both sexes, and the maxillary palpi are usually 4-segmented. The clypeus laterally is contiguous with the margin of the eye and is black in the females, yellow, at least in part, in the males. The scopa is plumose, tergum 7 in the males is distinctly spinose at base on each extreme side, and the pygidial plate is distinctly notched on each side toward the apex. In the female the pubescence of the metanotum is ordinary, lacking the elongate median tuft of hairs that distinguishes the closely related *Svastra*.

KEY TO SPECIES

Females

1. Scopa on hind legs entirely black
 bimaculata nulla LaBerge (p. 269)
 Scopa pale 2
2. Abdomen black pubescent, without evident spots or fasciae of pale pubescence, except possibly a basal fascia on segment 2 which is usually covered by the disc of segment 1 3
 Abdomen with spots or fasciae of pale pubescence on segments 3 or 4 6
3. Dorsum of thorax largely or entirely pale pubescent 4
 Dorsum of thorax largely black pubescent
 *rustica* (Say) (p. 300)
4. Apical half of basal abdominal tergum impunctate 5
 Impunctate area of basal tergum occupying only the narrow apical rim
 *dentiventris* Smith (p. 289)
5. Pleura largely pale ochraceous pubescent; clypeus dull, punctures close and rather fine *bidentis* Cockerell (p. 283)
 Pleura with a limited area of pale pubescence just beneath wing bases, otherwise fuscous ^{black, dark}
 (*Helimelissodes*) *desponsa* Smith (p. 274)
 an or substantial much less than out area of it.
- 6(2). Abdominal terga 3 and 4, and usually 2 also, with white, apical fasciae; scopa of simple, or very sparsely plumose, hairs (*Apomelissodes*) 7
 Fasciae on terga 2 and 3, when present, submedian in position, that on 4 usually apical or nearly 9
7. Clypeus shining, median area above sparsely and irregularly punctate
 *mittelli* LaBerge. (p. 279)
 Clypeus closely punctate throughout .. 8
8. Scopal hairs on hind tibiae entirely simple; punctures of pleura and of propodeum laterally, deep and distinct, although close
 *fimbriata* Cresson (p. 277)
 Scopal hairs sparsely but distinctly plumose; punctures of pleura and of propodeum laterally, crowded and indistinct .. *apicata* Lovell & Cockerell (p. 276)
- 9(6). Pubescence, except the scopa, entirely black on head, thorax and legs
 *bimaculata bimaculata* Lepeletier (p. 267)
 Some pale pubescence on either the head, thorax or legs 10
10. Pubescence of scutum and scutellum entirely pale, or with but a very few inconspicuous dark hairs 11
 Scutum and scutellum with extensive patches of black pubescence 15^{CU}_{DU}^{CU}
11. Pubescence of dorsum of thorax bright fulvous 12
 Thorax with pale ochraceous pubescence dorsally 13
12. Abdominal terga 3-5 with rather short but erect, black hairs basad of the fasciae ... *trinodis* Robertson (p. 304)
 Pubescence of abdominal terga 3-5 largely pale, subappressed
 *agilis* Cresson (p. 282)^{CU}_{DU}^{CU}
 ^{bl}_{CU}^{CU}
- 13(11). Mid basitarsi and tibiae entirely pale pubescent 14
 Mid basitarsi with black or piceous hairs on outer surface, mid tibiae dark pubescent at least in part
 *comptoides* Robertson (p. 271)^{CU}_{DU}^{CU}
14. Abdominal terga 1-3 with short, suberect, black pubescence laterally, basad of the fasciae on 2 and 3
 *tepaneca* LaBerge (p. 273)
 Pubescence of terga 1-3 entirely pale ...
 *menuachus* Cresson (p. 295)
- 15(10). Pleura black pubescent at least in part 16
 Pleura entirely pale pubescent 18
16. Pleura largely pale pubescent, with but a small amount of black pubescence beneath wing bases
 *denticulata* Smith (p. 288)^{CU}_{DU}^{CU}
 Pubescence on upper part of pleura ochraceous, becoming fuscous or blackish below 17
17. Posterior two-thirds of scutum conspicuously black pubescent; apical areas of terga 2 and 3 largely impunctate
 *rustica* (Say) (p. 300)
 Scutum with only a limited area of black pubescence posteriorly; apical areas of terga 2 and 3 distinctly although finely punctate
 *comptoides* Robertson (p. 271)
- 18(15). Large and robust; wings infuscated;

- scutum coarsely punctate
(Callimelissodes) coloradensis Cresson
 (p. 280)
 Size moderate; wings hyaline or lightly
 infuscated; punctures of scutum and
 scutellum rather fine 19
19. Clypeus with dark pubescence
 *rustica* (Say) (p. 300)
 Pubescence of clypeus entirely pale .. 20
20. Mid basitarsi brownish or blackish pubes-
 cent 21
 Mid basitarsi pale pubescent 25
21. Scutum almost entirely black pubescent,
 with only a very narrow area of pale
 hairs along anterior margin
 *illata* Lovell & Cockerell (p. 292)
 Scutum with a narrow but distinct band
 of pale pubescence across anterior margin 22
22. Fasciae on segment 4 entire, uninterrupted
 on its posterior border
 *boltoniae* Robertson (p. 284)
 Fascia on segment 4 interrupted medially
 on its posterior border, or slightly re-
 moved from the rim 23
23. Second abdominal tergum very nearly im-
 punctate .. *denticulata* Smith (p. 288)
 Tergum 2 with numerous close, distinct
 punctures, at least over basal half .. 24
24. Apical half of tergum 2, beyond the fas-
 cia, nearly or quite impunctate
 *rustica* (Say) (p. 300)
 Apical half of tergum 2 minutely but
 rather closely punctate, the punctures
 nearly as close as over basal half
 *tincta* LaBerge (p. 303)
 Often have to look closely
- 25(20). White fascia of tergum 4 subapical
 and quite narrow, being noticeably re-
 moved from rim 26
 Fascia on tergum 4 definitely apical in
 position 27
26. Terga 2 and 3 without evident punctures
 between the fasciae and apical rims;
 fascia on 4 separated from rim by a
 distinct, shining, bare area
 *subillata* LaBerge (p. 301)
 Terga 2 and 3 with scattered, minute but
 distinct punctures between fasciae and
 and apical margins; fascia on 4 sepa-
 rated from rim by a narrow area of
 black pubescence
 *pilleata* LaBerge (p. 298)
- 27(25). Wings lightly but uniformly infus-
 cated; median fasciae of terga 2 and 3
 very narrow, white; tergum 4 with
 conspicuous, erect, black pubescence
 across basal area of disc
 *communis* Cresson (p. 269)
 Wings hyaline or somewhat whitish ... 28
28. Basal half of tergum 2 with fine but dis-
 tinct punctures, even near mid line .. 29
 Punctures on basal half of tergum 2 me-
 dially exceedingly minute and obscure,
 if at all evident 31
29. Scutellum shining, punctures deep and
 distinct but well separated, interspaces
 considerably greater than diameter of
 punctures .. *fumosa* LaBerge (p. 291)
 Scutellum closely punctate throughout 30
30. Punctures of clypeus contiguous throug-
 out; size small (8 mm.); wings whitish
 *nivea* Robertson (p. 297)
 Clypeus shining between slightly sepa-
 rated punctures
 *manipularis* Smith (p. 294)
- 31(28). Terga 2 and 3 only very obscurely
 punctate even at each extreme side;
 vertex with a transverse row of erect
 black hairs
 *wheeleri* Cockerell (p. 308)
 Terga 2 and 3 quite distinctly punctate
 toward each side; vertex with little if
 any black pubescence 32
32. Mandibles very short, length only about
 twice the basal width; scutellum some-
 what more rounded, the punctures
 rather close, considerably finer than
 those of scutum medially
 *coreopsis* Robertson (p. 286)
 Mandibles of ordinary length; scutellum
 rather flat, punctures similar to those
 of scutum medially, but much closer ..
 *vernoniae* Robertson (p. 306)
- Males**
1. Fasciae on abdominal terga 2-5 apical in
 position, usually complete and conspic-
 uous (*Apomelissodes*) 2
 Fasciae either invident, or those on terga
 2-4 more or less median in position .. 4
2. Clypeus entirely or in part black
 .. *apicata* Lovell & Cockerell (p. 276)
 Clypeus entirely yellow 3
3. Abdominal fasciae of elongate, white hairs
 that overly the depressed, non-pubescent
 apical margins
 *fimbriata* Cresson (p. 277)
 Abdominal fasciae of short, densely plu-
 mose hairs covering most of the de-
 pressed apical margins
 *mitchelli* LaBerge (p. 279)
- 4(1). Upper portion of clypeus to some de-
 gree black 5
 Clypeus entirely yellow 9
 can be shade brown
5. Pubescence of dorsum of thorax entirely
 pale ochraceous 6
 Scutum and scutellum with a considerable
 amount of black or fuscous pubescence
 often
 the e
 looks
 dark

6. Basal segment of flagellum extremely short, subequal to pedicel
dentiventris Smith (p. 289)
 Basal segment of flagellum elongate, equalling about one-third the length of segment 2
(Heliomelissodes) desponsa Smith (p. 274)
- 7(5). Vertex with conspicuous, erect, black hairs; apical impressed areas of abdominal terga dark, concolorous with the more basal areas, with a few very short hairs and microscopic punctures
denticulata Smith (p. 288)
 Pubescence of vertex entirely white; impressed areas of terga more coppery 8
8. Basal half of tergum 2 deeply and distinctly punctate, the apical half beyond the fascia invaded to some degree by minute punctures
tincta LaBerge (p. 303)
 Punctures on basal half of tergum 2 very minute and sparse near mid-line, becoming more distinct toward each side, the apical half nearly or quite impunctate
subillata LaBerge (p. 301)
- 9(4). Pubescence of legs black, at least in part 10
 Pubescence of legs entirely pale 12
10. Pubescence of mid and hind tibiae and basitarsi white
bimaculata bimaculata (Lepeletier) (p. 267)
 Pubescence of mid and hind tibiae and basitarsi blackish or fuscous 11
11. Thorax entirely black pubescent
bimaculata nulla LaBerge (p. 269)
 Thorax, other than legs, covered with pale ochraceous pubescence
(Heliomelissodes) desponsa Smith (p. 274)
- 12(9). Wings lightly but uniformly infuscated 13
 Wings at most faintly yellowish, usually hyaline 15
13. Pubescence of scutum and scutellum entirely pale ochraceous
comptoides Robertson (p. 271)
 Scutum and scutellum with considerable fuscous pubescence 14
14. Larger (15 mm.); punctures of abdominal terga deep, distinct and rather coarse and close; broad, median area of tergum 2 not fasciate
(Callimelissodes) coloradensis Cresson (p. 280)
 Smaller; punctures of tergum 2 basally minute and rather sparse, the broad, apical impressed area nearly impunctate; tergum 2 with narrow, oblique, white fasciae on each side
communis Cresson (p. 269)
- 15(12). Labrum entirely black 16
 Labrum yellow, at least in part 22
16. Apical impressed areas of abdominal terga dark, becoming somewhat yellowish along rims 17
 Apical impressed areas of terga broadly hyaline 20
17. Dorsum of thorax with bright fulvous pubescence *trinodis* Robertson (p. 304)
 Thoracic pubescence pale ochraceous or whitish 18
18. Scutum closely and deeply punctate throughout, interspaces no greater than diameter of punctures, even posteriorly
dentiventris Smith (p. 289)
 Punctures in median posterior area of scutum quite sparse 19
19. Punctures of abdominal terga 1 and 2 deep, distinct, close, and quite coarse over both basal and apical areas
boltoniae Robertson (p. 284)
 Terga 1-3 with minute, rather sparse punctures, apical impressed areas of 2 and 3 impunctate
subillata LaBerge (p. 301)
20. Tergum 5 not angulate laterally; terga 2 and 3 without dark hairs
coreopsis Robertson (p. 286)
 Tergum 5 angulately produced at each extreme side; terga 2 and 3 often with some suberect black hairs 21
21. Punctures of abdominal terga relatively close and coarse, interspaces no more than two or three times the diameter of the punctures
fumosa LaBerge (p. 291)
 Tergal punctures finer and much more widely separated, especially laterally
boltoniae Robertson (p. 284)
- 22.(15). Apical impressed areas of terga darker, possibly becoming somewhat brownish along rims 23
 Abdominal terga broadly hyaline and transparent apically 28
23. Pubescence of dorsum of thorax entirely pale 24
 Dorsum of thorax with at least some intermixture of dark hairs 25
24. Dorsum of thorax with bright ochraceous or fulvous pubescence
trinodis Robertson (p. 304)
 Pubescence of thorax pale ochraceous to whitish
rustica (Say) (p. 300)
- 25(23). Mandibles with basal, yellow maculations 26
 Mandibles black, not maculated 27

26. Apical depressed area of tergum 2 extensive, occupying more than half of the median length of plate; pubescence ochraceous
 *wheeleri* Cockerell (p. 308)
 Depressed area of tergum 2 less extensive, occupying much less than half of the median length; pubescence white ..
 *pilleata* LaBerge (p. 298)
- 27(25). Pubescence of discs of abdominal terga 2-4, basad of the fasciae, entirely pale
 *subillata* LaBerge (p. 301)
 Discs of terga 2-4 with evident, erect dark hairs *illata* Lovell & Cockerell (p. 292)
- 28(22). At least basal half of mandibles black 29
 Mandibles with a distinct basal yellow spot 31
29. Dorsum of thorax with abundant black pubescence *manipularis* Smith (p. 294)
 Dorsum of thorax entirely pale pubescent 30
30. Posterior half of scutum closely and rather uniformly punctate
 *bidentis* Cockerell (p. 283)
 Posterior half of scutum shining, nearly impunctate except along margins
 *nivea* Robertson (p. 297)
- 31(28). Labrum entirely yellow
 *tepaneca* Cresson (p. 273)
 Labrum at least narrowly black along the lateral margins 32
32. Basal segment of flagellum very short, its shorter side about equal to pedicel
 *agilis* Cresson (p. 282)
 Shorter side of basal segment of flagellum considerably longer than pedicel ..
 33
33. Apical impressed area of tergum 2 occupying fully half the median length of plate, basal half smooth but dull, punctures very minute, well separated
 *vernoniae* Robertson (p. 306)
 Impressed area of tergum 2 occupying less than half the median length of plate, basal area dull, very finely and closely punctate . *menuachus* Cresson (p. 295)

***Melissodes (Melissodes) bimaculata bimaculata* (Lepeletier)**

- Macrocera bimaculata* Lepeletier, 1825. In Latreille, Encycl. Method. Ins. 10, p. 528. ♀.
Macrocera binotata Say, 1837. Boston Jour. Nat. Hist. 1, p. 404. ♀ ♂.
Macrocera nigra Lepeletier, 1841. Hist. Nat. Ins. Hym. 2, p. 112. ♂.
Melissodes nigra Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 310.
Melissodes bimaculata Cresson, 1879. Amer. Ent. Soc. Trans. 7, p. 225.

- Melissodes bimaculata* Ashmead, 1894. Psyche 7, p. 25. (biology)
Melissodes bimaculata Banks, 1902. N. Y. Ent. Soc. Jour. 10, p. 209. (biology)
Melissodes melanosoma Cockerell, 1905. Canad. Ent. 37, p. 266.
Melissodes binotata Tucker, 1909. Kans. Acad. Sci. Trans. 22, p. 281.
Melissodes bimaculata Folsom, 1922. Ent. Soc. Amer. Ann. 15, p. 183. (biology)
Melissodes bimaculata Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 34. (biology)
Melissodes bimaculata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Melissodes (Melissodes) bimaculata bimaculata LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1104.

FEMALE—Length 13-15 mm., breadth of abdomen 5-5.5 mm.; black, the mandibles slightly reddened but very dark, with a faint yellowish area toward the apex, segments of flagellum beyond the 2nd brownish-testaceous beneath, black above; apical tarsal segments somewhat brownish, spurs brownish-testaceous; tegulae black, somewhat tinged with brown along outer margin; wings rather uniformly deeply infuscated, veins piceous to black; cheeks much narrower than eyes; clypeus slightly protuberant, its median length approximately half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum slightly less than twice the length of segment 2; punctures of clypeus deep, distinct, rather coarse and close above, becoming fine and densely crowded toward apical margin, those on labrum densely crowded medially, becoming somewhat coarser and rather sparse on each side; face laterally above clypeus closely and rather finely punctate, punctures becoming minute and sparse above where the surface is shining between eyes and ocelli; vertex closely and rather deeply punctate behind ocelli; cheeks shining and very finely punctate beneath rather dense pubescence; scutum shining between deep and distinct punctures, these rather coarse and quite sparse in median area of disc posteriorly, becoming somewhat finer and much closer laterally and anteriorly, those on scutellum finer and more evenly distributed, interspaces nearly equal to diameter of punctures; punctures of pleura coarse, close and deep, interspaces narrow, somewhat shining; posterior face of propodeum rather coarsely, deeply and closely punctate, the dorsal triangle shining below, upper surface somewhat less shining, quite closely and rather deeply punctate along upper margin and toward each side, lateral faces closely and rather finely punctate throughout; basal two-thirds of basal abdominal tergum deeply, distinctly and rather

coarsely and closely punctate, the punctate area nearly reaching apical margin on each extreme side, apical third medially somewhat shining and entirely impunctate; terga 2-4 deeply, distinctly and rather finely punctate, punctures well separated medially on 2 and 3, becoming close at extreme sides, much closer on 4, the broad apical impressed areas well punctured nearly to the rims; tergum 5 densely and very finely rugose beneath the dense pubescence; pygidium rather narrowly triangular, median length barely exceeding the basal width, narrowly rounded at apex; pubescence of head, thorax, and fore and mid legs, largely black, with only a few pale hairs on face around and between antennae; tibial scopa whitish, strongly contrasting with the otherwise black pubescence, the hairs quite densely plumose; abdominal terga 1-3 largely short, black pubescent, although basal tergum with somewhat more copious, erect pubescence anteriorly, sometimes with barely perceptible traces of oblique, white fasciae at extreme sides of 2 and 3; tergum 4 densely white pubescent apically, broadly interrupted medially; and terga 5 and 6 entirely black.

MALE—Length 11-13 mm., breadth of abdomen 4.5 mm.; black, the clypeus and labrum bright yellow, mandibles largely dark, but more or less yellow at base, apex with a rather short testaceous maculation; flagellum beyond segment 1 brownish-testaceous beneath, black above, the basal segment more piceous; apical tarsal segments becoming somewhat brownish-testaceous, spurs pale testaceous; tegulae piceous or black, very narrowly brownish along outer margin; wings rather deeply and uniformly infuscated, veins piceous to black; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum about as long as the apical width, segment 2 about three times longer; punctures of clypeus quite uniformly coarse, close, deep and distinct, those on labrum much finer and closer medially, becoming rather sparse on each side; punctures of face laterally above clypeus quite deep, distinct and rather close and coarse, becoming minute on the shining surface above antennae, rather sparse between eyes and ocelli; vertex closely and rather coarsely punctate medially, becoming rather sparse laterally, distinctly separated on cheeks, rather coarse on hind margin, becoming minute toward eyes; scutum shining between coarse, deep and distinct punctures, these rather widely separated over posterior half, becoming closer and somewhat finer laterally and anteriorly; scutellum with somewhat finer and closer punctures; pleura with coarse, deep and distinct punctures

that are rather well separated on central area, but become coarser above and below; posterior face of propodeum deeply, distinctly, and quite sparsely punctate, dorsal face becoming much more closely punctate, especially toward extreme sides, lateral faces closely and distinctly punctate; punctures of abdominal terga 1-3 deep, distinct but rather fine, well separated medially, becoming quite close at each extreme side, apical impressed areas distinctly, deeply and finely punctate nearly to the rims, the punctures somewhat more sparse than basally; terga 4-6 much more closely and finely punctate, the punctures becoming densely crowded laterally; tergum 5 not distinctly angulate laterally, but 6 with a short, triangular, apical spine-like angle on each side; pubescence largely whitish on face, with a few dark hairs at extreme sides, vertex white pubescent in part but a few dark hairs between ocelli, and posterior margin densely fringed with fuscous pubescence, that on cheeks entirely black; scutum with an intermixture of dark and light hairs, those on scutellum more definitely blackish, the pleura and propodeum largely dark pubescent, but with a few pale hairs beneath and on upper part of propodeum posteriorly; legs with dark pubescence on the coxae, trochanters and femora, but tibial and tarsal hairs generally whitish; abdominal terga largely covered with short, suberect, dark pubescence, but with an intermixture of pale hairs on basal tergum anteriorly, and terga 3-5 with narrow fasciae that are widely interrupted medially, somewhat oblique on 3, more nearly subapical on 4, and definitely apical on 5; median length of pygidial plate about equal to basal width, abruptly constricted toward the apex which is rather narrowly truncate; sternum 7 similar to *comptooides* (fig. 81) but apical rolled portion of median plates much smaller; sternum 8 truncate or broadly and shallowly incurved apically; sternum 8 and genital armature as in *comptooides* but gonostyli with hairs at base more elongate.

DISTRIBUTION—Generally distributed throughout the Eastern United States, reaching North Dakota, Colorado and New Mexico in the West, May to October.

FLOWER RECORDS—The following genera are listed by LaBerge (1956): *Abutilon*, *Agastache*, *Althaea*, *Arctium*, *Asclepias*, *Asparagus*, *Aster*, *Astragalus*, *Baptisia*, *Bidens*, *Blephilia*, *Brauneria*, *Cacalia*, *Campanula*, *Cassia*, *Cephalanthus*, *Cicuta*, *Cirsium*, *Convolvulus*, *Cuphea*, *Cucurbita*, *Dalea*, *Desmodium*, *Dianthera*, *Dipsacus*, *Echinocystis*, *Eupatorium*, *Gaura*, *Gerardia*, *Gladiolus*, *Gossypium*, *Grindelia*, *Hele-*

nium, *Helianthus*, *Hibiscus*, *Impatiens*, *Ipomoea*, *Jacquemontia*, *Lepachys*, *Lespedeza*, *Lobelia*, *Lythrum*, *Malva*, *Medicago*, *Melilotus*, *Mentha*, *Monarda*, *Nepeta*, *Oenothera*, *Oxalis*, *Petalostemum*, *Petunia*, *Phytostegia*, *Platycodon*, *Polygonum*, *Prunella*, *Pycnanthemum*, *Ratibida*, *Rhus*, *Rudbeckia*, *Sagittaria*, *Scrophularia*, *Scutellaria*, *Seymeria*, *Sicyos*, *Silphium*, *Siscanna*, *Solidago*, *Stachys*, *Strophostylis*, *Symphoricarpos*, *Teucrium*, *Trifolium*, *Verbena*, *Veronica*, *Veronica* and *Vitex*.

***Melissodes (Melissodes) bimaculata nulla* LaBerge**

Melissodes (Melissodes) bimaculata nulla LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1109.

This South Florida form differs from typical *bimaculata* primarily in the more uniformly black pubescence. In the female the scopa is black or very dark fuscous, and the abdominal terga are entirely black, with no evidence of white fasciae. The wings also are somewhat more deeply infuscated. In the males the pubescence of the face is whitish but the thorax is almost entirely black pubescent and the pubescence of the legs is largely black, possibly somewhat more fuscous on hind tibiae. Also as in the female, the abdomen is entirely lacking in white pubescent fasciae and the wings are somewhat darker.

DISTRIBUTION—South Florida, February to July.

FLOWER RECORD—*Lithrum lineare*.

***Melissodes (Melissodes) communis communis* Cresson**

Melissodes communis Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 204. ♀ ♂.

Melissodes hortivagans Cockerell, 1905. Biol. Soc. Wash. Proc. 18, p. 180. ♂ ♀.

Melissodes Martini Cockerell, 1905. Ann. Mag. Nat. Hist. (7) 15, p. 526. ♀.

Melissodes variabilis Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 368. ♀ ♂.

Melissodes xanthopteralis Cockerell, 1906. Ann. Mag. Nat. Hist. (7), 17, p. 362. ♂.

Melissodes manni Cockerell, 1924. Amer. Mus. Novitates 113, p. 1. ♂.

Melissodes hortivagans melanotica Cockerell, 1925. Ann. Mag. Nat. Hist. (9) 16, p. 231. ♀.

Melissodes (Melissodes) communis communis LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1053.

FEMALE—Length 11.5-14.5 mm., breadth of abdomen 4-5 mm.; black, the mandibles somewhat reddened apically, segments of flagellum beyond the 2nd brownish-testaceous beneath, black above; apical tarsal segments becoming more brownish-testaceous, spurs pale testaceous; tegulae piceous anteriorly, becoming more testaceous posteriorly and along outer margin; wings lightly infuscated, veins brownish to piceous; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum nearly twice as long as shorter side of segment 2; punctures of clypeus deep, distinct, quite close and rather coarse, becoming somewhat crowded and much finer toward apical rim; labrum very finely and densely punctate medially, becoming less crowded laterally; lateral areas of face above clypeal margin finely and rather closely punctate, the punctures becoming sparse above antennae medially, lateral areas nearly impunctate; vertex finely and closely punctate medially, punctures rather fine and close on cheeks posteriorly, becoming minute and hardly visible toward eyes; scutum shining, punctures quite coarse and deep, sparse in center of disc posteriorly, becoming quite fine and close laterally and anteriorly, fine but evenly distributed and rather close on scutellum; punctures of pleura deep, distinct, rather fine and quite close; posterior face of propodeum rather dull, punctures rather fine and close medially, becoming somewhat more widely separated on each side, dorsal area dull medially, punctures rather fine but distinct and slightly separated, becoming closer laterally, lateral faces quite uniformly, finely, closely and distinctly punctate; basal abdominal tergum dull across basal half, punctures very fine, shallow, rather widely separated, closer at extreme sides where they nearly reach apical margin, the broad median apical area entirely impunctate; terga 2 and 3 very finely and rather closely punctate across base, punctures becoming crowded laterally, impressed apical areas relatively smooth, with only widely scattered, exceedingly minute punctures at all evident; terga 4 and 5 very finely and densely rugose across base, impressed apical area of 4 only very minutely punctate beneath dense tomentum; median length of pygidium about equal to basal width, subtriangular, apex narrowly rounded; pubescence of head largely pale, with a few scattered, erect, fuscous hairs across vertex; scutum and scutellum largely fuscous pubescent, but the narrow anterior margin of scutum, and pleura and propodeum entirely, pale ochraceous pubescent; pubescence of legs largely pale, with some darker hairs on outer

surface of fore and mid tibiae and basitarsi, the hind tibial scopa pale yellowish, scopal hairs sparsely but quite distinctly plumose; basal abdominal tergum with rather copious, erect, pale pubescence anteriorly and at extreme sides, with a few short dark hairs evident toward sides apically; tergum 2 with a rather broad, basal, white fascia that is usually partially covered by tergum 1, and with a narrow, submedian white fascia, intervening area dark, with short, subappressed blackish hairs visible; tergum 3 with a submedian, quite narrow, white fascia, area between this and base more thinly covered with whitish tomentum; apical half of tergum 4 densely white tomentose to the rim, but this slightly interrupted on apical margin medially, basal area largely covered with erect, but rather short, blackish pubescence; apical impressed areas of terga 2 and 3 with rather sparse, short, subappressed, black hairs; terga 5 and 6 entirely covered with blackish pubescence, but the apical fimbria of 5 somewhat more fuscous medially.

MALE—Length 11-13 mm., breadth of abdomen 3.5-5 mm.; black, the clypeus, labrum and basal half of mandibles bright yellow, mandibles apically becoming piceous; antennal flagellum testaceous beneath, piceous above, basal segment more piceous; tarsal segments of legs becoming testaceous, spurs pale yellow, tegulae largely testaceous; wings lightly infuscated, somewhat paler apically, veins testaceous to brownish; apical margins of abdominal terga becoming somewhat hyaline; cheeks considerably narrower than eyes; clypeus slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; shorter side of basal segment of flagellum only very slightly longer than pedicel, segment 2 about five times as long; punctures of clypeus rather coarse and close but not crowded, rather obscure on the yellow surface, those on labrum somewhat closer, deeper and more distinct; lateral areas of face above clypeus finely and closely punctate, punctures becoming more minute above antennae, surface shining; vertex quite closely punctate behind ocelli; cheeks rather closely and distinctly punctate along posterior margin, becoming shining and nearly impunctate toward eyes; punctures of scutum, scutellum and pleura deep, distinct and quite coarse, rather sparse in center of scutum posteriorly, becoming closer and somewhat finer laterally and anteriorly, rather well separated on scutellum but becoming quite close along anterior and posterior margins, rather well separated on median area of pleura, becoming somewhat closer above and below; posterior face of propodeum rather sparsely punctate, dorsal area

becoming much more closely punctate medially and along upper margin, lateral faces somewhat shining between quite deep and distinct but rather fine, irregularly scattered punctures; abdominal terga 1 and 2 with quite deep, distinct and rather fine punctures across base, these rather widely separated, becoming close only at extreme sides, apical impressed areas largely impunctate, invaded only slightly by very minute punctures; terga 3 and 4 much more finely and closely punctate medially, punctures very close at sides of 4, apical impressed areas largely impunctate; tergum 5 very finely and closely punctate across disc, apical impressed area impunctate, with a short, acute, triangular process at each extreme side; tergum 6 densely and finely rugose beneath dense pubescence, with a triangular apical spine on each side; pubescence of head, thorax and legs largely pale ochraceous, scutum with a few dark hairs in center of disc posteriorly, and scutellum with more abundant, erect, somewhat darker pubescence; basal abdominal tergum with rather copious, erect, pale hair basally and laterally, otherwise largely bare; tergum 2 with a pair of somewhat oblique, very narrow, white fasciae that are widely separated medially, basal area of disc covered with short, suberect, blackish pubescence, becoming white at extreme sides; terga 3 and 4 with submedian, white fasciae that are very thin or interrupted medially, 4 with largely pale, suberect hairs across base, 5 with more elongate, fuscous pubescence or hairs, with some elongate whitish hairs at extreme sides; tergum 6 largely fuscous pubescent; median length of pygidial plate about equal to basal width, margins carinate, nearly parallel to the abruptly constricted apical area, apex subtruncate or very broadly rounded; sternum 7 much as in *comptoidea* (fig. 81) but apical rolled portion much smaller; sternum 8 broadly truncate or incurved at apex; genital armature as in *comptoidea*, but gonostyli with hairs at base more elongate.

DISTRIBUTION—Mexico to Wyoming and North Dakota, east to the New England states and Florida, March to September.

FLOWER RECORDS—Host plant records according to LaBerge (1956) include the following plant genera: *Abutilon*, *Althaea*, *Amorpha*, *Asclepias*, *Baptisia*, *Bejaria*, *Blephilia*, *Brasoria*, *Campanula*, *Cassia*, *Chrysopsis*, *Cirsium*, *Cleome*, *Convolvulus*, *Croton*, *Cucurbita*, *Cyrilla*, *Dalea*, *Dianthera*, *Euchium*, *Gossypium*, *Grindelia*, *Helenium*, *Helianthus*, *Heliotropium*, *Hyrtia*, *Ipomoea*, *Lactuca*, *Lythrum*, *Malva*, *Medicago*, *Melilotus*, *Mentha*, *Monarda*, *Nepeta*, *Oenothera*, *Opuntia*, *Passiflora*, *Petaloste-*

um, *Phaseolus*, *Platycodon*, *Prionopsis*, *Proboscidea*, *Pycnanthemum*, *Ratibida*, *Rudbeckia*, *Rhus*, *Salvia*, *Sidalcea*, *Solanum*, *Solidago*, *Teucrium*, *Thelesperma*, *Verbena* and *Vernonia*.

***Melissodes (Melissodes) comptoides*
Robertson**

Melissodes comptoides Robertson, 1898. Acad. Sci. St. Louis, Trans. 8, p. 52. ♀ ♂.

Melissodes martini hitei Cockerell, 1908. Ann. Mag. Nat. Hist. (8) 2, p. 33.

Melissodes (Melissodes) comptoides LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1087.

FEMALE—Length 12.5-13 mm., breadth of abdomen 5-5.5 mm.; black, mandibles with a subapical testaceous maculations; segments of flagellum beyond 2nd brownish-testaceous beneath, black above; apical tarsal segments becoming brownish-testaceous, spurs testaceous, tegulae rather dark anteriorly, becoming reddish-testaceous posteriorly, margin more yellowish; wings lightly infuscated, veins piceous; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length about half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum about twice the length of segment 2 on its shorter side, this about equal to apical width; clypeus rather dull, punctures quite coarse, deep and close, becoming narrowly finer and densely crowded toward apical margin, labrum with dense fine punctures along mid-line, these becoming more distinctly and widely separated laterally; lateral areas of face above clypeus closely, finely and quite deeply punctate, median area between antennae much more sparsely punctate, punctures becoming somewhat more sparse above; vertex very closely and finely punctate behind ocelli; cheeks with close, fine, deep and distinct punctures posteriorly, these becoming minute and obscure along margin of eye; punctures of scutum and mesopleura deep, distinct and quite coarse, slightly separated on scutum medially, becoming somewhat finer and much closer laterally, anteriorly and posteriorly, pleural punctures rather evenly distributed and quite close; punctures of scutellum much finer and closer, almost crowded; posterior face of propodeum dull, punctures quite deep and distinct, irregularly scattered, dorsal area much more closely, deeply and regularly punctate, lateral faces finely, closely and deeply punctate throughout; basal abdominal tergum largely covered with fine, deep, distinct, slightly separated punctures, only the apical third or fourth impunctate, the punctate area nearly reaching apical margin laterally; tergum 2 with deep, distinct, rather fine and slightly

separated punctures across basal area, these invading the apical impressed areas, but punctures finer and somewhat more widely separated, only the very narrow apical rim impunctate; terga 3 and 4 quite deeply, closely and rather finely punctate across base, punctures invading apical impressed areas where they are somewhat more sparse, apical rim of 3 narrowly impunctate; pygidium subtriangular, with narrowly rounded apex; pubescence rather short but largely pale on face, with some elongate black hairs between antennae and eyes, a row of black hairs across vertex, and a few elongate, black hairs around margin of clypeus; pubescence of cheeks whitish; scutum, scutellum and pleura above chiefly pale ochraceous pubescent, scutum posteriorly with a very few dark, erect hairs and a small amount of dark pubescence on scutellum; mesopleura with an intermixture of dark and light hairs on outer surface becoming black or fuscous pubescent beneath; propodeum entirely pale ochraceous pubescent; pubescence of legs largely dark, the fore and mid tibiae with a fuscous patch on outer surface toward apex, scopa entirely pale yellow, scopal hairs densely plumose; basal abdominal tergum with rather copious, erect, pale ochraceous pubescence basally, disc apically with some short but definite black pubescence on each extreme side, median area bare; tergum 2 with a basal, pale ochraceous fascia which is usually largely covered by tergum 1, and with a narrow, submedian, whitish fascia that is usually broadly interrupted medially, intermediate area between these fasciae with extremely short, suberect, black pubescence; tergum 3 with a submedian white fascia, with some thin white pubescence and scattered, erect black hairs toward basal margin; tergum 4 with a broad, dense, white fascia which is completely apical on each side, but median area rather broadly interrupted on apical margin, basal area of disc with erect, rather coarse and elongate black hairs which tend to overlie the white fascia; terga 5 and 6 entirely blackish or fuscous pubescent.

MALE—Length 10-13 mm., breadth of abdomen 3.5-5 mm.; black, the clypeus, labrum and base and apex of mandibles yellow; segments of flagellum beyond the 1st brownish-testaceous beneath, more piceous above, and basal segment piceous; apical tarsal segments becoming testaceous, spurs pale yellowish, tegulae brownish-testaceous, becoming somewhat more yellowish posteriorly; wings quite uniformly lightly infuscated, veins testaceous to piceous; apical margins of abdominal terga narrowly yellowish; cheeks much narrower than eyes; clypeus very slightly protuberant, its median length slightly greater than distance between eyes below; eyes rather strongly

convergent below; shorter side of basal segment of flagellum no longer than pedicel, much shorter than apical width, segment 2 at least six times longer; clypeus with rather fine, well separated but quite distinct punctures, those on labrum much finer and closer medially, becoming rather sparse at each extreme side; lateral areas of face above clypeus closely, finely and rather deeply punctate, supraclypeal area very sparsely so, punctures becoming more minute and indistinct above, surface shining; vertex quite closely and deeply punctate behind ocelli, and cheeks shining, with rather coarse and close punctures posteriorly, these becoming minute and obscure toward margin of eye; punctures of scutum, scutellum and pleura coarse, deep and distinct, rather well separated on scutum medially, becoming closer anteriorly and posteriorly, quite close over most of scutellum, rather uniformly slightly separated on pleura; posterior face of propodeum quite deeply, distinctly and coarsely punctate, punctures rather sparse on each side, otherwise close, dorsal area quite closely punctate medially, becoming more rugoso-punctate laterally, lateral faces shining between numerous, rather close, fine and shallow punctures; abdominal terga 1 and 2 with rather coarse, deep and distinct punctures basally, rather widely separated medially on 1, somewhat closer on 2, becoming minute and indistinct toward apical margin of 1, and invading the broad, impressed, apical area of 2 where the punctures are very sparse and minute; discs of terga 3 and 4 finely and closely punctate, punctures becoming densely crowded toward each side, apical impressed areas invaded only slightly by minute punctures; terga 5 and 6 very finely and densely rugoso-punctate; tergum 5 not noticeably angulate at each side, but tergum 6 with a triangular, robust, apical spine at each extreme side; pubescence entirely pale ochraceous on head, thorax and legs; basal abdominal tergum with copious ochraceous pubescence anteriorly, and somewhat shorter, suberect, fuscous or black pubescence posteriorly; tergum 2 with a broad, dense, basal, white fascia which is usually covered by apical margin of tergum 1, and with traces of oblique, narrow, whitish fasciae on each side, widely interrupted medially, disc otherwise covered with very short, suberect, blackish or fuscous pubescence nearly to the rim; tergum 3 with a submedian, white fascia which is slightly interrupted medially, and with some obscure white tomentum between this and base on each side, and tergum 4 with a subapical, dense, white fascia which is narrowed medially exposing the impunctate, shining, apical margin of the plate, basal areas of both 3 and 4 covered with suberect rather long dark hairs,

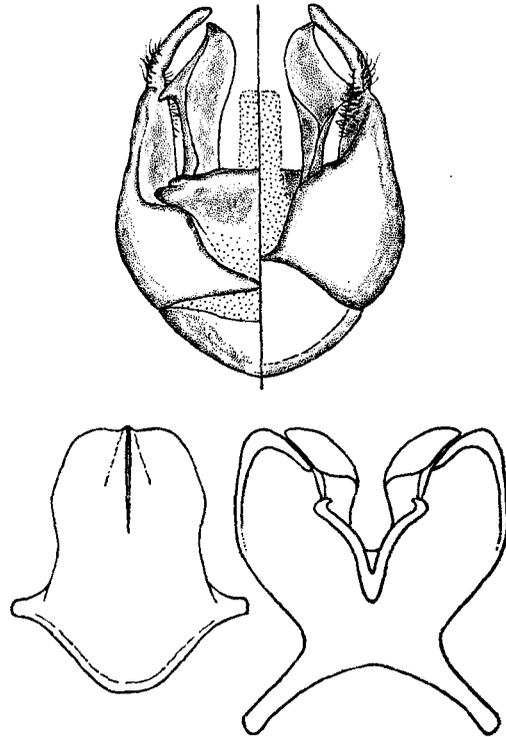


Figure 81
Dorsal (D) and ventral (V) aspects of genital armature, and sterna 7 and 8 in male of *Melissodes comptoides*.

and with some similar dark hairs beyond the fascia on 3; terga 5 and 6 entirely blackish pubescent; median length of pygidial plate about equal to basal width, margin strongly carinate, abruptly constricted toward apex which is broadly rounded or subtruncate; sterna 7 and 8 and genital armature as shown (fig. 81).

DISTRIBUTION — Arizona, Colorado and South Dakota, east to New Jersey and Florida, April to October.

FLOWER RECORDS — LaBerge (1956) lists the following: *Amphiachyris*, *Asclepias*, *Aster*, *Blephilia*, *Campanula*, *Cassia*, *Cleome*, *Cicuta*, *Cirsium*, *Diodea*, *Euphorbia*, *Gossypium*, *Helenium*, *Helianthus*, *Lepachys*, *Lespedeza*, *Ludwegia*, *Lycopus*, *Lythrum*, *Medicago*, *Melilotus*, *Monarda*, *Petalostemum*, *Prunella*, *Pycnanthemum*, *Ratibida*, *Solidago*, *Symphoricarpos*, *Taraxacum*, *Teucrium*, *Verbena*, *Vernonia* and *Veronica*.

Melissodes (Melissodes) tepaneca
Cresson
(Fig. 82)

- Melissodes tepaneca* Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 211. ♀ ♂.
Melissodes petalostemonis Robertson, 1909. Acad. Sci. St. Louis, Trans. 10, p. 53. ♀.
Melissodes galvestonensis Cockerell, 1905. Biol. Soc. Wash. Proc. 18, p. 181.
Melissodes bruesi Cockerell, 1906. Amer. Ent. Soc. Trans. 32, p. 110.
Melissodes loena Cockerell, 1909. Entomologist 42, p. 148.
Melissodes masuca Cockerell, 1909. Entomologist 42, p. 148.
Melissodes tepaneca aschenborniana Cockerell, 1912. Ann. Mag. Nat. Hist. (8) 10, p. 28.
Melissodes masuca Cockerell, 1917. N. Y. Ent. Soc. Jour. 25, p. 191.
Melissodes petalostemonis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Melissodes aurescens Cockerell, 1949. U. S. Natl. Mus. Proc. 98, p. 462.
Melissodes tepaneca panamensis Michener, 1954. Amer. Mus. Nat. Hist. 104, p. 132.
Melissodes (Melissodes) tepaneca LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1130.

FEMALE—Length 12-13 mm., breadth of abdomen 4.5 mm.; black, the mandibles more reddish, with an obscure faint yellow area apically; segments of flagellum beyond the 2nd testaceous beneath, piceous above, basal segments darker brownish; apical tarsal segments and entire hind tibiae and tarsi brownish-testaceous, spurs pale yellow, tegulae yellowish-hyaline; wings pale yellowish-hyaline, veins testaceous to brownish; abdominal terga becoming narrowly yellowish-hyaline apically; cheeks considerably narrower than eyes; clypeus very slightly protuberant, its median length slightly less than half the distance between eyes below; eyes very slightly convergent below; shorter side of segment 2 of flagellum about equal to breadth, about half the length of segment 1; punctures of clypeus rather coarse but shallow, slightly separated, becoming fine and densely crowded along apical margin, those on labrum very fine and densely crowded medially, becoming rather sparse laterally; lateral areas of face above clypeus finely, closely and rather shallowly punctate, the supraclypeal area very sparsely punctate, punctures becoming very sparse on each side above antennae where the surface is shining, but close and fine medially below ocelli, vertex closely and finely punctate behind ocelli; cheeks shining, with fine, slightly separated punctures posteriorly, these becoming minute and indefinite toward eye margin; scutum shining between rather deep,

moderately coarse punctures, these well separated over posterior half of disc, becoming closer laterally and anteriorly, those on scutellum somewhat finer and quite close; pleura somewhat shining between quite deep, distinct and rather coarse punctures, these well separated in general but becoming closer above beneath wing bases; posterior face of propodeum dull, punctures rather close but not very coarse, dorsal area quite coarsely but shallowly and closely punctate, lateral faces dull and tessellate between fine and very shallow punctures beneath dense pubescence; basal abdominal tergum quite closely and deeply punctate across base, punctures nearly reaching apical margin at each side, becoming more sparse apically, the broad median area impunctate; tergum 2 with deep, distinct, fine and well separated punctures across basal half, apical half with scattered, exceedingly minute, barely visible punctures; basal area of tergum 3 much more closely punctate, 5 and 6 very densely and finely rugoso-punctate, punctures of apical areas of 4 and 5 very fine but definite and distinct; pygidium triangular, with narrowly rounded apex; pubescence of head almost entirely pale ochraceous, with only a few dark hairs on vertex between ocelli, and thorax densely pale ochraceous pubescent, largely obscuring surface of scutum and scutellum, long and copious elsewhere; pubescence of legs largely pale, but front coxae with a few dark hairs, and front basitarsi with some dark hairs anteriorly, mid tibiae with more brownish pubescence on outer surface, the hind tibial scopa pale yellowish, hairs distinctly plumose; basal abdominal tergum with rather abundant, pale ochraceous pubescence across base, apical portion of disc with some suberect, dark pubescence visible toward each side; terga 2 and 3 with whitish, basal fasciae that are usually covered by the preceding tergal plate, and a narrow, median, whitish fascia separated from basal fascia by an area of suberect fuscous pubescence, and with some blackish pubescence across the apical impressed areas; tergum 4 with some blackish, suberect pubescence across base, but the broad apical area densely covered with whitish tomentum which is slightly interrupted on apical margin medially; terga 5 and 6 largely blackish or fuscous pubescent, with some pale hairs on 5 laterally.

MALE—Length 9.5-11 mm., breadth of abdomen 3.5 mm.; black, the clypeus, labrum and base of mandibles bright yellow, mandibles with a testaceous apical maculation; antennal flagellum pale testaceous beneath, piceous above; apical tarsal segments becoming testaceous, tibiae more or less infused with testaceous apically, spurs pale yellow, tegulae testaceous or yellowish-hyaline; wings faintly

yellowish, veins pale testaceous to brownish; apical margins of abdominal terga broadly yellowish-hyaline; cheeks little more than half as broad as eyes; clypeus only slightly protuberant, its median length about half the distance between eyes below; eyes quite strongly convergent below; basal segment of flagellum about equal to pedicel in length, segment 2 fully six times this length; punctures of clypeus rather shallow and obscure, well separated above medially, becoming rather close at each extreme side, close and fine on apical margin, those on labrum fine and close medially, becoming quite sparse laterally; lateral areas of face above clypeus quite closely and rather finely punctate, supraclypeal area impunctate medially, face becoming finely and densely punctate on each side, surface above antennae becoming minutely and more sparsely punctate between eyes and ocelli, surface shining, median area quite coarsely and closely punctate; punctures of vertex close and rather fine behind ocelli, cheeks shining, with rather fine and close punctures posteriorly, these becoming very minute and sparse toward eye margin; scutum shining, punctures quite deep and distinct, rather coarse and widely separated medially over posterior half, becoming much closer laterally and anteriorly, somewhat finer and rather sparse on scutellum, and pleura shining between deep, distinct and rather sparse punctures; posterior face of propodeum rather dull, punctures quite coarse, deep and close, dorsal area rather coarsely, closely and shallowly punctate, lateral areas more shining, punctures somewhat finer and quite close throughout; discs of abdominal terga with quite deep, distinct, well separated punctures medially, the punctures becoming slightly closer laterally and coarser across base, finer and more sparse toward the largely impunctate, impressed, apical areas, those on 4 and 5 very close across the base, crowded on 6; tergum 5 only obscurely angulate at each extreme side, and 6 with a rather short, slender, apical spine at each side; pubescence entirely pale yellowish on head, thorax and legs; basal abdominal tergum largely covered with pale ochraceous pubescence, but with some obscure, suberect, dark pubescence across apical third; tergum 2 with a rather broad, basal, pale tomentose fascia which is covered in part by the preceding plate, and with a narrow submedian pale fascia, these separated by an area of suberect blackish hairs, and apical impressed area with similar dark hairs; terga 3 and 4 with submedian, pale ochraceous fasciae, the basal pubescence suberect but entirely pale, apical areas with more elongate, suberect hairs; tergum 5 with a subapical fascia and with some elongate dark hairs across base; tergum 6 apparently entirely dark pubescent;

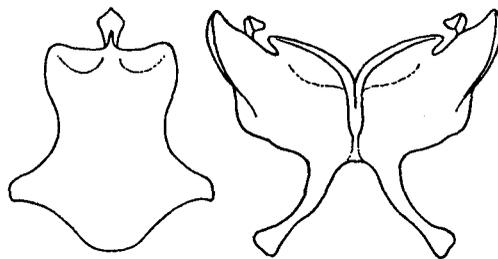


Figure 82
Sterna 7 and 8 in male of *Melissodes tepaneca*.

median length of pygidial plate about equal to basal width, slightly narrowed apically, with a narrow but deep subapical constriction on each side, apex subtruncate or broadly rounded; sterna 7 and 8 as shown (fig. 82); genital armature resembling *comptoides* (Fig. 81), but gonostyli very short, without evident setae.

DISTRIBUTION — Central America, north and east to Kansas, Illinois, North Carolina and Florida, March to November in the United States.

FLOWER RECORDS — LaBerge (1956) lists the following genera as host plants in the United States: *Abutilon*, *Agastache*, *Asclepias*, *Aster*, *Baccharis*, *Borrichia*, *Brazoria*, *Callirrhoe*, *Cephalanthus*, *Cercidium*, *Coreopsis*, *Dalea*, *Eryngium*, *Gaillardia*, *Gossypium*, *Grindelia*, *Helenium*, *Lactuca*, *Lindheimeria*, *Lythrum*, *Marrubium*, *Medicago*, *Monarda*, *Opuntia*, *Parkinsonia*, *Petalostemon*, *Phacelia*, *Phlox*, *Prosopis*, *Ratibida*, *Rubus*, *Rudbeckia*, *Salvia*, *Sisyrinchium*, *Teucrium*, *Verbesina* and *Verbena*.

***Melissodes (Heliomelissodes) desponsa*
Smith**

(Fig. 84)

Melissodes desponsa Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 310. ♀.

Melissodes nigripes Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 311. ♂. (not ♀)

Melissodes daponsa Bridwell, 1899. Kans. Acad. Sci. Trans. 16, p. 211.

Melissodes cnici Robertson, 1901. Canad. Ent. 33, p. 230. ♀ ♂.

Melissodes (Heliomelissodes) desponsa LaBerge, 1956. Univ. Kans. Sci. Bul. 38, p. 562.

FEMALE—Length 12-13.5 mm., breadth of abdomen 5-5.5 mm.; black, including labrum and base of mandibles, the latter with an apical testaceous maculation; flagellum beyond segment 2 brownish-testaceous beneath, black

above; apical tarsal segments becoming somewhat brownish, spurs testaceous, tegulae piceous; wings uniformly very lightly infuscated, veins brownish to piceous; cheeks nearly as broad as eyes; clypeus rather strongly protuberant, its median length slightly less than half distance between eyes below; eyes subparallel; basal segment of flagellum twice the length of shorter side of segment 2, which is about equal to the apical breadth; clypeus quite uniformly, deeply, distinctly, closely and rather coarsely punctate; punctures of labrum similar, but somewhat more crowded medially; face below antennae rather finely and closely punctate, becoming smooth and shining, with exceedingly minute and barely evident punctures above antennae, median area rather dull, with fine and rather vague punctures; vertex laterally with some rather distinct and close punctures; cheeks shining, posterior punctures distinct and close, becoming very minute along eye margin; scutum and scutellum somewhat shining between deep, distinct and rather coarse punctures, these slightly separated on disc of scutum posteriorly, becoming finer and densely crowded over anterior half, distinct and slightly separated on scutellum, rather shallow and quite close over mesopleura; posterior face of propodeum dull, punctures rather shallow, irregularly scattered, dorsal area dull, impunctate in mid-line but becoming rather coarsely reticulate laterally, lateral faces becoming somewhat shining anteriorly but otherwise very closely and finely punctate; basal abdominal tergum finely but rather deeply punctate across basal third, punctures rather sparse medially, closer laterally, the broad apical area entirely impunctate; tergum 2 very minutely and sparsely punctate medially, punctures becoming somewhat more distinct and close at each side basally, apical area practically impunctate; tergum 3 very finely and quite closely punctate across basal half, punctures invading apical area nearly to the rim but becoming very minute apically; tergum 4 even more closely punctate across base, becoming more rugose toward the sides basally; the depressed apical half very finely and closely punctate, the narrow apical rim impunctate; tergum 5 dull, with dense, minute punctures; median length of pygidium much greater than basal width, evenly narrowed apically to the narrowly rounded apex, with a slightly elevated median ridge apically; head with pale ochraceous pubescence around and above antennae and across vertex back of ocelli, the cheeks, clypeus, labrum and posterior margin of vertex with black pubescence, mandibles fringed beneath with very long, black or fuscous hairs; scutum with some short, rather inconspicuous black hairs posteriorly, and scutellum with a considerable area of black pubescence, otherwise dorsum of thorax

pale ochraceous pubescent, this extending across upper part of pleura and on posterior face of propodeum, the pleura laterally and below, and lateral faces of propodeum, black pubescent; legs largely black or fuscous pubescent, but scopa pale yellowish, hairs sparsely plumose; abdominal terga largely bare, but basal tergum with some rather short pale pubescence anteriorly, the more apical terga with short fuscous pubescence and scattered, elongate, suberect black hairs, entirely lacking pale fasciae.

MALE—Length 11-13.5 mm., breadth of abdomen 4-5 mm.; black, the clypeus yellow, with upper margin sometimes narrowly invaded with black; labrum and mandibles black, mandibles with orange maculae on outer surface near apex; 2nd and following segments of flagellum testaceous beneath, piceous above, the basal segment, pedicel and scape piceous to black; apical tarsal segments somewhat more brownish, spurs dark brownish to testaceous; tegulae blackish; wings very lightly and uniformly infuscated, veins brownish to piceous; cheeks much narrower than eyes; clypeus rather strongly protuberant, median length slightly greater than half the distance between eyes below; eyes very slightly convergent below; shorter side of basal segment of flagellum nearly twice as long as pedicel, segment 2 about two and one half times length of 1; punctures of clypeus and labrum quite deep, distinct, rather close and coarse, those on face on each side below antennae somewhat finer and very close, becoming somewhat more sparse above, surface somewhat more shining, well separated on each side of vertex between eyes and ocelli, but very fine and densely crowded medially, rather close along cheeks posteriorly but becoming minute and widely separated toward margin of eye; punctures quite deep, distinct and rather coarse on scutum and scutellum, slightly separated on scutellum and on scutum posteriorly, becoming finer and densely crowded laterally and anteriorly; punctures quite coarse and close on pleura laterally, becoming finer and closer below, sometimes with a shining, impunctate space just beneath wing base; posterior face of propodeum quite dull, tessellate, punctures irregularly scattered, rather shallow but coarse, dorsal area with a few rather coarse punctures along mid-line, becoming rather coarsely reticulate toward each side, lateral faces becoming somewhat smooth and shining anteriorly and below, punctures becoming obsolescent; punctures of abdominal terga quite deep and distinct, rather coarse, well separated on basal tergum, becoming closer laterally, apical area somewhat invaded by very minute punctures, these becoming close laterally, the margin becoming impunctate; punctures of terga 2 and

3 very fine and well separated toward each side, apical impressed area quite broad, invaded nearly to the rim with very minute, rather close, barely distinguishable punctures; terga 4 and 5 very finely and much more closely punctate, the depressed margins invaded by minute, rather close punctures nearly to the rims; tergum 5 with a slight angle at each extreme side, and tergum 6 with a corresponding, triangular spine-like projection; face with some pale ochraceous pubescence around and between antennae and across vertex, some erect fuscous hairs on each side of clypeus and across posterior margin of vertex; cheeks entirely black pubescent; scutum, scutellum, propodeum and upper part of pleura entirely pale ochraceous pubescent, pleura black pubescent below, and legs with largely black hairs, somewhat paler on inner surface of hind tibiae; basal abdominal tergum with rather copious, erect and elongate, pale ochraceous pubescence across basal half, but with some fuscous pubescence on anterior face near base and some short blackish pubescence on each extreme side apically; pubescence of discs otherwise largely black, suberect, rather thin, short medially, becoming more evident laterally and more elongate on the more apical terga, with no fasciae evident; median length of pygidial plate subequal to basal width, slightly narrowed apically to the abruptly truncate apex, with a slight emargination on each side toward apex; sterna 7 and 8 and genital armature as shown (fig. 84).

DISTRIBUTION — North Dakota to Nova Scotia, South to Oklahoma, Alabama and North Carolina, June to October.

FLOWER RECORDS — *Aster*, *Brauneria*, *Carduus*, *Cassia*, *Centaurea*, *Cirsium*, *Coreopsis*, *Helianthus*, *Inula*, *Monarda*, *Pontederia*, *Pycnanthemum*, *Rudbeckia*, *Silphium*, *Solidago* and *Verbena*.

Melissodes (Apomelissodes) apicata
Lovell and Cockerell

(Fig. 83)

Melissodes apicata Lovell and Cockerell, 1906. Psyche 13, p. 111. ♀.

Melissodes (Apomelissodes) apicata LaBerge, 1956. Univ. Kans. Sci. Bul. 38, p. 551.

FEMALE—Length 11.5-12 mm., breadth of abdomen 4.5-5 mm.; black, including clypeus and labrum entirely, and mandibles and legs in large part, mandibles with an apical yellowish spot, apical tarsal segments somewhat more brownish; segments of flagellum beyond the 2nd brownish beneath, black above; tegulae piceous; wings subhyaline at base, becoming very lightly infuscated apically, veins

brownish to piceous; apical rims of abdominal terga very narrowly yellowish-hyaline; cheeks considerably narrower than eyes; clypeus rather strongly protuberant, its median length approximately half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum about twice as long as shorter side of segment 2 which is slightly broader than long; clypeus rather coarsely, striately punctate, labrum much more finely and densely so; lateral areas of face below antennae quite closely and coarsely punctate, median area above antennae closely and deeply punctate, lateral areas rather smooth and entirely impunctate; vertex with fine, very close punctures medially, becoming somewhat more separated laterally, cheeks with well separated punctures, rather coarse along hind margin, becoming very fine along eye margin; scutum and scutellum shining, punctures deep and distinct, coarse and well separated on scutum medially, becoming fine and close laterally and anteriorly, those on scutellum somewhat finer, uniformly close; mesopleura less shining, punctures quite coarse but rather shallow, subcontiguous; propodeum posteriorly with rather coarse scattered punctures, dorsal area impunctate along mid-line, becoming quite closely and shallowly punctate laterally, lateral faces somewhat more finely and closely punctate, becoming smooth but dull below and anteriorly; basal abdominal tergum somewhat shining, punctures fine and rather vague, irregularly scattered and sparse, apical third entirely impunctate; discs of terga 2 and 3 with fine but quite distinct, well separated punctures, these becoming somewhat closer at extreme sides, those on 4 and 5 much closer; median length of pygidium somewhat greater than basal width, elongate triangular, apex narrowly rounded; pubescence of head largely white, but with a fringe of black hairs across vertex, and a few black hairs around antennae; scutum and scutellum largely black pubescent, but scutum with a band of white pubescence anteriorly, this continuing very narrowly along lateral margins to the propodeum; tubercles with elongate black hairs, thorax otherwise whitish pubescent; legs largely white pubescent, but fore and mid tibiae with a fuscous patch on outer surface; scopa creamy white, hairs short plumose; basal abdominal tergum with rather copious, erect, whitish pubescence anteriorly and laterally; terga 2-4 with rather broad and very dense, completely apical, white fasciae, this more or less interrupted on 2; discs of terga 2-5 with black pubescence, this very short on 2 and 3 basally, becoming more elongate apically and overlying the fascia to some degree on 3 and 4; tergum 5 with a very dense fimbria of elongate black hairs apically; tergum 6 black pubescent on each side of pygidium.

MALE—Length 9.5-12 mm., breadth of abdomen 3.5-5 mm.; black, including labrum and mandibles, clypeus yellow, with apical margin narrowly black and upper and lateral margins more or less invaded with black; antennal flagellum brownish-testaceous toward the base, becoming more piceous apically, and piceous above; apical tarsal segments somewhat more brownish, spurs pale testaceous; tegulae piceous to black; wings lightly infuscated, veins brownish to piceous; apical rims of abdominal terga very narrowly yellowish-hyaline; cheeks nearly equal to eyes in width, the clypeus slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes slightly convergent below; shorter side of basal segment of flagellum only slightly longer than pedicel, segment 2 about five times this length; punctures of clypeus close and rather coarse, somewhat more vague on maculated area, finer and closer on labrum medially, becoming somewhat separated laterally; punctures of face quite coarse and close, becoming very fine and well separated above, between eyes and ocelli, where surface is shining, close and rather fine on vertex medially becoming somewhat coarser and more distinctly separated laterally, quite coarse, distinct and well separated on cheeks, becoming fine and close along margin of eye; scutum and scutellum shining, punctures deep, distinct and quite coarse, well separated medially on scutum, becoming somewhat finer and closer laterally and anteriorly, somewhat finer on scutellum, but evenly distributed and slightly separated; mesopleura rather dull, punctures quite coarse but shallow and close; posterior face of propodeum with rather coarse, shallow, scattered punctures, surface somewhat shining, dorsal area narrowly impunctate along mid-line, becoming shallowly rugose or reticulate laterally, lateral faces more finely and closely punctate, the punctures becoming obsolescent below and anteriorly; basal abdominal tergum largely covered with deep, distinct, rather fine, well separated punctures medially, these becoming closer laterally, fine and well separated toward apical rim; discs of terga 2-5 with very fine, rather deep and distinct, slightly separated punctures, these becoming somewhat more minute beneath the dense fasciae; tergum 5 not angulate laterally; tergum 6 with a distinct, triangular, apical spine at each extreme side; pubescence of head largely pale ochraceous, but with a quite dense fringe of black hairs across vertex; scutum and scutellum largely fuscous pubescent, anterior third of scutum with pale ochraceous pubescence which extends narrowly along lateral margins to the propodeum, thorax and legs otherwise pale ochraceous pubescent; basal abdominal tergum with copious, elongate, pale ochraceous pubescence anteriorly, but with

apical third more or less covered with shorter, suberect, black pubescence; terga 2-5 with rather broad, dense, completely apical, white fasciae, completely hiding apical margins, discs with copious but rather short, erect, black pubescence, some black hairs overlying the white fasciae apically, pubescence of tergum 6 entirely black; basal half of pygidial plate somewhat rounded and elevated, with subcarinate margins and a low median ridge that projects apically, the apical part somewhat depressed, subtruncate, margin very slightly outcurved; sternum 7 as shown (fig. 83); sternum 8 similar to *fimbriata* but more broadly rounded apically; genital armature as in *fimbriata*.

DISTRIBUTION — Maine to Florida, through the Atlantic coast states, March to July.

FLOWER RECORDS — Females visit *Pontederia*, but males have been collected also on *Hydrocotyle*, *Melilotus* and *Stachys*.

Melissodes (Apomelissodes) fimbriata
Cresson

(Fig. 83)

Melissodes fimbriata Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 203. ♀ ♂.

Melissodes perplexa Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 206. (♂ misident)

Melissodes (Apomelissodes) fimbriata LaBerge, 1956. Univ. Kans. Sci. Bul. 38, p. 545.

FEMALE—Length 11-12 mm., breadth of abdomen 4 mm.; black, the mandibles pale yellowish apically; segments of flagellum beyond the 2nd brownish-piceous beneath, black above; apical tarsal segments brownish-testaceous, and spurs pale yellowish; tegulae black, strongly narrowed anteriorly; wings subhyaline basally, becoming lightly infuscated apically, veins brownish to piceous; cheeks subequal to eyes in width, clypeus only slightly protuberant, its median length slightly greater than distance between eyes below; eyes very slightly convergent below; basal segment of flagellum about one and one half times segment 2, which is somewhat longer than broad; punctures of clypeus quite coarse and very close, becoming finer and densely crowded apically, the labrum more shallowly rugosopunctate; face laterally with fine and close punctures, these becoming rather sparse above where surface is shining, somewhat coarser medially, fine and close on vertex back of ocelli, becoming more widely separated laterally and on cheeks; scutum and scutellum shining, punctures deep and distinct, rather coarse and well separated on scutum medially, becoming close and somewhat finer laterally and anteriorly.

orly, evenly distributed on scutellum; mesopleura rather coarsely, closely and shallowly punctate; posterior face of propodeum quite coarsely but shallowly punctate, becoming rather sparsely so above, dorsal area impunctate along mid-line, becoming dull and densely rugoso-punctate laterally, lateral faces quite uniformly closely punctate throughout; anterior half of basal abdominal tergum rather dull, punctures shallow but rather coarse and well separated medially, becoming closer and finer laterally, disc rather broadly impunctate across apical third; terga 2 and 3 more finely, deeply and distinctly punctate, well separated medially, becoming quite close at extreme sides and quite close over most of tergum 4; tergum 5 densely and rather finely rugoso-punctate; pygidium quite narrow and elongate, nearly parallel-sided, with a narrowly rounded apex; pubescence whitish in general on head, with a few dark hairs across vertex; scutum and scutellum with copious, erect, fuscous pubescence, scutum narrowly pale pubescent across anterior margin, and the entire pleura propodeum and legs pale pubescent; tibial scopa pale ochraceous, hairs slender, elongate and simple, without evident plumosities; basal abdominal tergum with rather copious, elongate, pale pubescence across base and along lateral margins; tergum 2 with a basal fringe of rather loose, whitish, plumose hairs, usually covered by the apical part of tergum 1; terga 2-4 with whitish, subapical fasciae that occupy the rather narrow, apical, impressed areas, disc of tergum 2 with very short, thin, whitish hairs and a few dark hairs at each extreme side, 3 and 4 with somewhat more conspicuous and erect blackish pubescence which overlies in part the apical fascia; tergum 5 largely fuscous or blackish pubescence this becoming pale to some degree at each extreme side, forming a dense apical fimbria.

MALE—Length 9-10.5 mm., breadth of abdomen 3.5-4 mm.; black, clypeus bright yellow, labrum and mandibles entirely black, flagella brownish-testaceous beneath, more piceous above, apical tarsal segments somewhat more piceous, and spurs brownish-testaceous; tegulae black, strongly narrowed anteriorly; wings very faintly infuscated basally, becoming somewhat more deeply so apically, veins brownish to piceous; apical margins of terga 2-5 obscurely yellowish-hyaline; cheeks considerably narrower than eyes, clypeus somewhat protuberant, its median length considerably greater than half the distance between eyes below; eyes somewhat convergent below; shorter side of basal segment of flagellum very slightly longer than pedicel, segment 2 about five times as long; punctures of clypeus rather fine and close, somewhat deeper and more distinct on labrum; face laterally rather dull

and finely punctate below antennae, punctures becoming somewhat more sparse above, close, deep and distinct on vertex medially, more widely separated laterally and on cheeks; scutum and scutellum shining, punctures deep, distinct and rather coarse, well separated on scutum medially; pleura quite dull, somewhat more shining anteriorly; punctures shallow but quite coarse and close; posterior face of propodeum somewhat shining, punctures rather shallow but coarse and somewhat separated medially, becoming closer laterally and on lateral faces, dorsal area distinctly punctate medially, becoming rugose at each side; basal abdominal tergum with rather deep and distinct, moderately coarse, well separated punctures medially, becoming closer laterally and somewhat closer and finer toward the narrow

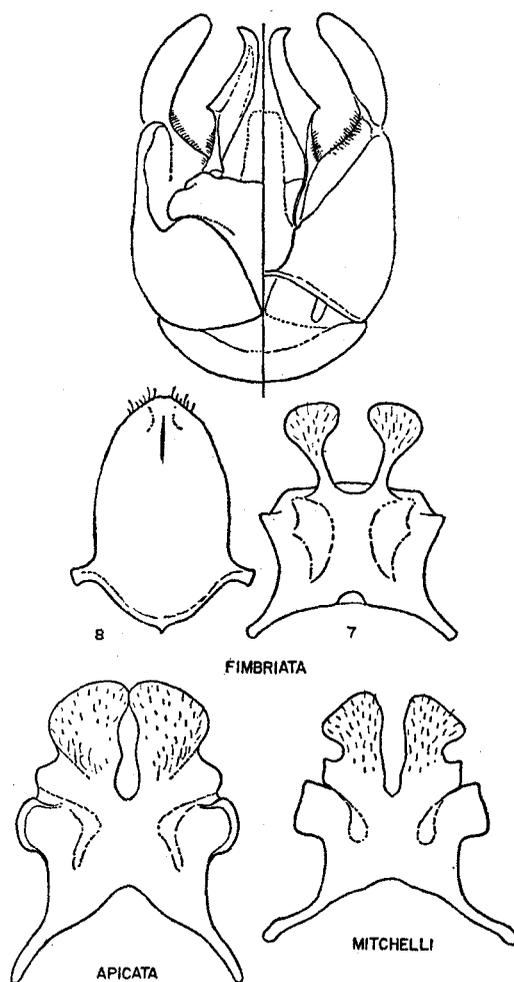


Figure 83
Sternum 7 in males of *M.* (*Apomelissodes*);
sternum 8 and genital armature in *M.* (*A.*)
fimbriata.

impunctate apical margin; discs of terga 2-4 with quite deep, distinct and rather sparse punctures medially, these becoming somewhat closer laterally, rather abruptly densely crowded along margin of the impunctate, depressed apical margins; terga 5 and 6 more finely and closely punctate, becoming densely so on 6 laterally; tergum 5 with an obscure angle on each extreme side; tergum 6 with a corresponding, rather slender, subtriangular, spine-like projection; scutum and scutellum with abundant, rather long and erect, blackish pubescence, scutum with whitish pubescence anteriorly, which extends along lateral margins to the propodeum; head, thorax and legs otherwise whitish pubescent; abdominal terga 1 and 2 entirely pale pubescent, 2 with a thin, basal, white fascia, usually covered by rim of tergum 1, terga 2-5 with whitish fasciae occupying the rather narrow, depressed, apical margins of each; discs of terga 3-6 with rather abundant, erect, black pubescence; tergum 6 not fasciate, fully exposed to apical rim; pygidial plate strongly elevated basally, with subparallel, lateral, carinate margins, abruptly constricted before apex which is rather broadly subtruncate; sterna 7 and 8 and genital armature as shown (fig. 83).

DISTRIBUTION—Virginia to Georgia, west to Texas and Kansas, April to July.

FLOWER RECORDS — Females visit *Oenothera*, in North Carolina chiefly *O. laciniata*, but males have been collected on *Helianthus* and *Kneiffia*.

Melissodes (Apomelissodes) mitchelli
LaBerge

(Fig. 83)

Melissodes (Apomelissodes) mitchelli LaBerge, 1956. Univ. Kans. Sci. Bul. 38, p. 556. ♂ ♀.

FEMALE—Length 10-11 mm., breadth of abdomen 4 mm.; black, including labrum, mandibles and tegulae, the antennal flagellum rather brownish-piceous beneath, black above; apical tarsal segments becoming somewhat brownish-testaceous, spurs pale testaceous; wings subhyaline basally, becoming lightly infuscated apically, veins testaceous to piceous; apical margins of abdominal terga narrowly testaceous; cheeks slightly narrower than eyes; clypeus slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum slightly less than twice the length of segment 2 which is about as broad as long; clypeus and supra-clypeal area shining and sparsely punctate medially, punctures becoming rather coarse, close and shallow on clypeus laterally,

fine and close apically; punctures of labrum rather uniformly fine and close; lateral areas of face rather closely and shallowly punctate below level of antennae, becoming more sparsely punctate above and in median area where surface is shining; vertex closely and rather finely punctate back of ocelli, punctures becoming more distinctly separated but still quite close laterally and on cheeks; scutum shining, punctures quite coarse, well separated over posterior half, becoming fine and quite densely crowded laterally and anteriorly, finer and rather irregular but well separated over most of scutellum; mesopleura dull, punctures rather coarse and shallow but somewhat variable; posterior face of propodeum rather dull, punctures rather coarse and numerous but somewhat separated, dorsal area largely impunctate medially, but becoming rather finely punctate at each side, lateral faces quite fully punctate, coarsely so posteriorly, becoming very finely and densely so anteriorly and below; disc of basal abdominal tergum rather dull, median punctures very minute and obscure, quite sparse, becoming somewhat more distinct and close toward each side; discs of terga 2 and 3 rather dull, median punctures very minute and well separated, becoming somewhat closer but still obscure laterally; tergum 4 with much more distinct, deep and fine punctures which become quite close at each extreme side; median length of pygidium somewhat greater than basal width, margins sub-parallel, apex broadly rounded; pubescence of head largely white, but with a few dark hairs back of ocelli; scutum and scutellum largely covered with erect and rather copious, fuscous pubescence, scutum very narrowly whitish pubescent anteriorly, this extending very narrowly along lateral margins to propodeum, thorax otherwise whitish pubescent; legs whitish pubescent in large part, but front and mid tibiae with a fuscous pubescent patch on outer surface, scopa entirely whitish, of rather elongate robust hairs which are very sparsely plumose; basal abdominal tergum with rather elongate, whitish pubescence anteriorly and laterally, otherwise bare; terga 2 and 3 with basal, white tomentose fasciae that are usually covered by the preceding tergal plate, and with dense whitish fasciae occupying the depressed apical margins nearly to the rim, that on 2 widely interrupted medially, slightly so on 3, discs with very short and obscure, dark pubescence, more evident on extreme sides; disc of tergum 4 quite densely, short, fuscous pubescent, with a few elongate apical dark hairs that overly the rather broad, dense, apical, white fascia; tergum 5 entirely covered with fuscous pubescence, obscuring the surface, that on 6 dense and more brownish on each side of pygidium.

MALE—Length 11 mm., breadth of abdomen 4 mm.; black, clypeus bright yellow, labrum and mandibles black in large part, antennal flagellum brownish-testaceous beneath, piceous above, apical tarsal segments becoming dull testaceous, spurs testaceous, and tegulae black; wings subhyaline basally, becoming very faintly clouded apically, veins testaceous to brownish; abdominal terga rather narrowly brownish-hyaline apically; cheeks considerably narrower than eyes; clypeus somewhat protuberant, its median length considerably greater than half the distance between eyes below; eyes slightly convergent below; shorter side of basal segment of flagellum very slightly longer than pedicel, segment 2 five or six times this length; punctures of clypeus rather coarse and close, but shallow and inconspicuous, labrum more finely and closely punctate; punctures rather close and deep on lateral areas of face below antennae, becoming somewhat finer and more distinctly separated above, fine and irregular on vertex back of ocelli, and rather fine and close on cheeks anteriorly, becoming somewhat more sparse posteriorly and below; scutum and scutellum shining, punctures of scutum coarse, deep and well separated medially, becoming somewhat finer and very close laterally and anteriorly, much finer and rather sparse on scutellum medially, becoming somewhat closer and coarser laterally; pleura rather dull between quite coarse, close and shallow punctures; propodeum posteriorly somewhat shining, with scattered, rather coarse, shallow punctures, dorsal area impunctate in mid-line, becoming rather irregularly and shallowly punctate laterally, lateral faces quite coarsely and rather deeply punctate, punctures becoming considerably finer and closer below; basal abdominal tergum with rather deep and distinct but rather fine and well separated punctures medially, these becoming somewhat closer and finer at each extreme side, the apical impressed margin entirely impunctate; discs of terga 2 and 3 with fine, well separated, quite regularly distributed punctures, becoming slightly closer at extreme sides; discs of terga 4 and 5 much more finely, deeply, distinctly and closely punctate; punctures of tergum 6 obscured by dense pubescence; tergum 5 not distinctly angulate or spinose laterally, but tergum 6 with a small, carina-like, triangular, lateral process at each side; pubescence of head largely creamy-white, with a very few dark hairs around ocelli; scutum and scutellum with rather abundant, erect, fuscous pubescence, the scutum very narrowly pale pubescent anteriorly and along lateral margin to the propodeum, thorax and legs otherwise whitish pubescent; basal abdominal tergum with copious, elongate and erect, whitish pubescence anteriorly and laterally, largely bare

otherwise; terga 2 and 3 with basal, whitish fasciae that are usually covered by the preceding plates; terga 2-5 with apical, dense, whitish fasciae, largely occupying the rather narrow, depressed, apical margins, discs with dark pubescence that is short on tergum 2, becoming progressively more elongate on the more apical segments, with elongate black hairs more or less overlying the white fasciae; pubescence of terga 6 and 7 entirely fuscous or black; pygidial plate strongly elevated toward base, with subparallel, lateral, carinate margins, abruptly constricted before apex which is rather broadly subtruncate; sternum 7 as shown (fig. 83); sternum 8 similar to *fimbriata* but more broadly rounded apically; genital armature as in *fimbriata*.

DISTRIBUTION — North Carolina to Florida, April and May.

FLOWER RECORD—No collections have been on other than *Opuntia*.

Melissodes (Callimelissodes)
coloradensis Cresson

(Fig. 84)

Melissodes coloradensis Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 200. ♀ ♂.

Melissodes (Callimelissodes) coloradensis LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 346.

FEMALE—Length 14-16 mm., breadth of abdomen 5.5 mm.; black, including clypeus, labrum and tegulae; mandibles with a vague, subapical yellowish area; segments of flagellum beyond the 2nd brownish-testaceous beneath, black above; apical tarsal segments becoming testaceous; wings quite deeply infuscated, veins piceous; cheeks distinctly narrower than eyes; clypeus not markedly protuberant, its median length about half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum nearly twice the length of segment 2, the latter slightly longer than broad; clypeus somewhat shining between coarse, close and deep punctures, these becoming finer and more densely crowded apically, labrum somewhat more finely but very closely and deeply punctate; median area of face, above and on each side of clypeus, rather closely and deeply punctate, lateral areas above antennae becoming smooth and very sparsely punctate, vertex and cheeks with fine and well separated punctures; scutum, scutellum and mesopleura shining between coarse and deep punctures, these rather widely separated on scutum medially, much closer and finer laterally and anteriorly, somewhat finer and evenly distributed on scutellum, rather close over most of pleura; propodeum dull and tessellate, punctures rather coarse, shallow and

well separated, becoming closer on lateral faces, dorsal area becoming rather coarsely and shallowly rugoso-punctate on each side, lateral faces becoming somewhat more shining and sparsely punctate below and along anterior margin; abdominal terga with rather deep and distinct punctures, these rather widely separated medially on basal tergum, becoming progressively closer on the more apical terga, and becoming obsolescent toward apical margin of each plate, the rather narrow apical margins impunctate; median length of pygidium considerably greater than basal width, gradually narrowed to the rather broadly rounded apex; pubescence of head entirely pale ochraceous; scutum and scutellum with short, erect, fuscous, pubescence in large part, the scutum pale pubescent only across the narrow anterior margin, and scutellum with a few pale hairs around posterior margin, thorax otherwise pale ochraceous pubescent; legs, including scopa, largely pale ochraceous pubescent, but fore and mid tibiae with somewhat darker hairs on outer face, scopal hairs densely plumose; basal abdominal tergum with rather copious, erect, pale ochraceous pubescence across base; tergum 2 with a narrow, basal, ochraceous fascia and with a vestige of a pale subapical fascia on each extreme side; tergum 3 with a subapical, rather narrow, pale fascia that is widely interrupted medially; and tergum 4 with a rather broad, apical fascia which is partially interrupted medially on the apical margin; discal pubescence of these tergal plates very short and inconspicuous, but erect and entirely dark, that on 4 more abundant, entirely dark on 5, forming a blackish or fuscous apical fimbria of long appressed hairs along posterior margin, these becoming pale at each extreme side, and pubescence of tergum 6 dark on each side of pygidium.

MALE—Length 14.5-16 mm., breadth of abdomen 5-5.5 mm.; black, the clypeus, labrum and base of mandibles bright yellow, mandibles dark apically but with an outer, orange maculation covering most of apical half; flagellum brownish-testaceous beneath, piceous above, apical tarsal segments brownish-testaceous, spurs brownish-testaceous, tegulae black; wings uniformly pale brownish, veins brownish to piceous; cheeks distinctly narrower than eyes; clypeus not markedly protuberant, its median length slightly greater than half the distance between eyes below; eyes slightly convergent below; shorter side of basal segment of flagellum very slightly longer than pedicel, segment 2 about six times this length; punctures of clypeus rather coarse and distinct, slightly separated, those of labrum somewhat finer and closer, rather fine and densely crowded on each side of face above

clypeal margin, becoming somewhat more distinctly separated above antennae, rather coarse and well separated on vertex laterally and over most of cheeks; scutum and scutellum somewhat shining between deep, distinct punctures, these rather coarse, slightly separated in center of scutum, becoming somewhat finer and very close laterally and anteriorly, well separated but hardly sparse on scutellum, close, deep and coarse beneath dense pubescence on pleura; punctures coarse but rather shallow on the dull posterior face of propodeum, lateral faces somewhat more shining, quite fully punctate, dorsal area impunctate on midline, but becoming irregularly rugose lateral-

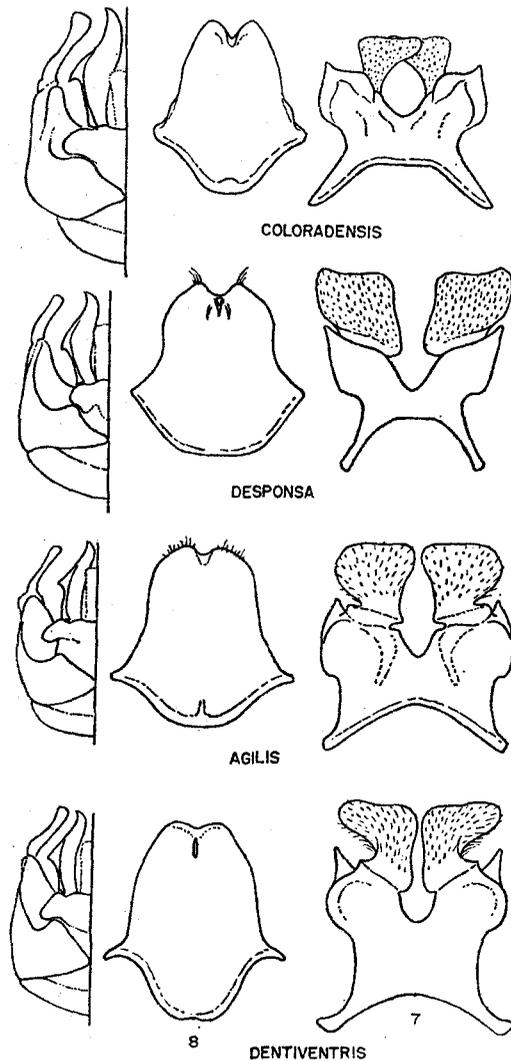


Figure 84
Genital armature and sterna 7 and 8 in males
of *Melissodes*.

ly; discs of abdominal terga deeply and rather coarsely punctate, rather sparsely so medially, but otherwise rather close, invading to a considerable degree the impressed apical areas, only the rather narrow apical rims impunctate; terga 4-6 dull, punctures fine and densely crowded; tergum 5 with an obscure angle at each extreme side, and tergum 6 with a corresponding pronounced, triangular spine at each side; scutellum and posterior half or more of scutum covered with suberect and rather copious, fuscous pubescence, otherwise entire head, thorax, legs and basal abdominal tergum pale ochraceous pubescent; tergum 2 with a narrow and rather obscure band of pale pubescence across base, usually covered by tergum 1; terga 3 and 4 with ochraceous fasciae evident at each side, widely interrupted medially on 3, more narrowly so on 4, tergum 5 with a similar, more apical, ochraceous fascia, interrupted on apical margin medially; median length of pygidial plate considerably less than basal width, slightly narrowed apically, with a subapical constriction, apex abruptly and rather broadly truncate; sterna 7 and 8 and genital armature as shown (fig. 84).

DISTRIBUTION—California to North Carolina, through Illinois and Ohio.

FLOWER RECORDS—According to LaBerge (1961) *Helianthus* is the primary source of pollen for *coloradensis*, but it has been recorded as visiting also species of the following: *Cirsium*, *Coreopsis*, *Heliopsis*, *Liatrix*, *Lythrum*, *Rudbeckia*, *Silphium*, *Solanum*, *Solidago*, *Verbena* and *Vernonia*.

Melissodes (Eumelissodes) agilis
Cresson
(Fig. 84)

Melissodes agilis Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 204. ♂.

Melissodes aurigena Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 212. ♀ ♂.

Melissodes (Eumelissodes) agilis LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 382.

FEMALE—Length 10.5-15 mm., breadth of abdomen 4-5 mm.; black, mandibles with an obscure yellowish spot apically; segments of flagellum beyond the 2nd brownish-testaceous below, black above; apical tarsal segments brownish-testaceous, spurs pale yellowish; tegulae testaceous, but obscured by dense pubescence; wings whitish-hyaline, veins testaceous to brownish; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length about half the distance between eyes below; eyes very slightly

convergent below; basal segment of flagellum less than twice the length of segment 2, shorter side of the latter about equal to its apical width; clypeus rather dull, punctures quite coarse, close and deep, those on labrum somewhat more widely separated; supraclypeal area largely impunctate medially, lateral areas of face below antennae very closely and finely punctate, becoming minutely punctate above where surface is shining, somewhat more coarsely and deeply punctate medially; vertex with fine and close punctures medially; cheeks shining, closely punctate posteriorly, becoming minutely and obscurely punctate toward margin of eye; scutum and scutellum quite coarsely and deeply punctate beneath dense pubescence; punctures rather coarse and slightly separated on scutum medially, becoming closer and finer laterally and anteriorly, quite coarse and slightly separated on scutellum; punctures of pleura rather coarse and shallow, slightly separated, becoming somewhat finer and closer posteriorly; posterior face of propodeum dull, punctures very shallow and vague, dorsal area dull but shallowly rugose, lateral faces somewhat more shining and more closely and finely punctate, becoming quite smooth below; discs of abdominal terga with fine, slightly separated punctures across basal half, tergum 1 impunctate apically, 2 and 3 with very minute and sparse punctures apically, 3-5 with very fine, densely crowded punctures basally; pygidium elongate-triangular, apex narrowly rounded; pubescence entirely bright ochraceous or fulvous on head and thorax, ochraceous on legs, with some brownish hairs on front basitarsi and mid tibiae, hind tibial scopa ochraceous, the hairs quite densely plumose; basal abdominal tergum with copious, erect and rather long, ochraceous pubescence, with no dark hairs in evidence; tergum 2 with a basal, yellowish fascia and a submedian fascia, the intervening pubescence thin and entirely pale; tergum 3 with a somewhat broader, subapical, ochraceous fascia, and 5 with a broad, dense, uninterrupted, apical tomentose area; tergum 5 largely fuscous pubescent, with some elongate ochraceous hairs on each side, apical margin largely occupied by a dense fuscous fimbria; tergum 6 fuscous pubescent on each side of pygidium.

MALE—Length 9-12 mm., breadth of abdomen 3.5-4 mm.; black, the clypeus entirely, labrum in large part, and base of mandibles, yellow, labrum black at each extreme side; segments of flagellum beyond the 1st pale testaceous beneath, brownish above; apical tarsal segments brownish-testaceous, spurs pale yellow; tegulae covered with dense, pale pubescence; wings whitish-hyaline, veins pale testaceous; apical margins of abdominal terga broadly pale yellowish-hyaline; cheeks consid-

erably narrower than eyes; clypeus only very slightly protuberant, its median length very slightly greater than distance between eyes below; eyes rather strongly convergent below; shorter side of basal segment of flagellum very little longer than pedicel, segment 2 six or seven times longer; punctures of clypeus rather deep and close, moderately coarse, but obscured by the yellow color and abundant pubescence, those on labrum somewhat closer and coarser; supraclypeal area largely impunctate, but lateral areas of face above clypeus very finely but distinctly punctate, punctures becoming minute and more widely separated above, between eyes and ocelli; vertex rather finely and closely punctate, and cheeks with deep, distinct but rather fine, well separated punctures which become very minute toward eye margin; scutum and scutellum shining between quite deep, distinct and rather coarse punctures, these well separated medially over posterior half, becoming somewhat finer and closer laterally and anteriorly, well separated also on scutellum; punctures of peura well separated, rather coarse and shallow, becoming finer and closer posteriorly; posterior face of propodeum rather dull, the punctures shallow but rather coarse, irregularly scattered, dorsal area dull, becoming rather coarsely rugoso-punctate, lateral faces with rather close and coarse punctures posteriorly, becoming finer and more obscure anteriorly and below; discs of abdominal terga with distinct but rather shallow punctures, these rather coarse on basal tergum, becoming progressively finer and closer on the more apical terga, apical margins with only very minute, widely scattered and sparse punctures; tergum 5 obscurely angulate at each extreme side, and tergum 6 with a triangular, acute, spine-like posterior projection on each extreme side; pubescence entirely whitish or pale ochraceous on head, thorax and legs, somewhat more yellowish on tarsal segments, almost brownish on basitarsi beneath; basal abdominal tergum with copious, elongate and more or less erect, pale ochraceous pubescence; tergum 2 with a broad, loose, pale, basal fascia, covered in part by disc of tergum 1, and terga 2-5 with pale yellowish fasciae that border the apical hyaline margins, the more basal pubescence on each thinner but entirely pale and suberect; median length of pygidial plate somewhat greater than basal width, margins somewhat converging apically to a deep subapical constriction, the apex rather broadly truncate; sterna 7 and 8 and genital armature as shown (fig. 84).

DISTRIBUTION—With the apparent exception of Florida, *agilis* occurs throughout the United States, Southern Canada

and Northern Mexico, and is in flight from May to November in the East.

FLOWER RECORDS—LaBerge (1961) states that *agilis* is apparently an oligolege of *Helianthus*. Other plants visited, including records from the literature, are species of *Abutilon*, *Althaea*, *Aplopappus*, *Arctium*, *Argemone*, *Bidens*, *Blephilia*, *Brassica*, *Brauneria*, *Carduus*, *Carya*, *Cassia*, *Centromadia*, *Chrysopsis*, *Chrysothamnus*, *Cirsium*, *Clematis*, *Cleome*, *Convolvulus*, *Coreopsis*, *Cosmos*, *Datura*, *Enceliopsis*, *Engelmannia*, *Ericameria*, *Eupatorium*, *Eustoma*, *Gaillardia*, *Grindelia*, *Gutierrezia*, *Haplopappus*, *Helenium*, *Heliopsis*, *Heliotropium*, *Hibiscus*, *Ipomoea*, *Lactuca*, *Lepachys*, *Liatris*, *Medicago*, *Melilotus*, *Mentha*, *Monarda*, *Penstemon*, *Pepo*, *Petalostemum*, *Phacelia*, *Physostegia*, *Platycodon*, *Pluchea*, *Prionopsis*, *Pycnanthemum*, *Pyrrhopappus*, *Rudbeckia*, *Schrankia*, *Senecio*, *Silphium*, *Sium*, *Solidago*, *Teucrium*, *Verbena*, *Verbesina*, *Vernonia*, *Veronica*, *Vitex* and *Wistizenia*.

Melissodes (Eumelissodes) bidentis Cockerell

Melissodes bidentis Cockerell, 1914. Ann. Mag. Nat. Hist. (8) 14, p. 362. ♀.

Melissodes (Eumelissodes) bidentis LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 400.

FEMALE—Length 9 mm., breadth of abdomen 3.5 mm.; black, the apical tarsal segments becoming somewhat brownish on mid and hind legs; tegulae brownish-piceous; wings lightly infuscated, veins brownish to piceous; spurs pale testaceous; cheeks considerably narrower than eyes; clypeus very slightly protuberant, its median length about half the distance between eyes below; eyes very slightly convergent below; clypeus dull and densely tessellate, the punctures rather coarse but shallow, slightly separated above, becoming densely crowded toward apical margin, those on labrum somewhat closer and deeper; supraclypeal area very sparsely punctate, lateral areas of face above clypeus finely and rather closely punctate, the punctures becoming minute and sparse above on each side where surface is shining, median area below ocelli relatively dull and closely punctate; vertex rather closely and finely punctate behind ocelli; cheeks shining, minutely punctate, punctures somewhat coarser toward posterior margin; scutum shining between the deep, distinct and rather coarse punctures, these slightly separated on posterior half medially, becoming

finer and closer laterally and anteriorly, fine and irregular on scutellum; pleura somewhat shining between rather coarse and deep punctures, these well separated medially, becoming somewhat finer and more obscure posteriorly and anteriorly, posterior face of propodeum densely tessellate, finely and rather closely punctate, dorsal area dull and rather shallowly rugose, lateral faces somewhat shining, with fine, well separated punctures; basal abdominal tergum with fine but rather distinct, well separated punctures across base, apical area entirely impunctate; terga 2 and 3 very minutely and obscurely punctate, punctures hardly visible even at high magnification; terga 4 and 5 dull, minutely and very closely punctate; pygidium elongate-triangular, apex narrowly rounded; pubescence of head entirely yellowish, and dorsum of thorax, entire propodeum and upper part of pleura, pale yellowish, pleura below and legs in large part fuscous to black, the hind tibial scopa yellowish, hairs abundantly plumose; basal abdominal tergum with some copious, more or less erect, yellowish pubescence across anterior face, and with some dark, suberect, fuscous pubescence at each extreme side; following terga with no evident pale pubescence or fasciae, discal pubescence very short, obscure, suberect, largely fuscous, hairs at extreme sides of 5 and 6 somewhat paler.

MALE—Length 9 mm., breadth of abdomen 3.5 mm.; black, the entire clypeus, median basal area of labrum, and outer apex of mandibles, yellow; segments of flagellum beyond the 1st testaceous beneath, piceous above; apical tarsal segments only slightly brownish, spurs pale yellowish; tegulae rather dark, with abundant pale pubescence; wings subhyaline, veins testaceous to brownish; apical margins of abdominal terga quite broadly yellowish-hyaline; cheeks slightly narrower than eyes; clypeus little if any protuberant, median length somewhat greater than half distance between eyes below; eyes rather strongly convergent below; shorter side of basal segment of flagellum very slightly longer than pedicel, segment 2 fully four times this length; punctures of clypeus close and rather coarse but not very deep, those on labrum somewhat closer, deeper and more distinct; supraclypeal area largely impunctate, lateral areas of face above clypeus with rather fine, well separated punctures, these becoming more minute above where surface is shining, median area below ocelli quite closely punctate; vertex rather closely punctate behind ocelli, cheeks shining and very finely punctate; scutum shining between rather coarse, deep and distinct punctures, these well separated medially over posterior half, becoming close laterally, anteriorly and narrowly along posterior margin, those

on scutellum rather sparse on each side; pleura with rather coarse, close and deep punctures, well separated medially, becoming close beneath wing bases; posterior area of propodeum dull, punctures rather fine, shallow and scattered, dorsal face rather coarsely, irregularly rugose, lateral faces rather dull, with close punctures posteriorly, punctures becoming minute and vague anteriorly and below; basal abdominal tergum with fine, slightly separated punctures across basal area of disc, these becoming more minute and sparse toward apical margin; terga 2-4 with very fine, rather well separated punctures across disc, apical impressed areas largely impunctate; tergum 5 dull and densely tessellate, the punctures minute, obscure but well separated, this plate not conspicuously angulate laterally; tergum 6 with a narrowly rounded, subtriangular, spine-like apical projection on each side; pubescence entirely whitish-ochraceous on head, thorax, legs and basal abdominal tergum; tergum 2 with a thin, basal, whitish fascia largely obscured by the preceding tergal plate and with a subapical fascia that borders the depressed apical margin, this widely interrupted medially, disc otherwise with very short, inconspicuous, more or less erect, darker pubescence, terga 3 and 4 with subapical, whitish fasciae also bordering the depressed apical margin, basal pubescence more elongate and erect, somewhat darker, tergum 5 not conspicuously fasciate but with a few pale hairs along the margin of the depressed area, 6 with fuscous pubescence basally but apical margin fringed with somewhat paler brownish hair; median length of pygidial plate somewhat greater than basal width, margins slightly convergent apically to a rather abruptly constricted apex which is rather broadly truncate.

DISTRIBUTION—Texas to North Dakota, east to New York, July to October.

FLOWER RECORDS—According to LaBerge (1961) *bidentis* has been collected on species of *Bidens*, *Echinacea*, *Gossypium*, *Helianthus*, *Physostegia*, *Rudbeckia* and *Sonchus*.

Melissodes (Eumelissodes) boltoniae
Robertson

Melissodes boltoniae Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 368. ♀.

Melissodes melandri Cockerell, 1906. Amer. Ent. Soc. Trans. 32, p. 109. ♀.

Melissodes (Eumelissodes) boltoniae LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 482.

FEMALE—Length 9-13 mm., breadth of abdomen 4-4.5 mm.; black, the mandibles with

a small yellowish subapical spot; apical tarsal segments somewhat brownish, spurs pale testaceous, antennae and tegulae entirely black; wings subhyaline, faintly clouded apically, veins piceous to black; cheeks much narrower than eyes; clypeus but very slightly protuberant, its median length slightly less than distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum about one and a half times the length of segment 2, shorter side of the latter about equal to the breadth; punctures of clypeus coarse, close and deep, those on labrum very close and fine medially, becoming quite sparse laterally; lateral areas of face between clypeus and level of antennae closely and quite finely punctate, the supraclypeal area narrowly impunctate medially, punctures becoming very minute and sparse above, where surface is shining between eyes and ocelli, median area below ocelli quite deeply and distinctly punctate; vertex minutely and closely punctate behind ocelli, becoming minutely and rather sparsely punctate laterally, cheeks shining, with minute and rather sparse punctures; scutum somewhat shining, punctures coarse and deep, quite sparse over posterior half medially, becoming much closer and finer laterally and anteriorly, those on scutellum somewhat finer and quite close; punctures of pleura quite close, coarse and deep throughout; posterior face of propodeum rather smooth but dull, punctures rather fine, very shallow, well separated, dorsal area becoming coarsely reticulate along upper margin, lateral faces dull and shallowly punctate, becoming narrowly shining below; basal abdominal tergum with rather coarse but shallow, well separated punctures across basal half, these becoming closer and deeper laterally, and nearly reaching the apical margin on each side, the rather broad median apical area entirely impunctate; terga 2 and 3 with close, rather fine punctures across basal half, those on 2 somewhat coarser and deeper than on 3, apical impressed areas smooth, with only scattered, exceedingly minute punctures evident; terga 4 and 5 densely and finely rugoso-punctate across base, apical areas obscured by pubescence; pygidium elongate triangular, apex narrowly rounded; pubescence of face and cheeks white, vertex with conspicuous, erect, black pubescence across top of head, but posterior margin white pubescent; scutellum entirely black pubescent and scutum largely so, with only a narrow anterior white pubescent area, the pleura and propodeum entirely white; coxae, trochanters and femora pale pubescent, the front tibiae and tarsi more fuscous pubescent, mid tibia with a fuscous, subapical patch on outer surface, tarsi with pale pubescence basally, becoming more or less infuscated apically; hind tibial scopa whitish, becoming somewhat infuscated at

apex of basitarsi, the hairs quite densely plumose; basal abdominal tergum largely white pubescent across base, with some inconspicuous, short, suberect black hairs on disc at each extreme side; terga 2 and 3 with submedian, slightly oblique, white fasciae, that on 2 interrupted medially, basal areas of discs with very short, inconspicuous, erect blackish hairs, and with rather sparse black hairs on apical impressed area; tergum 4 with a subapical, dense, white fascia separated from rim medially by a narrow band of fuscous tomentum, basal area with quite long and erect, black pubescence; terga 5 and 6 entirely black pubescent.

MALE—Length 8-10 mm., breadth of abdomen 3-4 mm.; black, clypeus entirely yellow, labrum black, and mandibles black except for an obscure, pale yellowish, subapical infusion; antennal flagellum testaceous beneath, brownish-piceous above; apical tarsal segments testaceous, spurs pale yellow; tegulae brownish; wings subhyaline, veins testaceous; impressed apical terga more or less yellowish-hyaline; cheeks about half width of eyes; clypeus very slightly protuberant, its median length about half distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum very short, no longer than pedicel, segment 2 about four times longer than segment 1 and pedicel combined; punctures of clypeus rather coarse and close, somewhat obscured by the yellow coloration, those on labrum fine and close but quite shallow, somewhat more widely separated toward each side; face above clypeus quite deeply and distinctly punctate on each side, the punctures slightly separated, becoming more minute above where the surface is shining; vertex with close and rather distinct punctures behind ocelli, becoming sparse on each side, cheeks somewhat shining beneath the dense pubescence, punctures minute and rather well separated; scutum somewhat shining between quite coarse, deep and distinct punctures, these quite sparse over posterior half of disc, becoming somewhat closer laterally and anteriorly, those on scutellum about equal in size, well but not widely separated; pleura with deep, distinct, rather coarse punctures, these rather well separated medially, becoming somewhat closer anteriorly and below; posterior face of propodeum smooth but rather dull, punctures shallow and rather sparse, dorsal area becoming rather coarsely rugoso-punctate along upper margin, lateral faces quite dull, punctures quite close but shallow and irregularly scattered; basal abdominal tergum well covered with deep, distinct, rather coarse and well separated punctures, these becoming somewhat closer at extreme sides and nearly reaching the apical margin where they become minute and rela-

tively sparse; discs of terga 2 and 3 with fine but deep and distinct punctures, these well separated across tergum 2, somewhat closer on 3, apical impressed areas with only exceedingly minute, widely scattered punctures; discs of terga 4 and 5 with fine and very close punctures basally, surface almost rugose, tergum 5 with a distinct but short, spine-like, latero-apical angle on each side, and tergum 6 with a corresponding triangular spine-like projection; pubescence of head, thorax and legs largely pale ochraceous, with only a slight amount of fuscous or blackish hairs on scutellum and on scutum posteriorly; basal abdominal tergum with copious, erect, pale ochraceous pubescence anteriorly, and some short, suberect, fuscous pubescence across apical half of disc; tergum 2 with a narrow, basal, pale fascia which is largely covered by the preceding tergum; terga 2-4 with narrow, pale ochraceous fasciae occupying the basal margin of apical impressed areas, the discs otherwise covered with suberect, fuscous or blackish pubescence; tergum 5 with a more nearly apical, pale ochraceous fascia, disc otherwise covered with rather elongate, blackish pubescence, becoming somewhat pale at each extreme side; median length of pygidial plate somewhat greater than basal width, carinate laterally, margins very slightly convergent to a rather abrupt subapical constriction, the apex narrowly truncate; sterna 7 and 8 and genital armature as in *agilis* (fig. 84).

DISTRIBUTION—Pennsylvania to Florida, west to Texas and Nebraska, July to November.

FLOWER RECORDS—LaBerge (1961) lists species of *Abutilon*, *Amphiachyris*, *Aster*, *Bidens*, *Boltonia*, *Cassia*, *Chrysopsis*, *Cirsium*, *Coreopsis*, *Helenium*, *Helianthus*, *Heterotheca*, *Lythrum*, *Ratibida*, *Rudbeckia*, *Silphium*, *Solidago*, *Verbena* and *Vernonia*.

***Melissodes (Eumelissodes) coreopsis*
Robertson**

Melissodes confusa Robertson (nec Cresson), 1894. Acad. Sci. St. Louis, Trans. 6, pp. 458-460.

Melissodes coreopsis Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 368. ♀.

Melissodes agilis semiagilis Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 364. ♂.

Melissodes confusiformis Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 366. ♀.

Melissodes helianthophila Cockerell, 1914. Ann. Mag. Nat. Hist. (8) 14, p. 361. ♂.

Melissodes (Eumelissodes) coreopsis LeBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 448.

FEMALE—Length 11 mm., breadth of abdomen 4 mm.; black, including clypeus, labrum and base of mandibles, the mandibles slightly reddened apically; segments of flagellum beyond the 1st brownish-testaceous beneath, piceous above; apical tarsal segments becoming testaceous; spurs pale yellow; tegulae piceous anteriorly, becoming testaceous-hyaline posteriorly; wings hyaline, veins testaceous to brownish; cheeks subequal to eyes in width; clypeus quite flat, its median length considerably less than distance between eyes below; eyes slightly convergent below; shorter side of segment 2 of flagellum slightly more than half the length of basal segment and slightly greater than apical width; clypeus coarsely and closely punctate, punctures becoming very fine and crowded toward apical margin, those on labrum fine and close medially, becoming rather widely separated laterally; mandibles very short, length less than twice the basal width; supra-clypeal area narrowly impunctate medially, lateral areas of face below antennae finely and rather closely punctate, becoming very minutely and sparsely so above antennae, surface shining and largely impunctate between eyes and ocelli; vertex closely and finely punctate behind ocelli; cheeks rather closely punctate posteriorly, becoming shining and very minutely punctate along margin of eye; scutum somewhat shining between deep, distinct and rather coarse punctures, these rather widely separated over posterior half, becoming closer and somewhat finer laterally and anteriorly, those on scutellum rather fine, well but not widely separated; punctures of pleura deep, distinct, rather coarse and close, becoming very fine and close posteriorly; posterior face of propodeum quite closely but rather shallowly punctate, dorsal area dull, finely reticulate along upper margin medially, but with a few coarse striations at each side, lateral faces dull, quite closely but shallowly punctate, punctures becoming somewhat finer anteriorly and below; basal half of basal abdominal tergum closely and quite coarsely punctate, punctures becoming finer but nearly reaching apical margin at each side, the broad, median, apical area impunctate; basal half of discs of terga 2 and 3 finely and quite closely punctate, punctures crowded on 3 laterally, apical areas smooth, with only exceedingly minute, obscure punctures evident; terga 4 and 5 finely and densely punctate across base; pygidium elongate-triangular, apex very narrowly rounded; head with some scattered, elongate, dark hairs across vertex, but otherwise whitish pubescent, with a dense, elongate, whitish fringe behind vertex and cheeks; scutellum and posterior two-thirds of scutum with rather copious, erect, fuscous pubescence, anterior third of scutum with erect, dull whitish pu-

bescence which reaches narrowly along lateral margins to propodeum, the pleura and propodeum entirely whitish pubescent; legs generally pale pubescent, with some more brownish hairs on basitarsi beneath, the hind tibial scopa pale yellowish, densely short plumose; basal abdominal tergum quite copiously, short, ochraceous pubescent anteriorly and laterally, largely bare apically; tergum 2 with a basal, whitish fascia that is largely obscured by the margin of tergum 1, and with a submedian, whitish fascia that fringes the apical impressed area, this slightly interrupted medially, disc otherwise with very thin and short, inconspicuous, pale hairs basally, apical area quite bare; terga 3 and 4 with submedian, pale fasciae bordering apical impressed area, basal area of 3 with some inconspicuous, thin, whitish tomentum and some more erect, somewhat darker but rather short hairs, apical area bare, 4 with more elongate and erect dark pubescence basally, apical area thinly, white tomentose, interrupted medially, tomentose area thus largely occupying apical half of disc; terga 5 and 6 largely dark pubescent, with some pale, elongate hairs at extreme sides.

MALE—Length 9 mm., breadth of abdomen 3.5 mm.; black, including labrum and base of mandibles, the latter with a subapical, yellowish maculation; clypeus entirely yellow; antennal flagellum pale testaceous beneath, somewhat darker above; the more apical tarsal segments testaceous, with basitarsi largely dark, spurs pale yellowish; tegulae rather dark anteriorly, becoming more testaceous posteriorly, quite densely pubescent; wings whitish-hyaline, veins pale testaceous to brownish; impressed apical margins of abdominal terga pale yellowish-hyaline; cheeks slightly narrower than eyes; clypeus only very slightly protuberant, its median length about half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum very short, subequal to pedicel, shorter side much less than apical width, segment 2 nearly four times combined length of segment 1 and pedicel; punctures of clypeus close and not very coarse, inconspicuous on the yellow surface, those of labrum close and fine medially, becoming rather sparse on each side; supraclypeal area shining and impunctate medially, lateral areas of face somewhat shining between minute, slightly separated punctures, these becoming even more minute between eyes and ocelli above, median area below ocelli somewhat more distinctly punctate; punctures very fine and quite close on vertex behind ocelli; cheeks shining, punctures hardly visible except along narrow posterior margin;

punctures of scutum coarse, deep and distinct, quite sparse in center posteriorly, becoming relatively fine and close laterally and anteriorly, quite coarse on scutellum, well separated but hardly sparse; pleura somewhat shining between deep, distinct, rather fine, slightly separated punctures; posterior face of propodeum rather dull, punctures rather shallow and irregularly scattered, dorsal area dull, irregularly rugose along upper margin, lateral faces somewhat shining between the numerous, rather close, shallow and vague punctures; discs of abdominal terga with deep, distinct and rather close punctures, these rather coarse on basal tergum, becoming increasingly fine on the more apical terga, much closer on tergum 4, apical impressed areas largely impunctate, invaded only slightly by very minute, obscure punctures; tergum 5 only obscurely angulate at each extreme side, tergum 6 with a rather short but slender apical spine on each side; pubescence quite long and copious, entirely pale yellowish-white on head, thorax, legs and basal abdominal tergum, rather short and inconspicuous on basal areas of terga, the apical impressed areas fringed basally with more or less dense, conspicuous, pale ochraceous fasciae which are broader laterally, much thinner or interrupted medially, especially on the more basal plates, entire and subapical on 4 and 5, the erect basal pubescence thin but entirely pale; terga 5 and 6 pale tomentose to the rims; median length of pygidial plate about equal to basal width, margins sharply carinate, slightly convergent apically to the abruptly constricted tip which is rather narrowly subtruncate.

DISTRIBUTION — Alberta and North Dakota to Mexico, east to Illinois, June to October.

FLOWER RECORDS—LaBerge (1961) lists species of the following: *Amphiachyris*, *Amorpha*, *Aster*, *Bidens*, *Boltonia*, *Chrysopsis*, *Chrysothamnus*, *Cirsium*, *Clematis*, *Cleome*, *Cooperia*, *Convolvulus*, *Coreopsis*, *Cosmos*, *Echinacea*, *Erucastrum*, *Eryngium*, *Eupatorium*, *Euphorbia*, *Eustoma*, *Gaillardia*, *Geranium*, *Gossypium*, *Grindelia*, *Gutierrezia*, *Haplopappus*, *Helenium*, *Heterotheca*, *Helianthus*, *Heliopsis*, *Marrubium*, *Medicago*, *Melilotus*, *Monarda*, *Nepeeta*, *Opuntia*, *Parosela*, *Petalostemum*, *Prionopsis*, *Psoralea*, *Ratibida*, *Rudbeckia*, *Salsola*, *Siphium*, *Solidago*, *Tetragonotheca*, *Tetranneuris*, *Trifolium*, *Verbena*, *Verbena* and *Vernonia*.

Melissodes (Eumelissodes) denticulata
Smith

- Melissodes denticulata* Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 311. ♂.
Melissodes senilis Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 311. ♀.
Melissodes perplexa Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 206. ♂.
Melissodes vernoniana Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 368. ♀ ♂.
Melissodes perplexa Mathewson and Daly, 1955. Kans. Ent. Soc. Jour. 28, p. 120. (biology)
Melissodes (Eumelissodes) denticulata LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 511.

FEMALE—Length 9.5-11 mm., breadth of abdomen 4-5 mm.; black, the mandibles with a subapical, testaceous maculation; segments of flagellum beyond the 2nd somewhat more piceous beneath, but black above; apical tarsal segments becoming brownish-testaceous; spurs pale testaceous; tegulae piceous to black; wings faintly infuscated, veins brownish to piceous; lower portion of cheeks nearly as broad as eyes; clypeus only very slightly protuberant, its median length half the distance between eyes below; eyes very slightly convergent below; segment 2 of flagellum slightly more than half the length of segment 1, slightly longer than broad; punctures of clypeus quite coarse, deep and close, becoming fine and densely crowded along apical margin, those on labrum somewhat finer and closer medially, becoming quite coarse but still close laterally; supraclypeal area with quite coarse, well separated punctures medially, these becoming fine and close laterally; lateral areas of face with fine and rather close punctures below level of antennae, becoming minute and sparse above on each side, but quite coarse and distinct below ocelli; vertex with fine, close and distinct punctures behind ocelli; cheeks somewhat shining, punctures minute, becoming somewhat coarser and closer posteriorly; scutum somewhat shining between the moderately coarse and deep punctures, these quite sparse medially over posterior half, becoming somewhat finer and very close laterally and anteriorly, those on scutellum about equally coarse, well separated but hardly sparse; punctures of pleura coarse, rather deep and quite close, becoming much finer posteriorly above mid coxae; posterior face of propodeum rather dull, punctures rather shallow, irregularly scattered, becoming quite close at each side, dorsal area rather coarsely reticulate along margin, lateral faces rather dull, punctures rather shallow but generally distributed; basal abdominal tergum with shallow but rather coarse, quite sparse punctures across basal half, becoming somewhat finer and closer at each extreme side, apical half

largely smooth and impunctate; basal half of tergum 2 smooth, with sparse, exceedingly minute and obscure punctures that are barely evident, apical half entirely impunctate; terga 3 and 4 more distinctly but very finely punctate across basal half, punctures rather well separated on 3, close on 4, minute and vague on 4 apically; pygidium elongate-triangular, apex rather narrowly rounded; pubescence of head largely whitish, but with a conspicuous band of long, fuscous hairs across vertex, and a few fuscous hairs intermixed with the white along margins of eye below; scutum and scutellum largely covered with rather short but erect and conspicuous fuscous pubescence, scutum narrowly pale pubescent across anterior margin, a few fuscous hairs intermixed among the light on tubercles and on pleura above; otherwise pleura and propodeum whitish pubescent; coxae, trochanters and femora largely whitish pubescent, the fore and mid tibiae with a somewhat darker patch on outer surface apically, and basitarsi largely fuscous pubescent; hind tibial scopa pale yellowish, the hairs abundantly plumose; basal abdominal tergum rather thinly short pubescent anteriorly, the pubescence entirely whitish; tergum 2 with a basal, whitish fascia that is largely obscured by the margin of tergum 1, and with a submedian fascia bordering the apical impressed area, which is rather widely interrupted medially, the intervening area with some very short, inconspicuous, suberect, black pubescence; tergum 3 with a submedian fascia bordering the impressed apical area, very slightly interrupted medially, basal area with thin and sparse, whitish tomentum and a few rather short, erect, blackish hairs, apical area beyond the fascia entirely bare; apical impressed area of tergum 4 largely whitish tomentose, somewhat interrupted along apical margin medially, basal area with somewhat more elongate, black pubescence; terga 5 and 6 entirely blackish to fuscous pubescent.

MALE—Length 9-11 mm., breadth of abdomen 3-4 mm.; black, clypeus yellowish-white, with upper third or fourth invaded by black; labrum black, often with a median yellowish-white maculation; mandibles with a small, subapical, testaceous spot; flagellum brownish beneath, piceous above; apical tarsal segments becoming brownish-testaceous, the spurs pale testaceous; tegulae piceous; wings faintly infuscated, veins brownish to piceous; cheeks much narrower than eyes; clypeus somewhat protuberant, its median length somewhat greater than half the distance between eyes below; eyes somewhat convergent below; shorter side of basal segment of flagellum about equal to pedicel, segment 2 seven or eight times as long; punctures of clypeus quite close but not very coarse, becoming fine and densely crowded along apical margin, those on labrum

fine and close along mid-line, becoming quite coarse, deep and conspicuous at each side; supraclypeal area with fine, sparse punctures, lateral areas of face below antennae dull, with rather fine and close but distinct punctures, these becoming more minute and more widely separated on the shining surface between eyes and ocelli; punctures below ocelli rather deep and distinct, quite close, the surface dull; punctures fine and close on vertex behind ocelli, becoming rather sparse on each side; cheeks with quite deep, distinct and close punctures that are rather coarse posteriorly, very fine along margin of eye; scutum somewhat shining between deep, distinct, and rather coarse punctures, these quite sparse across posterior half, becoming much finer and closely crowded laterally and anteriorly, those on scutellum about equal in size, rather sparse on each side; pleura with rather uniformly coarse, close and deep punctures, becoming somewhat finer posteriorly above mid coxae; posterior face of propodeum rather dull, punctures not very coarse but quite shallow, separated to some degree on each side, dorsal area becoming rather coarsely rugose along upper margin, lateral faces dull and quite finely and closely punctate; the punctures obsolescent anteriorly and below; basal abdominal tergum with coarse and deep punctures across base, these well separated medially, becoming somewhat closer laterally, fine and more sparse toward the rather narrowly impunctate apical margin; terga 2 and 3 with very fine, well separated punctures across base, somewhat closer on 3 than on 2, apical impressed areas largely smooth and impunctate; terga 4 and 5 quite closely, deeply and rather finely punctate across base, apical impressed areas impunctate; tergum 5 with a rather obscure, obtuse angle at each extreme side, and 6 with a corresponding distinct apical spine; pubescence of head largely yellowish-white, but vertex with abundant, erect, conspicuous, fuscous pubescence across top of head; scutum and scutellum largely covered with conspicuous, erect, fuscous or blackish pubescence, scutum rather narrowly whitish pubescent across anterior margin, the pleura, propodeum and legs pale pubescent; basal abdominal tergum with rather copious, erect, whitish pubescence anteriorly and laterally, disc with some very short, suberect, dark pubescence evident toward each side; tergum 2 with a rather thin and indefinite, basal, white fascia that is largely covered by disc of tergum 1, and apical impressed area narrowly fringed by a whitish fascia which is slightly interrupted medially, basal portion of disc with short, suberect, thin, blackish pubescence; apical impressed areas of terga 3-5 narrowly fringed with pale, transverse fasciae, usually complete, basal areas of each with more elongate and erect, blackish hairs;

tergum 6 entirely dark pubescent; median length of pygidial plate about equal to basal width, margins strongly carinate, very slightly converging toward the abruptly constricted apex which is rather broadly truncate; sternum 7 and genital armature resembling those of *agilis* (fig. 84), but sternum 8 narrower apically, the apex more deeply emarginate.

DISTRIBUTION — The New England states and Eastern Canada, to Florida, west to North Dakota and Texas, May to October.

FLOWER RECORDS—According to LaBerge (1961) this species is primarily oligolectic on species of *Vernonia*. Males and occasional females however will visit other flowers, and he lists species of *Amphiachyris*, *Carduus*, *Convolvulus*, *Eupatorium*, *Ipomoea*, *Pycnanthemum*, *Silphium*, *Solidago*, *Symphoricarpos* and *Verbena*.

Melissodes (Eumelissodes)
dentiventris Smith

(Fig. 84)

- Melissodes dentiventris* Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 312. ♂.
Melissodes autumnalis Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 369. ♀ ♂.
Melissodes megacerata Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 362. ♂.
Melissodes (Eumelissodes) dentiventris LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 403.

FEMALE—Length 10.5-14.5 mm., breadth of abdomen 5-5.5 mm.; black, the mandibles with an elongate, testaceous, subapical maculation; segments of flagellum beyond the 2nd more brownish-piceous beneath; apical tarsal segments somewhat more brownish apically, spurs pale testaceous; tegulae brownish-testaceous; wings very slightly but quite uniformly darkened, veins brownish to piceous; cheeks much narrower than eyes; clypeus only slightly protuberant, its median length somewhat less than half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum about one and a half times longer than segment 2 which is considerably longer than broad; clypeus dull, punctures coarse, close and deep, those on labrum much finer, rather sparse laterally; supraclypeal area shining and impunctate, the more lateral areas of face below antennae rather finely and closely punctate, lateral areas above shining and largely impunctate, the median area below ocelli rather dull, with rather fine, distinct, scattered punctures; vertex very finely and closely punctate behind ocelli, punctures sparse laterally, cheeks shining, with very minute

but rather close punctures; scutum and scutellum with coarse and deep punctures, rather well separated on scutum posteriorly, becoming closer and somewhat finer laterally and anteriorly, quite close over most of scutellum; pleura rather dull, punctures coarse and quite close but rather shallow; posterior face of propodeum dull, with rather fine and close punctures, dorsal area becoming rather densely rugose toward each side, lateral faces quite uniformly finely and closely punctate; disc of basal abdominal tergum quite fully punctate, only the narrow apical margin impunctate, punctures quite coarse, deep and close throughout; basal half of discs of terga 2 and 3 quite deeply and rather closely punctate, apical impressed areas more finely and sparsely but rather fully punctate, only the narrow apical rims impunctate, punctures of 2 somewhat coarser than those of 3, terga 4 and 5 much more densely punctate across base, 4 punctate nearly to apical rim; pygidium rather broadly triangular, apex rather broadly rounded; vertex with a transverse band of erect and elongate blackish hairs, a few blackish hairs along margins of eyes intermixed with pale, and clypeus with short but rather copious and erect fuscous pubescence, face and cheeks otherwise with pale ochraceous pubescence and vertex fringed posteriorly with the same color; scutum, scutellum, propodeum and upper part of pleura largely covered with ochraceous pubescence, but scutum and scutellum with a limited area of fuscous hairs medially, those on scutum in center of posterior half; pleura below and legs in large part black pubescent, hind tibial scopa pale ochraceous, the hairs densely plumose; basal abdominal tergum with copious, elongate, pale ochraceous pubescence anteriorly, posterior half of disc with short, suberect rather conspicuous fuscous pubescence; tergum 2 with a basal, whitish fascia which is largely covered by the preceding plate, apical impressed area narrowly bordered on each side with a few pale hairs, forming a narrow, usually poorly developed, oblique fascia, disc otherwise covered with very short suberect blackish pubescence, terga 3-5 entirely covered with blackish or fuscous pubescence, largely suberect but with some longer erect black hairs more evident toward each side.

MALE—Length 10.5-12 mm., breadth of abdomen 4-4.5 mm.; black, including labrum and base of mandibles, clypeus yellow, with upper margin narrowly blackened, mandibles with an apical testaceous maculation; antennal flagellum brownish-testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, the spurs pale yellow; tegulae quite dark, becoming narrowly

yellowish posteriorly; wings subhyaline, veins testaceous; apical margins of abdominal terga becoming narrowly yellowish-hyaline; cheeks slightly narrower than eyes; clypeus only very slightly protuberant, its median length slightly more than half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum but little longer than pedicel, segment 2 six or seven times longer; punctures of clypeus rather close, coarse and deep, those on labrum slightly finer but more distinct, supraclypeal area largely smooth and impunctate, lateral areas of face below antennae quite closely and finely punctate, punctures becoming somewhat more minute above, where the surface is shining between eyes and ocelli, median area below ocelli quite closely and distinctly punctate; vertex very closely and finely punctate behind ocelli, punctures somewhat more sparse laterally, cheeks with quite deep, distinct and rather close punctures posteriorly, the punctures becoming very fine toward margin of eye; scutum and scutellum somewhat shining between quite deep and coarse punctures, these slightly separated on scutum posteriorly, becoming much closer and somewhat finer laterally and anteriorly, quite close on scutellum; pleura somewhat less shining, punctures quite coarse, deep and distinct, close in large part; posterior face of propodeum rather dull, punctures deep, distinct and quite close but not very coarse, those on dorsal area becoming somewhat coarser medially, lateral areas more rugose or reticulate, lateral faces quite uniformly, closely and rather finely punctate; disc of basal abdominal tergum quite fully punctate, the more basal punctures quite coarse, deep and slightly separated, punctures becoming more minute, sparse and indefinite toward the rather narrowly impunctate apical rim; terga 2-4 quite deeply, distinctly and rather closely punctate basally, the punctures somewhat more widely separated on 2, becoming progressively closer on 3 and 4, apical impressed areas more minutely and sparsely punctate, the narrow rims impunctate; tergum 5 quite densely and finely rugoso-punctate across base, with an obscure, obtuse angle on each extreme side; tergum 6 with a corresponding, triangular, apical spine; entire head, thorax and legs pale ochraceous pubescent, with no dark hairs in evidence; basal abdominal tergum pale pubescent anteriorly, with some erect fuscous hairs intermixed among the pale across central and apical portions of disc; terga 2-6 with largely blackish pubescence, rather short and inconspicuous on the more basal terga, tergum 2 with an obscure, basal, whitish fascia and obscure, oblique, whitish fascia bordering the apical impressed area on each side; median length of pygidial plate somewhat greater than basal width,

lateral margins strongly carinate, slightly converging apically to the abruptly constricted apical third which is truncate; sterna 7 and 8 and genital armature as shown (fig. 84).

DISTRIBUTION — The New England States, south to Georgia and Texas, July to October.

FLOWER RECORDS—According to LaBerge (1961) *Aster* is the chief source of pollen for *dentiventris*, but species of the following genera are known to be visited: *Bidens*, *Boltonia*, *Coreopsis*, *Chrysopsis*, *Eupatorium*, *Helianthus*, *Isopappus*, *Lespedeza*, *Lippia*, *Polygonum*, *Solidago*, *Verbena*, *Vernonia* and *Veronica*.

***Melissodes (Eumelissodes) fumosa*
LaBerge**

Melissodes (Eumelissodes) fumosa LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 486. ♀ ♂.

FEMALE—Length 8-9 mm., breadth of abdomen 3-4 mm.; black, mandibles with a subapical, yellowish maculation; segments of flagellum beyond the 2nd brownish below, piceous above; apical tarsal segments brownish-testaceous, spurs pale yellow; tegulae brownish-testaceous; wings subhyaline, veins testaceous to brownish; cheeks much narrower than eyes; clypeus very slightly protuberant, its median length somewhat less than half distance between eyes below; eyes slightly convergent below; shorter side of segment 2 of flagellum very slightly more than half the length of segment 1; punctures of clypeus close, coarse and deep, narrowly fine and densely crowded toward apical margin, those on labrum considerably finer, very close medially, slightly separated laterally; supraclypeal area impunctate medially, lateral areas of face below antennae quite deeply and finely punctate, punctures slightly separated, face above antennae smooth and shining, with fine, sparse punctures medially, lateral areas practically impunctate; vertex finely and very closely punctate behind ocelli, cheeks somewhat shining, minutely and obscurely punctate; scutum and scutellum somewhat shining between deep and rather coarse punctures, these quite sparse over posterior half of scutum medially, becoming finer and closer anteriorly and along the narrow lateral margins, those on scutellum well separated but hardly sparse; broad lateral area of mesopleura dull and tessellate, punctures hardly evident but becoming somewhat more distinct above, anteriorly and below; posterior face of propodeum dull, the punctures shallow, rather sparse, dorsal area narrow, becoming rather vaguely rugose or reticulate on each extreme side, lateral faces

dull and tessellate, punctures fine, rather shallow, and vague; disc of basal abdominal tergum rather coarsely punctate, punctures rather shallow and sparse medially, becoming closer and more distinct laterally where they nearly reach apical margin, the broad median apical area entirely impunctate; terga 2 and 3 quite deeply and distinctly punctate across basal half, apical impressed area with only exceedingly minute, scattered punctures, 3 somewhat more finely and closely punctate than 2; tergum 4 very finely and closely punctate across base, apical margin obscured by tomentum; pygidium elongate-triangular, apex narrowly rounded; vertex with a transverse row of erect and elongate fuscous or blackish hairs, pubescence of head otherwise whitish; scutum and scutellum largely covered with rather copious and erect, blackish pubescence, only the narrow anterior margin pale pubescent, thorax otherwise pale ochraceous to whitish pubescent; legs largely pale pubescent, the fore and mid tibiae with some fuscous pubescence on outer face apically, and basitarsi with some fuscous hairs beneath and anteriorly; scopa pale yellowish, hairs densely plumose; abdominal tergum 1 with rather short pale pubescence anteriorly and laterally, the disc with some short, obscure, subappressed, dark pubescence toward each side, otherwise largely bare; tergum 2 with a basal whitish fascia and a submedian fascia separated by a band of short, thin, suberect, dark pubescence, apical margin largely bare; tergum 3 with a rather broad, subapical whitish fascia, the basal and apical areas with short, suberect, dark pubescence; tergum 4 with a broad, completely apical, whitish tomentose fascia, basal area dark pubescent; and terga 5 and 6 entirely dark pubescent.

MALE—Length 8-8.5 mm., breadth of abdomen 3-3.5 mm.; black, the mandibles somewhat reddened medially, clypeus bright yellow; antennal flagellum brownish-testaceous beneath toward base, apical segments more piceous, and more piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellow; tegulae dull testaceous; wings subhyaline, veins yellowish to testaceous; apical margins of abdominal terga broadly yellowish-hyaline; cheeks much narrower than eyes; clypeus only very slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum extremely short, no longer than pedicel, segment 2 about four times the combined length of segment 1 and pedicel; punctures of clypeus rather fine, close laterally, but rather widely separated along mid-line, labrum with a narrow median impunctate line, punctures on each side fine and close, but

becoming sparse laterally; supraclypeal area shining, with only a few scattered punctures, lateral areas of face on each side very finely and quite closely punctate, upper part of face shining, practically impunctate laterally, but with fine scattered punctures below ocelli; vertex very finely and closely punctate behind ocelli, punctures somewhat more sparse laterally, cheeks shining, punctures minute and obscure except posteriorly; scutum shining between quite coarse and deep punctures, these sparse on posterior half medially, becoming close and somewhat finer laterally and anteriorly, the scutellum with somewhat finer, well separated punctures, but these not sparse; pleura somewhat shining between the rather coarse, shallow punctures, these well separated on the broad lateral area, becoming somewhat closer anteriorly and below; posterior face of propodeum somewhat shining, punctures rather shallow, irregularly scattered and sparse, dorsal area irregularly roughened on each side, lateral faces rather dull, the more posterior punctures rather coarse and close, becoming minute and obscure anteriorly and below; basal abdominal tergum quite deeply and distinctly punctate, the punctures somewhat separated medially, becoming quite close and somewhat finer laterally, and becoming minute toward the rather narrowly impunctate apical margin; terga 2-5 with fine, distinct punctures across basal areas, these well separated on 2, slightly so on 3, and very close on 4 and 5, apical impressed areas invaded only slightly by very minute scattered punctures; tergum 5 with a distinct apical angle on each extreme side, and tergum 6 with a corresponding triangular spine; pubescence copious and entirely pale ochraceous to whitish on head, thorax and legs; basal abdominal tergum largely pale pubescent, copious anteriorly, but with some short suberect dark pubescence across apical half; tergum 2 with a rather thin, basal, whitish fascia, the apical impressed area bordered by a narrow fascia, the area between, as well as the apical impressed area, with short erect dark pubescence; terga 3-5 with narrow whitish fasciae bordering the impressed area, basal areas with rather short but suberect, largely pale pubescence; pygidial plate very slightly longer than its basal width, lateral margins strongly carinate, only very slightly convergent apically, abruptly constricted toward the rather broadly subtruncate apex; sterna 7 and 8 and genital armature similar to those in *agilis* (fig. 84).

DISTRIBUTION — Maryland to Mississippi, west to Kansas and Nebraska, June to October.

FLOWER RECORDS—*Asclepias*, *Koelia* and *Verbena*, and the following compo-

sites: *Aster*, *Boltonia*, *Chrysopsis*, *Eupatorium*, *Grindelia*, *Helenium* and *Solidago*. According to LaBerge (1961) there seems to be some preference for *Solidago* as a source of pollen.

Melissodes (Eumelissodes) illata
Lovell and Cockerell

Melissodes illata Lovell and Cockerell, 1906. Psyche 13, p. 110. ♀ ♂.

Melissodes (Eumelissodes) illata LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 565.

FEMALE—Length 9-12 mm., breadth of abdomen 3.5-4.5 mm.; black, the mandibles yellowish apically, antennal flagellum more piceous beneath, apical tarsal segments somewhat brownish-piceous, spurs pale testaceous; tegulae black to piceous; wings subhyaline basally, becoming very faintly darkened apically, veins brownish to piceous; cheeks somewhat narrower than eyes; clypeus but very slightly protuberant, its median length slightly less than half the distance between eyes below; eyes slightly convergent below; shorter side of segment 2 of flagellum about half the length of segment 1; punctures of clypeus close, quite coarse and deep, those on labrum somewhat finer and closer; supraclypeal area with but a few, scattered, sparse punctures medially, lateral areas of face on each side rather finely, shallowly and quite closely punctate, upper part of face shining, very minutely punctate on each side, median area below ocelli somewhat less shining, punctures rather coarse, deep and quite sparse; vertex very finely and closely punctate behind ocelli, cheeks somewhat shining, punctures minute along eye margin, becoming somewhat coarser and deeper posteriorly; scutum shining, punctures deep and coarse, quite sparse over most of disc, but becoming finer and very close at extreme sides and along anterior margin; punctures of scutellum somewhat finer, rather uniformly close but distinct; pleura somewhat shining, punctures quite coarse and rather close throughout; posterior face of propodeum rather dull, punctures shallow, irregularly scattered and sparse, quite obscure, dorsal area dull, densely tessellate medially, becoming rather vaguely rugose on each side, lateral faces rather dull, punctures fine, shallow and obscure, obsolescent anteriorly and below; basal abdominal tergum with rather coarse and distinct punctures across base, these well separated medially, becoming somewhat closer laterally where they approach the apical margin, the broad median apical area entirely impunctate; terga 2-4 with rather fine but deep, distinct punctures across basal half of each, the broad impunctate apical areas invaded only slightly by exceedingly minute, obscure punctures, the punctures well separated medially on 2, some-

what closer on 3, and fine, almost crowded across base of 4; basal areas of 5 and 6 largely hidden; median length of pygidium very slightly greater than basal width, narrowly elongate-triangular, apex rather narrowly rounded; vertex with a transverse band of erect black hairs, intermixed with the pale at each side between antennae and eyes, face otherwise with whitish pubescence; scutum and scutellum largely covered with rather copious, erect, black pubescence, with some intermixed black hairs on tubercles, scutum very narrowly pale pubescent anteriorly, the pleura and propodeum entirely pale pubescent; coxae, trochanters and femora largely pale pubescent, the fore and mid tibiae with some fuscous, appressed pubescence on outer face apically, and basitarsi dark pubescent in part, the hind tibial scopa pale ochraceous, the hairs quite densely short plumose; basal abdominal tergum with rather elongate, whitish pubescence anteriorly, and some shorter pale hairs along lateral margins, the disc with some very short, suberect, fuscous pubescence toward each side; tergum 2 with a basal pale tomentose fascia and a submedian fascia that is broadly interrupted medially and borders the very broad impressed apical area, discal pubescence extremely short across base, hardly evident, the apical area entirely bare; tergum 3 with a similar but nearly complete whitish fascia, basal area with some short dark pubescence, and apical area with some similar but shorter pubescence evident toward sides; tergum 4 with short, suberect, dark pubescence basally, the apical impressed area largely covered with whitish tomentum, but this rather broadly interrupted medially along the margin; terga 5 and 6 largely dark pubescent but with some elongate pale hairs at extreme sides of 5.

MALE—Length 8-9.5 mm., breadth of abdomen 3-3.5 mm.; black, the labrum with a median yellow maculation, mandibles yellowish apically, clypeus entirely bright yellow; antennal flagellum testaceous beneath, piceous above; apical tarsal segments becoming testaceous, spurs pale yellowish; tegulae dark; wings subhyaline, veins testaceous to piceous; apical margins of abdominal terga becoming somewhat yellowish; cheeks much narrower than eyes; clypeus rather strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum very short, little if any longer than pedicel, segment 2 four or five times longer than combined length of segment 1 and pedicel; punctures of clypeus rather fine, quite obscure on the yellow surface, close laterally, becoming rather well separated medially, those on labrum much finer, quite deep and close; punctures of supraclypeal area rather sparse,

becoming quite fine and close toward each extreme side below antennae, face above smooth and shining laterally, punctures minute and sparse, much closer just below ocelli; vertex very finely and closely punctate behind ocelli, punctures somewhat more distinct laterally, cheeks rather coarsely and closely punctate posteriorly, the punctures becoming very minute, rather close along eye margin; scutum and scutellum somewhat shining between quite coarse, deep and distinct punctures, these rather sparse on posterior half of scutum medially, becoming somewhat closer laterally and anteriorly, those on scutellum about equally coarse, well separated but hardly sparse; pleura somewhat shining, punctures rather deep and distinct, rather coarse, slightly separated in large part; posterior face of propodeum dull, punctures shallow and rather vague, irregularly scattered, dorsal area becoming rather coarsely rugoso-striate on each side, lateral faces dull but rather smooth, punctures very shallow becoming obsolescent anteriorly and below; basal abdominal tergum with rather coarse but shallow punctures, these rather well separated medially, becoming somewhat finer and closer at extreme sides where they approach the apical margin, becoming quite sparse and minute across the median apical area, only the narrow apical margin entirely impunctate; terga 2-4 very finely but rather distinctly punctate across base, punctures well separated medially, somewhat closer on 4, apical impressed areas with only exceedingly minute, obscure, scattered punctures evident; tergum 5 punctured much as 4 across base, with a rather obscure and obtuse apical angle at each extreme side; tergum 6 with a corresponding, triangular, apical spine; pubescence of head copious, erect and entirely whitish; scutum and scutellum with abundant, erect, fuscous or blackish pubescence, the anterior third of scutum with pale pubescence, and entire pleura, propodeum and legs pale pubescent; basal abdominal tergum with copious, elongate, pale pubescence over anterior half and laterally, the disc posteriorly with some short, suberect and rather inconspicuous, blackish pubescence; tergum 2 with a rather thin and inconspicuous, basal, whitish fascia, and with a submedian fascia that is interrupted medially and borders the apical impressed area, the disc otherwise with short but erect blackish pubescence; terga 3 and 4 with submedian fasciae that are nearly or quite entire, bordering the apical impressed area, that on 5 more subapical, discs with erect, more elongate, blackish pubescence; median length of pygidial plate slightly greater than basal width, margins carinate, slightly converging apically, with a rather abrupt but slight subapical constriction, the apex rather

rounded or subtruncate; sterna 7 and 8 and genital armature much as in *agilis* (fig. 84).

DISTRIBUTION—Prince Edward Island west to Alberta in Canada, south to North Carolina and Illinois, July to September.

FLOWER RECORDS—LaBerge (1961) lists species of *Aster*, *Cirsium*, *Chrysanthemum*, *Grindelia*, *Helianthus*, *Hieracium*, *Leontodon*, *Rudbeckia*, *Solidago*, *Sonchus* and *Tanacetum*.

Melissodes (Eumelissodes)
manipularis Smith

Melissodes manipularis Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 312. ♂.

Melissodes manipularis Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 329.

Melissodes (Eumelissodes) manipularis LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 500.

FEMALE—Length 12-13 mm., breadth of abdomen 4.5-5 mm.; black, including labrum and mandibles, the antennal flagella brownish-ferruginous beneath, more piceous above; apical tarsal segments dark, spurs pale yellow; tegulae black; wings subhyaline, veins testaceous to piceous; cheeks considerably narrower than eyes; clypeus only very slightly protuberant, its median length slightly greater than half the distance between eyes below; eyes very slightly convergent below; shorter side of segment 2 of flagellum about half the length of basal segment; punctures of clypeus deep but rather fine, slightly separated, becoming minute and rather densely crowded toward apical margin, those on labrum fine and close medially, becoming slightly separated laterally; supraclypeal area narrowly impunctate along mid-line, becoming rather closely punctate laterally, the lateral areas on each side very finely and rather closely punctate, upper part of face smooth and shining, practically impunctate between eyes and ocelli, median area below ocelli finely but quite distinctly punctate; vertex with very fine, densely crowded punctures behind ocelli, these becoming somewhat more distinct laterally, minute and rather close on cheeks, becoming somewhat more coarse and distinct posteriorly; scutum somewhat shining between rather coarse and deep punctures, these quite sparse over posterior half, becoming rather fine and close laterally and anteriorly, those on scutellum somewhat finer and quite close throughout; pleura rather dull, punctures quite deep and distinct, rather fine and close over lower half, becoming rather abruptly coarser and deeper on upper half; posterior face of propodeum rather dull, punctures fine and quite

close but not crowded, dorsal area more coarsely sculptured, becoming rather finely rugosostriate at each extreme side, lateral faces dull, punctures rather obscure, becoming obsolescent anteriorly and below; basal abdominal tergum quite deeply and distinctly punctate across basal half, punctures quite close but not crowded, becoming somewhat finer and close at each extreme side where they nearly reach apical margin, the broad median apical area entirely impunctate; terga 2 and 3 very finely punctate across basal half, punctures well separated but not sparse medially, becoming rather sparse toward each side on 2, somewhat closer on 3, the apical impressed areas with only exceedingly minute, barely visible, scattered, sparse punctures; tergum 4 very finely and densely punctate across basal half, apical area obscured by pubescence; and basal areas of terga 5 and 6 usually hidden; pygidium rather broadly rounded apically, broadly subtriangular; pubescence of head copious and erect, pale ochraceous to whitish, with a few erect, dark hairs between ocelli and on vertex laterally; posterior half of scutum with a conspicuous patch of erect blackish pubescence, and scutellum black pubescent in large part; thorax otherwise pale ochraceous pubescent; coxae, trochanters and femora largely pale pubescent, the front and mid tibiae each with a dense patch of fuscous pubescence on outer surface toward apex, the basitarsi with considerable fuscous pubescence; hind tibial scopa pale ochraceous, hairs quite densely plumose; basal abdominal tergum with rather short but copious and erect, pale pubescence anteriorly and more narrowly along sides, the disc with some very short, suberect, black pubescence at each extreme side; tergum 2 with a basal fascia that is usually hidden, and a submedian whitish fascia bordering the apical impressed area, sometimes slightly interrupted medially, disc with very short, suberect, dark pubescence, apical area with some similar, very obscure pubescence; tergum 3 with a submedian white fascia, and that on 4 covering the apical impressed area in large part, the basal areas rather densely black pubescent; terga 5 and 6 entirely black pubescent.

MALE—Length 11 mm., breadth of abdomen 4.5 mm.; black, the labrum yellow medially, clypeus entirely bright yellow; antennal flagellum brownish-testaceous beneath, more piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae dark; wings subhyaline, veins testaceous to piceous; apical margins of abdominal terga becoming somewhat yellowish-hyaline; cheeks slightly narrower than eyes; clypeus only slightly protuberant, its median length very slightly greater than distance between eyes below; eyes somewhat convergent

below; basal segment of flagellum extremely short, not much longer than pedicel, segment 2 nearly six times as long as pedicel and segment 1 combined; punctures of clypeus rather fine and obscure, quite close laterally, somewhat separated medially, those on labrum well separated and more distinct; supraclypeal area largely impunctate, the lateral areas of face on each side more finely and closely punctate, upper part of face becoming smooth and shining, punctures very minute laterally, minute in mid-line below ocelli, but rather coarse and deep on each side; vertex with fine densely crowded punctures behind ocelli, these becoming somewhat more distinct laterally, cheeks very minutely punctate along margin of eyes; scutum shining between quite coarse and deep punctures, these quite sparse medially toward the posterior margin, becoming much closer laterally and over anterior half, those on scutellum nearly as coarse but very close, almost contiguous; pleura quite deeply, distinctly and closely punctate throughout; posterior face of propodeum rather finely and closely punctate, dorsal area narrowly impunctate medially, becoming quite coarsely rugoso-punctate on each side, lateral faces dull and rather closely punctate throughout; basal abdominal tergum quite coarsely, deeply and closely punctate, the punctures somewhat more sparse medially, becoming minute toward the narrowly impunctate apical margin; tergum 2 deeply and distinctly but finely and quite closely punctate across basal half, the apical impressed area with only very obscure, minute punctures in evidence; tergum 3 more minutely and rather closely punctate across base; terga 4 and 5 very closely punctate; apical impressed areas of all largely impunctate; tergum 5 with an obscure apical angle on each extreme side, and 6 with a corresponding, triangular, apical spine; pubescence of head copious and erect, entirely pale ochraceous; scutum with a median posterior black pubescent patch, and scutellum quite largely covered with blackish pubescence, thorax otherwise with copious, erect, ochraceous pubescence, that of legs entirely pale; basal abdominal tergum with copious, erect, pale ochraceous pubescence basally and along lateral margins, disc with some suberect black pubescence on each side toward apical margin; tergum 2 with a whitish, rather dense, basal fascia, and a submedian, rather broad fascia that borders the apical impressed area, intermediate area with short, suberect but rather conspicuous, blackish pubescence and a few suberect black hairs on apical area; tergum 3 with a rather narrow fascia bordering the apical impressed area, and with considerable thin, pale tomentum between it and the base, this covered in part with erect, but rather short black hairs, apical impressed area with

some short, more decumbant, dark hairs; tergum 4 with a subapical whitish fascia, basal area with elongate black hairs, and apical margin narrowly bare; terga 5 and 6 entirely black pubescent; median length of pygidial plate considerably less than basal width, lateral margins carinate, strongly convergent apically to the abrupt, subapical constriction, the apex rather broadly truncate; sterna 7 and 8 genital armature resembling those in *dentiventris* (fig. 84).

DISTRIBUTION — North Carolina to Florida, in September.

FLOWER RECORDS — *Chrysopsis* and *Kuhnistera*.

Melissodes (Eumelissodes)
menuachus Cresson

- Melissodes Menuachus* Cresson, 1868. Amer. Ent. Soc. Trans. 1, p. 388. ♂.
Melissodes mennacus (!) Uhler, 1877. U. S. Geol. Geog. Survey Bul. 3, p. 783.
Melissodes pallida Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 127. ♀.
Melissodes blakei Cockerell, 1905. Ann. Mag. Nat. Hist. (7) 15, p. 523. ♀.
Melissodes Mizzeae Cockerell, 1905. Ann. Mag. Nat. Hist. (7) 15, p. 522. ♀.
Melissodes lavata Cockerell, 1924. Pan-Pacific Ent. 1, p. 56. ♀.
Melissodes mizeae Hicks, 1926. Colo. Univ., Studies 15, p. 225.
Melissodes lavata Cockerell, 1927. Ent. Soc. Amer. Ann. 20, p. 395. ♂.
Melissodes octobris Cockerell, 1934. Ent. News 45, p. 30. ♀.
Melissodes (Eumelissodes) menuachus LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 417.

FEMALE—Length 12-13.5 mm., breadth of abdomen 5-6 mm.; black, the mandibles somewhat reddened apically, segments of flagellum beyond the 2nd brownish-testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae dull yellowish-hyaline; wings hyaline, somewhat whitish, veins testaceous to brownish; cheeks slightly narrower than eyes; clypeus only very slightly protuberant, its median length half the distance between eyes below; eyes slightly convergent below; segment 2 of flagellum somewhat longer than broad and slightly longer than half the length of basal segment; punctures of clypeus fine and close, those on labrum rather sparse on each side; supraclypeal area impunctate medially, lateral areas of face below level of antennae very finely and closely punctate, surface becoming shining and nearly impunctate, median area below ocelli quite closely and rather coarsely punctate; vertex behind ocelli with minute,

densely crowded punctures, quite smooth, with minute obscure punctures laterally; cheeks shining, punctures minute and obscure, becoming somewhat more distinct toward posterior margin; scutum shining between quite coarse and deep punctures, these rather sparse medially over posterior half of disc, becoming quite close laterally and anteriorly, those on scutellum somewhat finer, deep, distinct and quite close; punctures of pleura fine and quite close, becoming minute and indistinct posteriorly; posterior face of propodeum dull and densely tessellate, punctures very shallow and obscure, dorsal area densely tessellate medially, becoming rather coarsely reticulate at each extreme side, lateral faces tessellate, punctures rather close but shallow and indefinite, becoming somewhat more distinct but fine anteriorly and below; basal abdominal tergum well punctured across basal two-thirds of disc, punctures shallow but rather coarse and close, nearly reaching apical margin at each extreme side, the broad, median, apical area entirely impunctate and somewhat reddened; basal areas of terga 2-4 minutely and closely punctate, apical impressed areas more or less invaded by exceedingly minute, rather indistinct, close punctures, the apical rims impunctate; pygidium narrowly rounded at apex; pubescence of head and thorax copious but rather short, entirely pale ochraceous, largely pale ochraceous on legs, but front and mid tibiae with a small area of darker pubescence on outer surface apically, and basitarsi with some dark pubescence beneath, hind tibial scopa pale ochraceous, hairs densely plumose; basal abdominal tergum rather copiously pale ochraceous pubescent anteriorly and laterally, discs of remaining terga with very short and thin, entirely pale pubescence, 2 with a basal whitish fascia and a narrow, submedian fascia bordering the apical impressed area, 3 with a submedian, rather broad fascia which is only slightly removed from apical margin, and 4 with a broad dense fascia completely covering the apical impressed area; tergum 5 largely covered with rather short but dense suberect fuscous pubescence, this forming a rather dense apical fimbria, but with some pale hairs on each side.

MALE—Length 11-12 mm., breadth of abdomen 4-5 mm.; black, the clypeus entirely bright yellow, labrum with a median basal yellow maculation, and mandibles yellow maculated at base; antennal flagellum testaceous beneath, more brownish above; apical tarsal segments brownish-testaceous, spurs pale yellowish; tegulae brownish-testaceous; wings hyaline, somewhat whitish, veins testaceous to brownish; apical margins of abdominal terga broadly yellowish-hyaline; cheeks subequal to eyes in width; clypeus but very slightly protuberant, its median length slightly greater

than distance between eyes below; eyes slightly convergent below; basal segment of flagellum nearly twice the length of pedicel, segment 2 fully five times as long; punctures of clypeus rather coarse and close, but obscure on the yellow surface, those of labrum somewhat finer, slightly separated; supraclypeal area impunctate medially, lateral areas of face below antennae finely, closely and quite distinctly punctate, surface becoming smooth and shining above, punctures very minute, well separated but distinct, those below ocelli somewhat more coarse and close; vertex with rather fine, crowded punctures behind ocelli and along posterior margin on each side; cheeks smooth and somewhat shining, punctures minute, becoming somewhat more distinct toward posterior margin; scutum shining between coarse, deep punctures, these well separated medially over posterior half of disc, becoming somewhat finer and very close laterally and anteriorly, those on scutellum somewhat finer, slightly separated and evenly distributed; pleura with rather close, coarse and shallow punctures; posterior face of propodeum dull and tessellate, punctures shallow and rather indistinct, somewhat separated, dorsal area dull, densely rugose or reticulate along upper margin, lateral faces somewhat more distinctly and closely punctate; basal abdominal tergum quite deeply punctate over most of disc, punctures somewhat coarser and well separated medially toward the base, becoming finer apically, finer and closer laterally; discs of terga 2-5 quite deeply punctate across base, the punctures somewhat coarser on the more basal terga, slightly but not widely separated on all, surface rather dull, the broad apical impressed areas entirely impunctate and to some degree transparent; tergum 5 with a distinct, acute angle on each extreme side, and tergum 6 with a corresponding, more elongate, acute spine; pubescence of head and thorax and basal abdominal tergum long and copious, entirely whitish to very pale ochraceous, the legs entirely whitish pubescent; discs of abdominal terga with rather elongate but thin, suberect, pale pubescence, 2 with a thin and indefinite, basal, whitish fascia, apical impressed areas of 2-5 rather narrowly fringed with pale ochraceous fasciae, that on 5 nearly apical, and that on 6 completely so; median length of pygidial plate about equal to the basal width, margins rather sharply carinate, slightly converging toward apex, this rather abruptly incurved on each side, apical margin very slightly curved, subtruncate; sterna 7 and 8 and genital armature much as in *agilis* (fig. 84).

DISTRIBUTION—British Columbia to Mexico, east to Wisconsin and Illinois, July to October.

FLOWER RECORDS—According to LaBerge (1961) *Grindelia* and *Solidago* are preferred by *menuachus* as a pollen source, but it has been collected also on species of *Argemone*, *Aster*, *Cassia*, *Chrysopsis*, *Chrysothamnus*, *Cleome*, *Eustoma*, *Gaillardia*, *Gutierrezia*, *Helianthus*, *Hymenothrix*, *Medicago*, *Melilotus*, *Petalostemum*, *Polygonum*, *Rudbeckia*, *Sidalcea*, *Verbena*, *Viguiera* and *Xanthocephalum*.

Melissodes (Eumelissodes) nivea
Robertson

Melissodes nivea Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 127. ♀.

Melissodes nivea Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 354. ♂.

Melissodes (Eumelissodes) nivea LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 455.

FEMALE—Length 9.5-11.5 mm., breadth of abdomen 4-5 mm.; black, the apical half of mandibles yellowish in part on outer surface; segments of flagellum beyond the 2nd brownish-ferruginous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae brownish; wings whitish-hyaline, veins pale testaceous to brownish; cheeks only slightly narrower than eyes; clypeus very slightly protuberant, its median length half the distance between eyes below; eyes slightly convergent below; segment 2 of flagellum somewhat more than half the length of basal segment; punctures of clypeus close, deep and quite coarse, those on labrum much finer but uniformly close; supraclypeal area with sparse, scattered punctures, the face laterally with fine but close and distinct punctures below level of antennae, becoming smooth and shining above between eyes and ocelli, the punctures minute and well separated but distinct, those below ocelli quite coarse and deep; vertex with fine and densely crowded punctures behind ocelli, and along posterior margin laterally; cheeks shining, with minute, well separated punctures, becoming somewhat coarser posteriorly; scutum somewhat shining between deep, distinct and quite coarse punctures, these rather sparse medially on posterior half, becoming finer and closer laterally and anteriorly, those on scutellum somewhat finer, distinct but rather close, uniformly distributed; pleura with quite close, coarse but rather shallow punctures, these becoming very fine and close posteriorly; posterior face of propodeum rather dull, punctures shallow, irregularly scattered, dorsal area dull and densely tessellate medially, becoming rather coarsely rugoso-striate along margin on each

side, lateral faces dull in large part, punctures rather close but obscure, becoming more distinct but still close anteriorly and below where surface is more shining; disc of basal abdominal tergum dull, punctures shallow, well separated but rather coarse medially, becoming finer and closer laterally where they nearly reach the apical margin, the broad median apical area entirely impunctate; discs of following terga closely punctate across base, rather coarsely so on 2, more finely so on following terga, apical impressed areas rather well punctured but punctures exceedingly minute and rather widely separated, only the very narrow apical rims entirely impunctate; pygidium narrowly rounded at apex; pubescence of face and cheeks quite copious, entirely white, vertex with fuscous pubescence across top of head, fringed behind with whitish pubescence, and a few dark hairs below level of ocelli on each side; scutum and scutellum largely covered with erect, copious but rather short, fuscous or blackish pubescence, scutum narrowly whitish pubescent across anterior margin, the prothorax, pleura and propodeum entirely whitish pubescent; coxae, trochanters and femora largely whitish pubescent, the fore and mid tibiae pale pubescent except for an apical patch of more fuscous, appressed hairs, the basitarsi with dark hairs beneath; hind tibial scopa whitish, hairs quite densely plumose; basal abdominal tergum largely whitish pubescent, copiously so anteriorly, but with some appressed, blackish pubescence on each side of disc; tergum 2 with a basal white fascia, largely obscured by the preceding tergum, and a median, narrow, whitish fascia bordering the basal margin of the impressed area, disc otherwise covered with very short, suberect, fuscous pubescence, the apical area only very thinly pale pubescent; tergum 3 with a rather narrow fascia bordering the impressed area, disc basally with thin, whitish tomentum and a few more elongate, erect hairs, the shorter of these dark, the long erect hairs whitish, apical margin very thinly whitish pubescent; tergum 4 dark pubescent across basal area, the apical area completely covered with dense whitish tomentum; terga 5 and 6 entirely dark pubescent except for some pale hairs laterally.

MALE—Length 9 mm., breadth of abdomen 3-3.5 mm.; black, the clypeus entirely bright yellow, and labrum with a large basal yellow maculation, dark laterally and apically; antennal flagellum brownish-testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae brownish; wings whitish-hyaline, veins yellowish to testaceous; apical margins of abdominal terga broadly yellowish-hyaline

and transparent; cheeks nearly as broad as eyes; clypeus only very slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum extremely short, somewhat shorter than pedicel, segment 2 about five times as long as segment 1 and pedicel combined; punctures of clypeus rather fine and close laterally, somewhat more separated medially, rather obscure on the yellow surface, those on labrum somewhat more distinct, slightly separated on each side; supraclypeal area impunctate medially, lateral areas of face below level of antennae rather dull, finely and rather closely punctate becoming minute and less distinct above where the surface is shining between eyes and ocelli, the more median punctures below ocelli rather coarse and close; vertex very finely and densely punctate behind ocelli, and more narrowly along margin laterally; cheeks somewhat shining, punctures minute, but becoming rather deep and distinct toward posterior margin; scutum shining, punctures rather deep and distinct, becoming very sparse and rather fine over posterior half, rather close at extreme sides and anteriorly, those on scutellum rather fine and quite sparse; punctures of pleura rather coarse and deep, somewhat separated, becoming finer and closer posteriorly above mid coxae; posterior face of propodeum rather dull, punctures shallow and irregular, rather sparse on each side of mid-line, dorsal area dull, becoming irregularly and rather coarsely reticulate on each side, lateral faces dull, rather closely punctate posteriorly, punctures becoming rather sparse, shallow and obscure anteriorly and below; punctures of abdominal terga quite deep and distinct, rather coarse and close across base of the basal tergum, becoming finer toward apical margin, only the narrow rim entirely impunctate; punctures rather well separated on discs of terga 2 and 3, closer and finer on 4, and much closer on 5, rather evenly distributed on each, apical impressed areas largely impunctate; tergum 5 with a short but acute angle on each extreme side, and 6 with a corresponding more elongate and slender spine; pubescence quite copious and elongate, entirely white on head, thorax, legs and basal abdominal tergum, only the basitarsi with some more yellowish pubescence beneath; discs of abdominal terga 2-6 with thin but rather copious and erect, whitish pubescence that does not obscure the surface, apical impressed areas fringed basally with narrow whitish fasciae, these more nearly apical in position on the more apical terga, and tergum 2 with a basal, rather thin fascia which is usually covered by the preceding plate; median length of pygidial plate somewhat greater than basal width, margins carinate, slightly conver-

gent apically, becoming rather abruptly narrowed toward the narrowly truncate apex; sterna 7 and 8 and genital armature resembling those in *agilis* (fig. 84).

DISTRIBUTION — New York to North Carolina and Mississippi, west to Arkansas, July to October.

FLOWER RECORDS—LaBerge (1961) lists species of *Aster*, *Bidens*, *Boltonia*, *Chrysopsis*, *Gerardia*, *Helenium*, *Helianthus*, *Lacinaria*, *Lepachys*, *Liatris*, *Prionopsis*, *Solidago* and *Vernonia*.

Melissodes (Eumelissodes) pilleata LaBerge

Melissodes (Eumelissodes) pilleata LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 459. ♀ ♂.

FEMALE—Length 11-12 mm., breadth of abdomen 4-5 mm.; black, the antennal flagellum somewhat more piceous beneath, apical tarsal segments somewhat more piceous, spurs dull testaceous; tegulae piceous; wings very lightly infuscated, veins piceous; cheeks somewhat broader than eyes; clypeus very slightly protuberant, its median length about half the distance between eyes below; eyes subparallel; basal segment of flagellum nearly twice the length of segment 2; clypeus closely, deeply and rather coarsely punctate, the punctures becoming very fine and densely crowded toward apical margin, those on labrum much finer, closely crowded medially, becoming quite sparse laterally; supraclypeal area somewhat shining and very sparsely punctate, lateral areas of face below level of antennae very finely and quite closely punctate, becoming more sparsely and minutely punctate above, the surface shining between eyes and ocelli, the median punctures below ocelli much coarser and deeper; vertex finely and densely punctate behind ocelli, more widely separated laterally; cheeks quite smooth, punctures minute, becoming somewhat more coarse and distinct along posterior margin; scutum shining between quite coarse and deep punctures, these sparse medially over apical half of disc, becoming somewhat finer and much closer laterally and anteriorly, those on scutellum slightly finer, quite close and uniform; punctures of pleura deep, rather coarse and quite close, becoming much finer posteriorly above mid coxae; posterior face of propodeum dull, punctures shallow and rather close, dorsal area dull, rather coarsely rugose or reticulate on each side of mid-line along upper margin, lateral faces dull and obscurely punctate posteriorly, the punctures becoming finer and more obscure anteriorly and below; basal two-

thirds of disc of basal abdominal tergum dull, rather shallowly but closely punctate, punctures becoming finer and closer laterally where they nearly reach the apical margin, the broad, median, apical area impunctate; discs of the following terga very finely punctate across basal area, punctures well separated on tergum 2, quite close on 3 and crowded on 4, apical impressed areas nearly impunctate, with only vague and extremely minute punctures at all visible; pygidium rather narrowly rounded apically; vertex with a transverse line of long black hairs, head otherwise with rather copious, short, whitish pubescence; scutum and scutellum largely covered with erect but rather short, fuscous or blackish pubescence, only the narrow anterior margin of scutum white pubescent; pleura and propodeum entirely whitish pubescent; legs largely pale pubescent, but fore and mid tibiae with some fuscous, appressed pubescence on outer face near apex, and basitarsi with dark hairs beneath; hind tibial scopa whitish or pale ochraceous, the hairs quite densely plumose; basal abdominal tergum with some short, rather inconspicuous, blackish pubescence on each side of disc, but otherwise with rather short, copious pale pubescence medially, anteriorly and at extreme sides; discs of the following terga largely covered with short, suberect but rather inconspicuous, black pubescence, the apical impressed areas only thinly pubescent; tergum 2 with a basal white fascia, usually obscured by the preceding tergum; terga 2-4 with submedian, white fasciae that fringe the impressed apical areas, more or less interrupted medially on 2, that on 4 more nearly subapical in position; terga 5 and 6 entirely blackish pubescent.

MALE—Length 9-11 mm., breadth of abdomen 3.5-4 mm.; black, the clypeus yellowish-white, labrum with a large, median, ivory maculation, and mandibles ivory maculated at base; antennal flagellum testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae piceous; wings very lightly infuscated, veins testaceous to piceous; apical margins of abdominal terga becoming narrowly yellowish apically; cheeks slightly narrower than eyes; clypeus only slightly protuberant, its median length considerably greater than half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum very short, no longer than pedicel, segment 2 nearly six times as long as segment 1 and pedicel combined; punctures of clypeus rather coarse and close laterally, becoming slightly separated medially, obscure on the whitish surface, those on labrum somewhat finer, slightly separated laterally; supracl-

peal area shining, with only a very few, widely scattered punctures, lateral areas of face below level of antennae closely and finely punctate, punctures becoming minute above antennae where the surface is shining and between eyes and ocelli, the more median punctures below ocelli quite coarse and deep; vertex finely and rather densely punctate behind ocelli, the punctures more distinct on each side; cheeks somewhat shining beneath the pubescence, punctures minute, becoming more distinct and deep toward the posterior margin; scutum shining between deep and rather coarse punctures, these quite sparse over posterior half medially, becoming finer and closer laterally and anteriorly, those on scutellum somewhat finer and quite sparse, the surface shining; punctures of pleura quite coarse and deep, rather well separated, becoming rather minute and closer posteriorly above mid coxae; posterior face of propodeum rather dull, punctures rather coarse, not widely separated, dorsal area becoming very dull, quite densely reticulate along upper margin, lateral faces somewhat more closely and finely punctate, the punctures becoming obsolescent anteriorly and below; discs of abdominal terga with quite deep and distinct punctures, those on basal tergum well separated medially and rather coarse, evenly distributed, becoming minute and somewhat more sparse toward apical margin which is very narrowly impunctate, those on the following terga becoming progressively finer and closer, apical impressed areas largely impunctate but invaded to a slight degree by extremely minute, widely scattered punctures; terga 5 and 6 closely punctate basally, 5 with a slight angle on each extreme side, and 6 with a corresponding, more elongate and robust spine; vertex with a few, erect and elongate dark hairs, but head otherwise quite densely long white pubescent; scutum and scutellum with copious, erect, fuscous pubescence, only the narrow anterior margin of scutum with pale pubescence; pleura, propodeum and legs entirely whitish pubescent; basal abdominal tergum with copious, long, erect, whitish pubescence across basal area, the narrow apical area with elongate, suberect, fuscous pubescence; discs of the following terga with erect, blackish to fuscous pubescence, more abundant on the basal area, sparse on the impressed apical areas, these fringed basally with narrow white fasciae, and tergum 2 with a basal white fascia which is usually covered in part by the preceding tergum; tergum 6 entirely fuscous pubescent; median length of pygidial plate about equal to basal width, margins strongly carinate and quite strongly convergent apically to the constricted and rather broadly truncate apex; sterna 7 and 8 and genital armature much as in *agilis* (fig. 84).

DISTRIBUTION—North Carolina, September and October.

FLOWER RECORDS — *Aster*, *Chrysopsis*, *Gerardia*, *Haplopappus*, *Kuhnistera* and *Liatris*.

Melissodes (Eumelissodes) rustica
(Say)

(Fig. 85)

Macrocera rustica Say, 1837. Boston Jour. Nat. Hist. 1, p. 406. ♂ ♀.

Melissodes rustica Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 309.

Melissodes assimilis Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 114.

Melissodes ambigua Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 116.

Melissodes festinata Provancher, 1888. Addit. Pet. Faun. Canada, Hym. 2, p. 300.

Melissodes simillima Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 355.

Melissodes asteris Robertson, 1914. Ent. News 25, p. 70.

Melissodes (Eumelissodes) rustica LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 543.

FEMALE—Length 9.5-11.5 mm., breadth of abdomen 4-4.5 mm.; black, the flagellum reddish-piceous beneath, black above; apical tarsal segments becoming brownish, spurs pale yellowish; tegulae piceous; wings subhyaline, veins testaceous to piceous; cheeks slightly broader than eyes; clypeus only very slightly protuberant, its median length about half the distance between eyes below; eyes very slightly convergent below (fig. 85); basal segment of flagellum about twice the length of segment 2; punctures of clypeus contiguous, rather coarse and deep, becoming very fine and densely crowded toward apical margin, those on labrum finer and more distinctly separated; supraclypeal area impunctate medially, becoming densely crowded on each side, lateral areas of face below antennae, rather

finely punctate, the punctures well separated, becoming minute and quite sparse above between eyes and ocelli where the surface is shining, the more median punctures below ocelli much more coarse and distinct; vertex finely and densely punctate behind ocelli, somewhat more finely so on each side; cheeks shining, punctures exceedingly minute, becoming somewhat more distinct and deep posteriorly; scutum shining between quite coarse and deep punctures, these rather sparse in median area posteriorly, becoming considerably closer laterally and anteriorly, those on scutellum much finer and quite close but not crowded; punctures of pleura quite deep, close and rather coarse; posterior face of propodeum dull, densely tessellate, the punctures rather coarse and close, but very shallow and obscure, dorsal area quite coarsely reticulate, becoming more striate at each extreme side, lateral faces dull and densely tessellate, punctures quite close but obscure; disc of basal abdominal tergum dull and tessellate across basal two-thirds, with rather coarse but shallow, somewhat separated punctures, these becoming somewhat finer and closer laterally where they nearly reach apical margin, the broad, median, apical area entirely impunctate; tergum 2 basally very finely and rather irregularly punctate, the punctures rather widely separated in general, apical impressed area largely impunctate except toward extreme sides; basal areas of terga 3-5 very finely and closely punctate, becoming almost rugose on the more apical terga, apical impressed areas with exceedingly minute punctures, those on 4 rather close; pygidium elongate-triangular, apex narrowly rounded; pubescence variable, largely black on the head, thorax and abdomen in the dark forms, with light hairs only around tubercles, on propodeum, and on basal abdominal tergum, scopa pale yellowish, the abdominal fasciae fuscous and thus obscure; in the lighter forms there is considerable pale pubescence across front of face and on cheeks laterally and below, the vertex with long fuscous pubescence and some fuscous hairs bordering eyes above; the scutum and scutellum are in large part fuscous pubescent, the scutum being pale pubescent over anterior third, and the pleura above, and entire propodeum pale ochraceous pubescent; the legs are largely black pubescent, but the hind tibial scopa is pale yellow, the hairs densely plumose; the discal pubescence of the abdominal terga is very short, suberect, largely blackish; tergum 2 with a basal whitish fascia, and the apical impressed areas of 2-4 fringed with narrow, whitish fasciae that are slightly interrupted medially; terga 5 and 6 are entirely fuscous pubescent.

MALE—Length 8-9 mm., breadth of abdo-

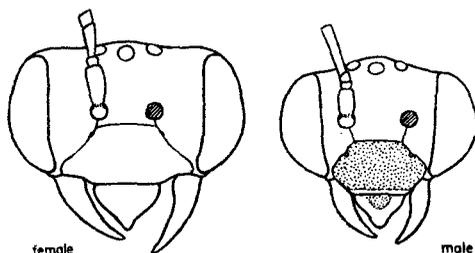


Figure 85

Facial view of head in both sexes of
M. (Eumelissodes) rustica.

men 3-3.5 mm.; black, the clypeus bright yellow, labrum with a basal, median, yellow maculation and mandibles rather obscurely testaceous toward the apex, usually entirely black at base; antennal flagellum testaceous toward apex, usually entirely black at base; antennal flagellum testaceous beneath, piceous above; apical tarsal segments brownish-testaceous, spurs pale yellowish; tegulae dark, brownish-piceous; wings rather whitish-hyaline, veins testaceous to brownish; cheeks much narrower than eyes; clypeus slightly protuberant, its median length about half the distance between eyes below; eyes rather strongly convergent below (fig. 85); basal segment of flagellum slightly longer than pedicel, segment 2 four or five times this length; punctures of clypeus quite close and rather coarse laterally, slightly more distinct medially, but obscure on the yellow surface, those on labrum somewhat deeper and more distinct; supraclypeal area largely impunctate, lateral areas of face below level of antennae distinctly but quite finely and closely punctate, becoming minute and obscure above where the surface is shining between eyes and ocelli, median punctures below ocelli considerably coarser and more distinct; vertex very finely and densely punctate behind ocelli, punctures somewhat more distinct on each side; cheeks shining, punctures exceedingly minute and obscure, but becoming somewhat more deep and distinct toward posterior margin; scutum shining between coarse, deep punctures, these rather sparse over posterior half of disc, becoming finer and closer laterally and anteriorly, those on scutellum slightly finer and rather sparse, the surface shining; pleura quite coarsely, deeply and rather closely punctate; posterior face of propodeum dull and tessellate, punctures shallow, irregularly scattered and obscure, dorsal area dull, becoming rather densely rugose along upper margin, more striate at each extreme side, lateral faces dull, punctures somewhat closer and more distinct; basal abdominal tergum rather dull, punctures rather coarse, shallow and widely separated toward base medially, becoming finer and closer laterally where they nearly reach apical margin, the more apical punctures minute and more widely separated, only the very narrow apical rim entirely impunctate; basal areas of terga 2 and 3 with rather fine, well separated punctures, apical impressed areas practically impunctate, with only a very few, minute, scattered punctures just beyond the fasciae; terga 4 and 5 basally very finely and quite densely punctate, 5 with a quite distinct angle on each side, tergum 6 with a corresponding, more elongate, subtriangular spine; pubescence copious and erect, largely pale yellowish or whitish on head, thorax, basal abdominal tergum and legs; discs of terga 2-6 with short,

rather thin, copious, pale pubescence, which does not obscure the surface, some of the more erect hairs appearing darker; tergum 2 with a rather thin, basal, white fascia and a submedian narrow fascia which fringes the apical impressed area; terga 3 and 4 white fasciate along margin of the impressed area, the apical portion of this area bare and impunctate; terga 5 and 6 largely dark pubescent, but 5 subfasciate; median length of pygidial plate about equal to the basal width, margins carinate, rather strongly convergent apically to the rather abruptly constricted and truncate apex; sternum 7 and genital armature resembling those in *agilis* (fig. 84), but sternum 8 narrower at apex.

DISTRIBUTION—Nova Scotia to Georgia and Mississippi, west to Idaho, Arizona and Mexico, May to November.

FLOWER RECORDS—LaBerge (1961) states that *rustica* is oligolectic on Compositae, preferring species of *Solidago* and *Aster* over most of its range. The complete list of plants visited includes also species of *Abutilon*, *Amphiachyris*, *Aplopappus*, *Asclepias*, *Baccharis*, *Bidens*, *Centaurea*, *Chrysopsis*, *Cirsium*, *Cleome*, *Coreopsis*, *Cosmos*, *Epilobium*, *Gaillardia*, *Grindelia*, *Helenium*, *Helianthus*, *Helipopsis*, *Hieracium*, *Lycopus*, *Marrubium*, *Melilotus*, *Mentha*, *Physostegia*, *Polymenantha*, *Ratibida*, *Rudbeckia*, *Silphium*, *Spiraea*, *Verbena*, *Verbesina* and *Vernonia*.

This is a very variable species with respect to the color of pubescence in the female, and in the male also, but to a lesser degree. The variations have some correlation with distribution, with populations in the Eastern United States generally darker than those in the West. A discussion and analysis of this variation is included in Part 3 of LaBerge's Revision (1961), pp. 546-552.

Melissodes (Eumelissodes) subillata
LaBerge

Melissodes (Eumelissodes) subillata LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 568. ♀ ♂.

FEMALE—Length 9.5-12 mm., breadth of abdomen 3.5-4.5 mm.; black, the mandibles with a yellowish apical maculation, flagellum reddish-piceous beneath; apical tarsal segments becoming brownish-testaceous, spurs pale yellow; tegulae dark; wings subhyaline, veins brownish to piceous; cheeks considerably narrower than eyes; clypeus very slightly protuberant its median length about half the

distance between eyes below; eyes very slightly convergent below; segment 2 of flagellum about half the length of basal segment; punctures of clypeus close and rather coarse laterally, slightly separated medially, becoming densely crowded and fine along apical margin, close and somewhat finer on labrum; supra-clypeal area rather sparsely punctate, face laterally with fine and rather close punctures below level of antennae, surface above shining, punctures very minute and quite sparse between eyes and ocelli, but median punctures below ocelli relatively coarse and close; vertex finely and densely punctate behind ocelli; cheeks somewhat shining, punctures minute and slightly separated, becoming somewhat coarser posteriorly; scutum shining between rather coarse and deep punctures, these well separated posteriorly, becoming somewhat finer and quite close laterally and anteriorly, those on scutellum about equally coarse, only slightly separated; pleura with deep and rather coarse punctures, these slightly separated in median area of lateral surface, becoming much finer and closer posteriorly above mid coxae; posterior face of propodeum dull and tessellate, punctures shallow, rather sparse and irregular, dorsal area dull, becoming rather coarsely reticulate along upper margin, lateral faces dull, punctures very shallow and vague but quite close; disc of basal abdominal tergum rather dull, punctures shallow and vague, well separated across basal area, somewhat finer and closer at extreme sides where they nearly reach apical margin, the broad median apical area entirely impunctate; basal areas of terga 2 and 3 very minutely punctate, sparsely so on 2, apical impressed areas entirely impunctate; tergum 4 minutely and much more closely punctate across base; pygidium elongate-triangular, its median length considerably greater than basal width, narrowly rounded at apex; vertex with much erect fuscous or blackish pubescence, fringed posteriorly with long white hairs, head otherwise whitish pubescent; scutum and scutellum largely short, fuscous pubescent, scutum with only a few pale hairs along anterior margin, and tubercles with intermixed fuscous hairs among the pale, the pleura and propodeum entirely whitish pubescent; legs largely pale pubescent, but fore and mid tibiae with a small apical patch of brownish appressed pubescence, and basitarsi with some dark hairs beneath; hind tibial *scopa* whitish, hairs rather densely plumose; basal abdominal tergum rather narrowly pale pubescent laterally and basally, disc with some short, suberect, blackish pubescence visible toward the sides; discs of terga 2-4 with short, suberect, blackish pubescence, more elongate and erect on 4, the apical impressed areas with only suberect hairs visible toward sides, tergum 2 with a rather broad

basal, whitish fascia and a narrow, submedian, somewhat oblique fascia, fringing the impressed apical area and rather widely interrupted medially; apical areas of terga 2 and 3 also fringed with a narrow whitish fascia, entire or narrowly interrupted, that on 4 quite broad laterally, more or less separated from rim of tergum medially; terga 5 and 6 largely dark pubescent, with a few elongate, pale hairs laterally.

MALE—Length 9.5-12 mm., breadth of abdomen 3-4 mm.; black, the clypeus entirely bright yellow, labrum often with a median, basal, yellow maculation, and mandibles with a subapical, more testaceous maculation; flagellum brownish-testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae piceous; wings subhyaline, veins testaceous to brownish; abdominal terga often becoming yellowish along apical rims; cheeks slightly narrower than eyes; clypeus only very slightly protuberant, its median length about half the distance between eyes below; eyes rather strongly convergent below; shorter side of basal segment of flagellum slightly longer than pedicel, segment 2 four or five times the length of segment 1; clypeus quite deeply and rather coarsely punctate, the punctures only very slightly separated, obscure on the yellow surface, those on labrum somewhat finer but deeper, more distinct and quite close; supra-clypeal area very finely and sparsely punctate, lateral areas of face below level of antennae finely and quite closely punctate, surface above shining, punctures between eyes and ocelli very minute and sparse, more coarse and distinct medially, below ocelli; vertex very finely and densely punctate behind ocelli, punctures somewhat more distinct laterally; cheeks rather smooth, somewhat shining, punctures exceedingly minute and vague, scutum shining, punctures deep and rather coarse, quite sparse over posterior half, becoming finer and closer laterally and anteriorly, scutellum somewhat more finely punctate, the punctures well separated throughout; pleura quite coarsely, deeply and closely punctate throughout, the punctures distinctly but not widely separated; posterior face of propodeum dull and tessellate, punctures rather shallow and sparse, dorsal area rather coarsely reticulate along upper margin, lateral faces quite closely but rather finely punctate posteriorly, the punctures becoming obsolescent anteriorly and below; basal abdominal tergum with rather fine, well separated, shallow punctures across basal half of disc, becoming finer and closer at extreme sides where they nearly reach apical margin, the broad, median, apical area nearly impunctate; basal areas of terga 2-5 very finely punctate, the punctures rather sparse on 2

and 3, closer on 4, and quite close on 5, apical impressed areas largely impunctate; tergum 5 with a short, somewhat obtuse angle on each extreme side, and tergum 6 with a corresponding, triangular, apical spine; vertex with considerable erect fuscous pubescence between tops of eyes, but fringed posteriorly with whitish pubescence, head otherwise with quite copious, elongate, whitish pubescence; scutum and scutellum covered in large part with elongate, fuscous hairs, the anterior third or fourth of scutum with erect pale pubescence, pleura, propodeum and legs entirely whitish pubescent; basal abdominal tergum largely whitish pubescent, quite elongate and copious basally, disc with some suberect, inconspicuous, dark pubescence on each side; discs of terga 2-5 with short, suberect, fuscous or blackish pubescence across the basal areas, impressed apical areas with some similar but shorter and more decumbent pubescence; tergum 2 with a rather broad, basal, white fascia and a medially interrupted fascia fringing the apical impressed area; terga 3 and 4 with narrow, entire, whitish fasciae bordering the impressed area, 5 with a somewhat less conspicuous whitish fascia, 6 entirely dark pubescent; median length of pygidial plate somewhat greater than basal width, margins carinate, nearly parallel, but rather abruptly constricted toward the broadly truncate apex, sterna 7 and 8 and genital armature resembling those in *agilis* (fig. 84).

DISTRIBUTION—Quebec to Saskatchewan in Canada, south to North Carolina and Illinois, June to September.

FLOWER RECORDS — Species of the following plant genera are listed by LaBerge (1961): *Aster*, *Chrysanthemum*, *Cichorium*, *Cirsium*, *Coreopsis*, *Echinacea*, *Epilobium*, *Eupatorium*, *Gaillardia*, *Helianthus*, *Hieracium*, *Lactuca*, *Petalostemum*, *Platycodon*, *Psoralea*, *Ratibida*, *Rudbeckia*, *Solidago*, *Sonchus*, *Teucrium* and *Vernonia*.

***Melissodes (Eumelissodes) tincta*
LaBerge**

Melissodes (Eumelissodes) tincta LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 493. ♀ ♂.

FEMALE—Length 9.5-11 mm., breadth of abdomen 4-4.5 mm.; black, mandibles with a more or less conspicuous, apical, testaceous maculation; antennal flagellum piceous beneath; apical tarsal segments somewhat brownish, spurs pale yellowish; tegulae somewhat brownish; wings whitish-hyaline, veins testaceous to piceous; cheeks nearly as broad as eyes; clypeus slightly protuberant, its median length half the distance between eyes

below; eyes slightly convergent below; segment 2 of flagellum slightly more than half the length of basal segment; punctures of clypeus quite coarse, close and deep, those on labrum close but somewhat finer; supraclypeal area sparsely punctate medially, lateral areas of face below level of antennae finely and rather closely punctate, becoming minute and rather sparse above on shining surface between eyes and ocelli, quite coarse and sparse medially, below ocelli; vertex finely and densely punctate behind ocelli, punctures somewhat more distinct laterally; cheeks somewhat shining; punctures minute along eye margin, becoming deeper and more distinct posteriorly; scutum somewhat shining between coarse and deep punctures, these well separated but not sparse over posterior half of disc, becoming much closer and somewhat finer laterally and anteriorly, those on scutellum finer and quite close; pleura with rather coarse but shallow, well separated punctures, becoming much finer and closer posteriorly above mid coxae; posterior face of propodeum dull and tessellate, punctures rather shallow, somewhat sparse, dorsal area becoming rather coarsely reticulate along upper margin, lateral faces dull, quite closely and finely punctate; basal abdominal tergum rather dull across basal half, with shallow, somewhat separated punctures, these becoming much closer laterally where they nearly reach the apical margin, the broad median apical area impunctate; basal areas of terga 2-4 quite deeply and distinctly but rather finely and closely punctate, those on 4 almost crowded, apical impressed areas very minutely but rather closely punctate nearly to the rim; median length of pygidium about equal to basal width, subtriangular, apex rather narrowly rounded; vertex with conspicuous, erect, fuscous pubescence across top of head, with some intermixed fuscous hairs between ocelli and antennae, and along margin of eyes above, face with a few intermixed dark hairs, otherwise whitish pubescent, quite copious and elongate; scutum and scutellum with conspicuous, erect, fuscous or blackish pubescence, the scutum narrowly white pubescent across anterior margin, the pleura and propodeum entirely whitish or pale ochraceous pubescent; the more basal segments of the legs pale pubescent, the fore and mid tibiae more fuscous pubescent along outer face, basitarsi with generally dark pubescence, hind tibial scopa whitish, hairs quite densely plumose; basal abdominal tergum with abundant, copious, long and erect, pale pubescence basally and with some short pale pubescence along lateral margins, disc with some short, suberect, fuscous pubescence at each side; discs of terga 2-5 largely covered with very short, erect or suberect, fuscous pubes-

cence, 2 with a rather narrow, basal, white fascia, and submedian, slightly interrupted fascia that fringes the apical impressed area; terga 3 and 4 with somewhat broader, entire, whitish fasciae, that on 3 submedian, more nearly apical on 4, the latter separated from the rim medially by a fuscous tomentose area; terga 5 and 6 entirely fuscous or blackish pubescent except for a few pale hairs at extreme sides.

MALE—Length 9.5-10 mm., breadth of abdomen 3.5-4 mm.; black, including labrum and base of mandibles, the latter with an apical yellowish maculation, and apical half of clypeus bright yellow, basal half or more black; antennal flagellum testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae brownish-testaceous; wings whitish-hyaline, veins yellowish to brownish; apical margins of abdominal terga becoming more or less yellowish-hyaline and transparent toward rims; cheeks slightly narrower than eyes; clypeus only slightly protuberant, its median length about half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum little if any longer than pedicel, segment 2 nearly five times as long as segment 1 and pedicel combined; punctures of clypeus fine and close laterally, becoming somewhat coarser and more distinct medially, quite obscure on the yellow maculated area, those on labrum fine, distinct and close; supraclypeal area very sparsely punctate medially, lateral areas of face below level of antennae finely and quite closely punctate, becoming very minute and obscure above on the shining surface between eyes and ocelli, much more coarse and distinct and rather close medially, below ocelli; vertex finely and densely punctate behind ocelli; cheeks with minute punctures along margin of eyes, these becoming quite coarse and deep posteriorly, scutum somewhat shining between coarse and deep punctures, these rather sparse in a limited posterior area, becoming very much finer and closer laterally and somewhat closer and rather coarse anteriorly, those on scutellum not quite so coarse, well separated but hardly sparse; punctures of pleura quite coarse, close and deep, becoming much finer and closer posteriorly above mid coxae; posterior face of propodeum rather dull and tessellate, punctures rather shallow but quite close, becoming somewhat sparser laterally, dorsal area quite coarsely rugose or reticulate along upper margin, lateral faces dull and densely tessellate, punctures shallow and irregular, becoming obsolescent below; basal abdominal tergum quite coarsely and deeply punctate, the punctures distinctly but not widely separated medially, becoming much

finer and somewhat more sparse toward the rim, quite close at extreme sides where they nearly reach the apical margin; terga 2-4 quite deeply but rather finely punctate across basal area, the punctures rather sparse on 2, somewhat closer but not crowded on 3 and 4, apical impressed area invaded only slightly by very minute and rather sparse punctures; tergum 5 quite finely and densely rugoso-punctate, obscurely angulate at each extreme side, tergum 6 with a corresponding triangular, apical spine on each side; head with copious, long and erect, whitish to pale ochraceous pubescence, sometimes with a few dark hairs behind ocelli and across vertex; scutum and scutellum with rather abundant, erect, dark pubescence, anterior margin of scutum covered with pale ochraceous pubescence, pleura and propodeum entirely pale ochraceous pubescent; pubescence of legs entirely whitish; basal abdominal tergum with copious, long and erect pubescence basally and more narrowly along lateral margins, disc with some shorter, suberect, fuscous pubescence; terga 2-5 with short, suberect, blackish or fuscous pubescence on basal area, sometimes with a small amount of suberect black pubescence on the apical areas; tergum 2 with a rather narrow basal yellowish-white fascia, and a submedian fascia that fringes the apical impressed area basally, this slightly interrupted medially; apical impressed areas of terga 3 and 4 also narrowly fasciate at base, 5 with a more nearly apical fascia; median length of pygidial plate about equal to basal width, margins carinate and slightly convergent to the rather abruptly constricted apex which is truncate; sterna 7 and 8 and genital armature, resembling those in *agilis* (fig. 84).

DISTRIBUTION—Minnesota and Michigan to North Carolina, Texas and Florida, August to December.

FLOWER RECORDS—LaBerge (1961) states that *tincta* is an oligolege of composites, chiefly species of *Chrysopsis* and *Aster*. He records it also on *Helianthus* and *Verbesina*.

Melissodes (Eumelissodes) trinodis
Robertson

Melissodes trinodis Robertson, 1901. Canad. Ent. 33, p. 231. ♀ ♂.

Melissodes trinodis Graenicher, 1905. Wis. Nat. Hist. Soc. Bul. 3, p. 164. (biology)

Melissodes (Eumelissodes) trinodis LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 393.

FEMALE—Length 11-12 mm., breadth of abdomen 4.5-5 mm.; black, the mandibles more or less yellow apically; segments of flagellum beyond the 2nd reddish-piceous below, black

above; apical tarsal segments more brownish, the spurs pale yellow; tegulae brownish-testaceous; wings whitish-hyaline, veins testaceous to piceous; cheeks about as broad as eyes; clypeus but very slightly protuberant, its median length about half the distance between eyes below; eyes slightly converging below; segment 2 of flagellum slightly more than half the length of segment 1; clypeus very closely and distinctly punctate, punctures rather fine, those on labrum fully as coarse and nearly as close; supraclypeal area impunctate medially, lateral areas of face below level of antennae very finely and closely punctate, becoming minute but still rather close on shining surface above between eyes and ocelli, median area below ocelli more deeply and distinctly but quite closely punctate; vertex very finely and densely punctate behind ocelli, lateral punctures more distinct; cheeks somewhat shining, rather closely punctate, the punctures minute and indistinct along eye margin, becoming rather coarse and deep posteriorly; punctures of scutum quite coarse and deep, rather uniformly close, only slightly separated in center of disc posteriorly, those on scutellum about equally coarse and close; punctures of pleura somewhat finer and more shallow than those on scutum, slightly separated, becoming somewhat finer and more obscure posteriorly above mid coxae; posterior face of propodeum dull and tessellate, punctures rather shallow and well separated, dorsal area becoming rather coarsely reticulate on each side along the upper margin, lateral faces dull, punctures rather close and fine; basal abdominal tergum rather closely punctate across basal half of disc, the punctures sometimes shallow and obscure, becoming closer at extreme sides where they nearly reach apical margin, the broad, median, apical area impunctate; terga 2-4 finely punctate across basal areas, punctures well separated but not sparse on 2, becoming finer on 3, and almost crowded on 4, apical areas with scattered, exceedingly minute and rather sparse punctures; median length of pygidium about equal to basal width, subtriangular, with narrowly rounded apex; entire head and thorax with copious, quite dense, bright ochraceous or fulvous pubescence, with only a few inconspicuous dark hairs at all evident on scutellum and on scutum posteriorly; legs pale pubescent basally, but fore and mid tibiae with more or less fuscous pubescence on outer surface, basitarsi with dark brownish pubescence, hind tibial scopa yellowish, the hairs quite densely plumose; basal abdominal tergum with a small amount of short, sub-apressed, fuscous pubescence on each side of disc, otherwise with rather copious ochraceous pubescence basally and along lateral margins; discs of terga 2-5 with rather sparse, short,

suberect, dark pubescence, this more sparse on the apical impressed areas; tergum 2 with a rather broad, basal, yellowish fascia, and 2 and 3 with submedian fasciae that fringe the apical impressed areas, that on 3 somewhat broader; apical area of tergum 4 largely covered with yellowish or whitish tomentum, this rather narrowly interrupted medially along the apical margin; terga 5 and 6 dark pubescent except for some lateral pale hairs.

MALE—Length 9-11 mm., breadth of abdomen 3.5 mm.; black, the clypeus entirely bright yellow, labrum with a basal, median, yellow maculation, and mandibles with subapical, more testaceous maculations; antennal flagellum brownish-testaceous beneath, piceous above; apical tarsal segments brownish-testaceous, spurs pale yellowish; tegulae rather dark anteriorly, becoming somewhat more yellowish-hyaline posteriorly; wings whitish-hyaline, veins yellowish to testaceous; margins of abdominal terga more or less yellowish; cheeks somewhat narrower than eyes; clypeus slightly protuberant, its median length somewhat greater than distance between eyes below; eyes quite strongly convergent below; basal segment of flagellum about equal to pedicel in length, segment 2 four or five times longer than segment 1 and pedicel combined; punctures of clypeus quite close laterally, becoming somewhat separated medially, rather obscure on the yellow surface, those on labrum somewhat deeper and more distinct; supraclypeal area impunctate medially, lateral areas of face below level of antennae very finely and closely punctate becoming minute and obscure but still rather close above where the surface is shining between eyes and ocelli, the more median punctures below ocelli much deeper and more distinct; vertex very finely and densely punctate behind ocelli, punctures becoming more distinct laterally; cheeks somewhat shining, punctures quite deep and distinct, well separated posteriorly, becoming minute toward eye margin; scutum and scutellum somewhat shining, the punctures rather sparse in a restricted median area of scutum posteriorly, becoming very close laterally and anteriorly, those on scutellum about equal in size but rather sparse; pleura with rather coarse and deep punctures, these slightly but not widely separated, becoming much finer and closer posteriorly above mid coxae; propodeum rather dull and tessellate posteriorly, punctures shallow but rather close, dorsal area becoming rather coarsely reticulate along upper margin, lateral faces rather dull, quite closely punctate; basal abdominal tergum with quite deep and distinct punctures across base, these well separated, becoming more minute and sparse toward apical margin,

much closer at each extreme side; terga 2-4 with fine but quite distinct punctures across basal area, these well separated on 2, somewhat closer on 3, quite close on 4, the apical impressed areas largely impunctate; tergum 5 quite densely punctate across base, with an obscure angle on each extreme side, and tergum 6 with an elongate, triangular, apical spine on each side; pubescence of entire head, thorax and legs pale ochraceous, the basal abdominal tergum largely pale ochraceous anteriorly and on lateral margins, the disc with suberect, more fuscous pubescence that is more evident laterally; discs of following terga with suberect, rather thin, dark pubescence which does not at all obscure the surface, more sparse on the apical impressed areas; tergum 2 with a narrow, basal, whitish fascia that is usually hidden by the preceding plate, and apical impressed area fringed by a narrow whitish fascia; impressed areas of 3 and 4 also fringed with whitish fasciae well removed from apical margin, that on 5 distinct but more nearly apical in position, 6 entirely dark pubescent; median length of pygidial plate about equal to basal width, margins carinate, rather strongly convergent apically to the abruptly constricted and truncate apex; sterna 7 and 8 and genital armature as in *agilis* (fig. 84).

DISTRIBUTION — Kansas and North Dakota, east to Maine and Georgia, July to October.

FLOWER RECORDS—LaBerge (1961) indicates that *Helianthus* is the primary source of pollen for *trinodis*, but he lists also species of *Arctium*, *Asclepias*, *Aster*, *Bidens*, *Blephilia*, *Carduus*, *Cassia*, *Cirsium*, *Coreopsis*, *Dichophyllum*, *Grindelia*, *Helenium*, *Heliopsis*, *Lepachys*, *Liatris*, *Monarda*, *Pepo*, *Petalostemum*, *Ratibida*, *Rudbeckia*, *Silphium*, *Solidago*, *Symphoricarpos*, *Teucrium*, *Verbena*, *Vernonia* and *Veronica*.

***Melissodes (Eumelissodes) vernoniae*
Robertson**

Melissodes vernoniae Robertson, 1902. Canad. Ent. 34, p. 323. ♀ ♂.

Melissodes confusiformis incondita Cockerell, 1925. Ann. Mag. Nat. Hist. (9) 16, p. 230. ♀.

Melissodes (Eumelissodes) vernoniae LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 517.

FEMALE—Length 12-13 mm., breadth of abdomen 4.5-5 mm.; black, mandibles more or less yellowish apically; antennal flagella more piceous beneath, black above; apical tarsal segments brownish-testaceous, the spurs pale testaceous; tegulae piceous, faintly testaceous

posteriorly; wings hyaline, veins testaceous to brownish; cheeks subequal to eyes in width; clypeus only very slightly protuberant, its median length about half the distance between eyes below; eyes very slightly convergent below; segment 2 of flagellum about half the length of segment 1; punctures of clypeus dull, punctures rather fine, close laterally, slightly separated medially, those on labrum uniformly fine and close; supraclypeal area with well separated punctures medially, becoming close laterally, and lateral areas of face below level of antennae with fine and rather close punctures, becoming minute and rather sparse above, where surface is shining between eyes and ocelli, the more median punctures below ocelli relatively coarse, deep and close; vertex very finely and densely punctate behind ocelli, becoming more distinctly separated laterally; cheeks somewhat shining, punctures very minute along eye margin, becoming relatively coarse and deep posteriorly; scutum and scutellum somewhat shining, punctures variable, rather coarse and well separated on scutum medially, becoming finer and closer around margin, those on scutellum about equal in size, slightly but not widely separated; punctures of pleura deep, rather coarse and quite close throughout, becoming very fine posteriorly above mid coxae; posterior face of propodeum dull and tessellate, punctures shallow, not very coarse, somewhat separated, dorsal area becoming rather narrowly rugose along upper margin, lateral faces dull and tessellate, rather closely but shallowly punctate; basal abdominal tergum rather coarsely but shallowly punctate across basal half, surface rather dull, punctures slightly separated, becoming finer and closer at extreme sides where they nearly reach apical margin, the broad median apical area entirely impunctate; basal areas of terga 2-4 very finely punctate, the punctures minute and rather sparse on 2 medially, becoming somewhat deeper and closer laterally, somewhat closer on 3 and 4 but obscured by tomentum, apical impressed areas practically impunctate; pygidium elongate-triangular, median length somewhat greater than basal width, apex narrowly rounded; pubescence copious but rather short on head, largely pale, but with a few erect blackish hairs on vertex; scutum and scutellum with short, erect, fuscous or blackish pubescence, the anterior third of scutum ochraceous pubescent; pleura and propodeum entirely ochraceous pubescent; legs largely pale pubescent but fore and mid tibiae with some brownish pubescence on outer face apically, the basitarsi with fuscous hairs beneath; hind tibial scopa pale yellowish, hairs abundantly plumose; basal tergum with abundant but rather short, pale pubescence basally, and

with some shorter pale pubescence at extreme sides, the disc otherwise bare, with no evidence of dark hairs; tergum 2 with a narrow, basal, whitish fascia and a more median, narrow fascia that fringes the apical impressed area and is slightly interrupted medially, disc otherwise practically bare, with only very minute, appressed pale pubescence at all evident; apical impressed area of tergum 3 fringed with a pale fascia along the base, basal part of disc thinly covered with pale tomentum, apical area largely bare; apical impressed area of tergum 4 entirely covered with cream-colored tomentum, possibly slightly interrupted on apical margin medially, basal area with some appressed, pale tomentum and some more erect but rather short dark pubescence; terga 5 and 6 largely fuscous or blackish pubescent, but 6 with some erect pale hairs at each extreme side.

MALE—Length 10.5-11 mm., breadth of abdomen 4-4.5 mm.; black, clypeus entirely pale yellow, labrum with a median, basal, yellow maculation, and mandibles yellow at base, and with a somewhat more testaceous subapical maculation; antennal flagellum testaceous beneath, more brownish above; apical tarsal segments becoming brownish-testaceous, the spurs pale yellowish; tegulae brownish; wings whitish-hyaline, veins testaceous to brownish; apical margins of abdominal terga broadly yellowish-hyaline and transparent; cheeks somewhat narrower than eyes; clypeus only slightly protuberant, its median length slightly greater than distance between eyes below; basal segment of flagellum very slightly longer than pedicel, segment 2 nearly four times as long as segment 1 and pedicel combined; punctures of clypeus fine and quite close laterally, somewhat more definitely separated medially, quite obscure on the yellow surface, those on labrum somewhat deeper and more distinct but quite close; supraclypeal area narrowly impunctate medially, becoming closely punctate at each side, lateral areas of face below level of antennae, very finely and closely punctate, punctures becoming very minute and rather close on the shining surface above, between eyes and ocelli, the more median punctures below ocelli somewhat deeper and more distinct but still very fine; vertex very finely and densely punctate behind ocelli, punctures becoming much more distinct and separated laterally; cheeks shining, punctures minute anteriorly, becoming rather deep and distinct posteriorly; scutum somewhat shining between deep and rather coarse punctures, these well separated but not sparse over pos-

terior half of disc, becoming much finer and closer laterally and anteriorly, those on scutellum about equal in size, well separated but not sparse; punctures of pleura deep and distinct, moderately coarse below, becoming much coarser above, very fine posteriorly above the mid coxae; posterior face of propodeum dull and tessellate, punctures shallow, irregularly scattered, but quite numerous, dorsal area becoming rugose along upper margin medially, more striate laterally, lateral faces very finely and closely punctate; basal abdominal tergum with rather coarse but shallow, well separated punctures medially, becoming somewhat finer but closer laterally where they approach the apical margin, becoming minute and more sparse toward the broad impunctate apical area; terga 2-5 very finely punctate across base, these well separated but not sparse on 2 and 3, much closer on 4, but obscured by tomentum, apical impressed areas largely impunctate; tergum 5 with a distinct, triangular process on each extreme side, 6 with a more robust, subtriangular, apical spine on each side; pubescence of head, thorax, legs and basal abdominal tergum largely whitish, only scutum posteriorly and scutellum with a few inconspicuous dark hairs intermixed in the generally light pubescence; discs of abdominal terga with subappressed, largely pale, thin pubescence, becoming somewhat more erect on the more apical terga, tergum 2 with a basal whitish fascia, often covered in part by the preceding tergum, and apical impressed areas of terga 2-5 fringed basally with rather narrow whitish fasciae, apical rims largely bare; median length of pygidial plate somewhat less than basal width, margins sharply carinate, very slightly convergent apically to the abruptly constricted truncate apex; sterna 7 and 8 and genital armature as in *dentiventris* (fig. 84).

DISTRIBUTION—North Dakota to Texas, west to Idaho, and east to Illinois and Indiana, May to September.

FLOWER RECORDS—LaBerge (1961) states that while *vernoniae* is oligolectic on *Vernonia*, males and occasional females will visit other plants, and there may be some dependence upon *Helianthus* and *Ipomoea* for pollen. Records include species of the following: *Bidens*, *Gaillardia*, *Grindelia*, *Helianthus*, *Heliopsis*, *Ipomoea*, *Lacinaria*, *Lactuca*, *Liatris*, *Monarda*, *Polygonum*, *Rudbeckia*, *Silphium* and *Verbena*.

Melissodes (Eumelissodes) wheeleri
Cockerell

Melissodes wheeleri Cockerell, 1906. Amer. Ent. Soc. Trans. 32, p. 111. ♀.

Melissodes wheeleri Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 367. ♂.

Melissodes (Eumelissodes) wheeleri LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 572.

FEMALE—Length 11 mm., breadth of abdomen 4.5 mm.; black, the apical tarsal segments becoming brownish-testaceous, spurs pale testaceous; tegulae piceous; wings subhyaline and somewhat whitish, veins testaceous to brownish; cheeks subequal to eyes in width; clypeus only very slightly protuberant, its median length half the distance between eyes below; eyes very slightly convergent below; clypeal punctures rather coarse and close, somewhat separated medially, becoming very fine, densely crowded and obscure toward apical margin, those of labrum very fine and close medially, becoming somewhat separated on each side; supraclypeal area sparsely punctate. lateral areas of face below level of antennae with fine, slightly separated punctures, becoming minute and rather sparse on shining surface above between eyes and ocelli, the more median punctures below ocelli quite coarse, deep and close; vertex very finely and densely punctate behind ocelli, becoming much more minutely and sparsely punctate laterally; cheeks somewhat shining, punctures exceedingly minute, becoming deeper and more distinct posteriorly; scutum somewhat shining between quite deep and rather coarse punctures, these quite sparse medially over posterior half of disc, becoming somewhat finer and much closer laterally and anteriorly, those on scutellum somewhat finer, distinctly but not widely separated; punctures of pleura quite coarse, close and deep, becoming somewhat finer and closer posteriorly above mid coxae; posterior face of propodeum dull and tessellate, punctures shallow, not very coarse, rather sparse, dorsal area rather finely and narrowly rugose along upper margin, lateral faces dull and densely tessellate, punctures shallow and rather obscure, obsolescent below; basal half of basal abdominal tergum dull, punctures fine, shallow and obscure, the broad apical area impunctate; basal areas of terga 2-4 minutely and quite obscurely punctate, the punctures well separated on 2, somewhat closer on 3, quite close on 4, apical impressed areas largely impunctate; pygidium rather broadly rounded apically; vertex with considerable erect, fuscous or black pubescence, fringed posteriorly with dense white pubescence, a few intermixed black hairs below the ocelli, otherwise head whitish pubescent; scutellum and posterior two-thirds of scutum with con-

siderable erect fuscous pubescence, more or less intermixed with pale on scutum, the anterior third entirely whitish pubescent, and pleura and propodeum entirely pale pubescent; legs largely pale pubescent, but fore and mid tibiae with some appressed brownish pubescence on outer surface apically, and basitarsi with some brownish or fuscous hairs beneath; the hind tibial scopa pale yellowish, hairs abundantly plumose; basal abdominal tergum with rather short but copious pubescence basally and laterally, with no dark hairs evident on the disc; basal areas of terga 2-4 with very thin, inconspicuous dark pubescence, apical impressed areas with only very sparse, inconspicuous largely appressed, dark hairs; tergum 2 with an obscure, basal whitish fascia that is usually covered by the preceding tergum, apical impressed area narrowly fringed with a white fascia which is interrupted medially; apical impressed area of tergum 3 fringed basally with a whitish fascia that is somewhat more dense and conspicuous than on 2 and is subinterrupted medially; impressed area of 4 completely covered with white tomentum, forming a dense, broad, apical fascia; terga 5 and 6 entirely brownish pubescent.

MALE—Length 8-9.5 mm., breadth of abdomen 2.5-3.5 mm.; black, the clypeus largely yellow, with only the upper margin very narrowly blackened, labrum with a large, median yellowish maculation and mandibles each with a small, basal, yellowish spot, and more or less yellowish apically; antennal flagellum testaceous beneath, brownish-testaceous above; apical tarsal segments becoming testaceous, the spurs pale yellowish; tegulae dull testaceous to brownish; wings whitish-hyaline, veins pale yellowish to testaceous; apical margins of abdominal terga becoming more or less yellowish-hyaline apically; cheeks about equal to eyes in width; clypeus only very slightly protuberant, its median length about half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum about equal to pedicel, segment 2 three or four times longer than combined length of segment 1 and pedicel; punctures of clypeus fine, rather well separated medially, becoming somewhat closer laterally, very obscure on the yellow surface, those on labrum fine, but somewhat deeper and more distinct, becoming slightly separated at each extreme side; supraclypeal area with fine, slightly separated punctures, lateral areas of face below level of antennae with somewhat finer and closer punctures, becoming minute but still rather close on the shining surface above, between eyes and ocelli, the more median punctures below ocelli very sparse and irregular, becoming somewhat coarser on each

side of mid-line; vertex with fine, densely crowded punctures behind ocelli, these becoming more minute and widely separated laterally, those on cheeks fine, but deep and distinct, except along margin of eye; scutum somewhat shining between quite coarse and deep punctures, these quite sparse on median area of disc posteriorly, becoming considerably finer and closer laterally and anteriorly, those on scutellum somewhat finer but quite close; punctures of pleura rather coarse but shallow, well separated but not sparse; posterior face of propodeum dull and tessellate, punctures fine, shallow, irregularly scattered and somewhat sparse, dorsal area becoming rather narrowly rugose or reticulate along upper margin, lateral faces rather dull, quite closely but obscurely punctate, the punctures obsolescent below; basal abdominal tergum with fine, rather well separated punctures on disc medially, these somewhat closer at extreme sides, and becoming minute and more sparse toward the rather narrowly impunctate apical margin; basal areas of terga 2-5 with very minute, scattered and rather sparse punctures, the apical impressed areas with only scattered, exceedingly minute and obscure punctures at all evident; disc of tergum 6 very dull, more reticulate than punctate; tergum 5 with a very obscure, low angle at each extreme side, and 6 with a corresponding triangular, rather robust, apical spine; pubescence quite copious, long and erect, entirely whitish on head, thorax,

legs and basal abdominal tergum; discs of terga 2 and 3 with rather abundant but thin, suberect, whitish pubescence, and 4-6 with more elongate, erect pubescence which is dark in part; tergum 2 with a loose, inconspicuous, basal, whitish fascia that is usually hidden, and the apical impressed area obscurely fringed on each side by a whitish fascia, usually interrupted medially; apical impressed areas of 3-5 fringed with a whitish fascia which is narrow on 3, somewhat broader on 4 and quite broad on 5, nearly reaching the apical rim; tergum 6 with entirely brownish pubescence; median length of pygidial plate about equal to basal width, margins strongly carinate, slightly converging apically to the rather obscurely constricted truncate apex; sterna 7 and 8 and genital armature as in *agilis* (fig. 84).

DISTRIBUTION—Arizona to Louisiana, north to North Dakota and Michigan, April to October.

FLOWER RECORDS—LaBerge (1961) gives *Gaillardia*, *Helianthus* and *Rudbeckia* as the genera preferred by *wheeleri*, but lists also species of the following: *Anthemis*, *Asclepias*, *Cleome*, *Coreopsis*, *Echinacea*, *Engelmannia*, *Grindelia*, *Opuntia*, *Petalostemum*, *Ratibida*, *Silphium* and *Sphaeralcea*.

Xenoglossodes Ashmead

- ? *Tetraloniella* Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 61. Type: *Macrocera graia* Eversmann. Monob. and orig. desig.
Xenoglossodes Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 63. Type: *Melissodes albata* Cresson. Monob. and orig. desig.

Primarily *Xenoglossodes* is a western group of bees, and only one species extends east of the Mississippi in its range. The clypeus is contiguous with the eye margin, and is black in the females, yellow in the males. The maxillary palpi are 5- or 6-segmented. The abdominal fasciae are apical in position on each tergum, and the scopa is of simple hairs. In the males tergum 6 is angulate or spinose laterally, but tergum 7 lacks these lateral spines.

Xenoglossodes albata (Cresson)

(Fig. 86)

- Melissodes albata* Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 281. ♀ ♂.
Synhalonia albata Patton, 1879. U. S. Geol. and Geog. Surv. Bul. 5, p. 474. ♂ ♀.
Eucera albata Dalla Torre, 1896. Cat. Hym. 10, p. 224.
Xenoglossodes albata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9-10 mm., breadth of abdomen 4 mm.; black, the mandibles reddish at base, testaceous on outer surface apically; antennal flagella brownish-piceous, legs more piceous, apical tarsal segments becoming testaceous, spurs pale yellow, tegulae yellowish-hyaline; wings whitish-hyaline, veins testaceous to piceous; cheeks much narrower than eyes; clypeus quite flat, its median length about half the distance between eyes below; eyes very slightly convergent below; mandibles rather short, rounded apically; labrum broadly triangular and quite densely pubescent, its median length about half the basal width; basal segment of flagellum somewhat shorter than 2nd and 3rd combined; clypeus dull, quite coarsely and densely punctate, the supraclypeal and lateral areas of face somewhat more finely and less densely punctate, punctures becoming minute and sparse on each side above, quite coarse and close medially, surface shining between eyes and ocelli; cheeks very finely and closely punctate beneath quite dense pubescence; scutum shining, punctures quite coarse, close in general but somewhat separated in median area posteriorly, those on scutellum somewhat finer and uniformly close, almost contiguous; pleura coarsely, closely and

deeply punctate; posterior face of propodeum shining, punctures rather fine, irregularly scattered and sparse, dorsal area dull, obscurely rugose along upper margin, lateral faces quite closely and deeply punctate; abdominal terga finely and closely punctate beneath dense tomentum; pygidium elongate triangular, apex rather narrowly rounded; pubescence entirely white, rather short but copious and dense on head and thorax; legs largely white pubescent, outer surfaces of front and mid tibiae densely white tomentose, becoming somewhat yellowish at apex, basitarsi with yellowish pubescence beneath; hind tibial scopa white, hairs rather sparsely plumose; basal abdominal tergum somewhat more thinly covered with elongate greyish-white pubescence, apical margin narrowly yellow, following terga densely and completely white tomentose, hiding the surface, apical margins of the terga apparently narrowly yellow apically, faintly evident through the tomentum; apical margin of tergum 5 becoming yellowish tomentose medially; tergum 6 with yellowish-brown pubescence on each side of pygidium.

MALE—Length 8 mm., breadth of abdomen 3.5 mm.; black, the clypeus and labrum entirely bright yellow, and mandibles yellow at base; antennal flagellum brownish-testaceous beneath, piceous above; legs chiefly black, but apical tarsal segments becoming brownish-testaceous, spurs pale yellow; tegulae yellowish-hyaline, wings whitish-hyaline, veins yellowish to piceous; apical margins of abdominal terga narrowly yellowish-hyaline; cheeks much narrower than eyes; clypeus quite flat, its median length about half the distance between eyes below; eyes slightly convergent below; mandibles short, simple; labrum rather broadly rounded, its median length about half the basal width, densely covered with pubescence, hiding the surface; tergum 6 with a triangular apical process on each extreme side; clypeus quite coarsely and closely punctate, punctures rather vague on the yellow surface; supraclypeal area rather closely punctate, lateral areas of face below antennae very finely and closely punctate, punctures becoming minute and quite sparse above laterally, but deep, distinct and relatively coarse medially, surface shining between eyes and ocelli; cheeks somewhat shining, punctures close and fine; scutum somewhat shining between quite coarse and rather close punctures, these more distinctly separated medially over posterior half; scutellum with somewhat finer, quite crowded punctures; pleura quite coarsely and closely punctate throughout; propodeum rather dull, quite closely and rather coarsely punctate, becoming more finely rugose on dorsal area laterally, and lateral surfaces very finely and closely

- 6. At least the basal half of discs of terga 2-4 black pubescent, with white apical or subapical fasciae; 1st recurrent vein nearly interstitial with 2nd intercubital vein *belfragei* Cresson (p. 315)
- Terga 2-4 only narrowly black across base, the white fasciae very extensive; 1st recurrent vein well basad of 2nd intercubital vein *speciosa* Cresson (p. 321)

Males

- 1. General aspect of abdomen black, with largely black pubescence and no conspicuous pale pubescence or fasciae 2
- Abdomen either pale fasciate or with considerable conspicuous pale pubescence 5
- 2. Basal segment of flagellum nearly half the length of segment 2 *illinoensis* Robertson (p. 321)
- Basal segment of flagellum not more than one-fourth the length of segment 2 3
- 3. First recurrent vein joining second submarginal cell about a third before apex of cell; basal segment of flagellum about one-fourth the length of the second *atriventris* Smith
- First recurrent vein joining second submarginal cell about a fourth before apex of cell; basal segment of flagellum about one-fifth the length of the second segment 4
- 4. Basal segment of flagellum slightly broader than long; dorsum of thorax with bright fulvous pubescence *rosae* Robertson (p. 321)
- Basal segment of flagellum slightly longer than broad; dorsum of thorax with yellowish-white pubescence *dubitata* Cresson (p. 316)
- 5(1). Pubescence of abdomen entirely pale fulvous, with no black hairs at all evident *fulvohirta* Cresson (p. 318)
- Abdominal terga with at least some intermixture of black pubescence, the pale hairs more greyish or whitish 6
- 6. Hind tibial spurs hooked at tip *hamata* Bradley (p. 319)
- Hind tibial spurs straight 7
- 7. Labrum black; basal segment of flagellum nearly half as long as segment 2 *belfragei* Cresson (p. 315)
- Labrum yellow; segment 2 of flagellum at least three times the length of segment 1 8
- 8. Tergum 2 quite densely pale pruinose, obscuring the surface *speciosa* Cresson (p. 321)

- Tergum 2 black pubescent basally, or with thin, erect, pale pubescence which does not hide surface 9
- 9. First recurrent vein meeting 2nd submarginal cell slightly less than one-third from its apex; abdominal tergum 2 with a subapical fringe of black pubescence *frater* Cresson (p. 317)
- First recurrent vein meeting 2nd submarginal cell no more than a fourth from its apex; tergum 2 with no black pubescence *dubitata* Cresson (p. 316)

***Tetralonia atriventris* (Smith)**

(Figs. 87-89)

Melissodes atriventris Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 310. ♂.

Synhalonia atriventris Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 353. ♀ ♂.

Synhalonia atriventris fuscipes Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 54. ♀. (preocc.)

Tetralonia robertsoni Cockerell, 1914. Ann. Mag. Nat. Hist. (8) 13, p. 283. ♀. (new name)

Tetralonia robertsonii Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Tetralonia atriventris Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 221. (biology)

FEMALE—Length 13-15.5 mm., breadth of abdomen 5-6 mm.; black, the legs largely black, spurs testaceous, tegulae brownish-piceous; wings lightly infuscated, veins piceous to black, 2nd recurrent vein reaching 3rd submarginal cell much nearer apex than 1st does to apex of 2nd submarginal; cheeks slightly narrower than eyes; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes (fig. 87); eyes subparallel; mandibles simple; basal segment of flagellum only slightly shorter than segments 2 and 3 combined; punctures of clypeus rather coarse, distinctly but not widely separated; punctures on labrum close medial-

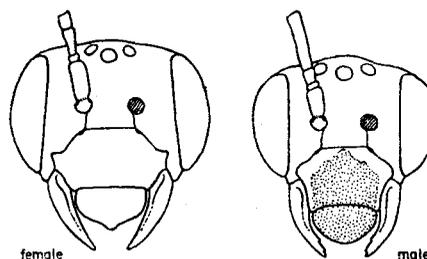
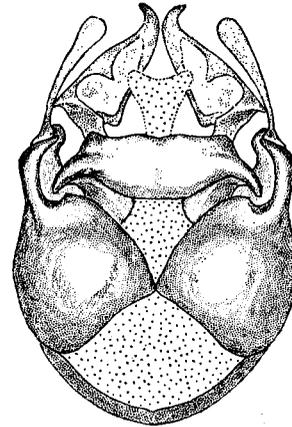


Figure 87
 Facial view of head of both sexes of *Tetralonia atriventris*.

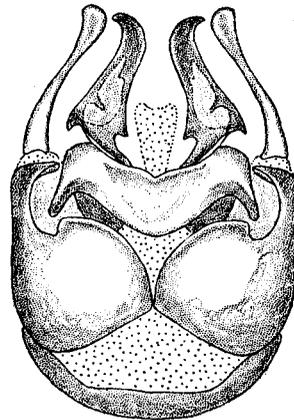
ly, becoming very sparse laterally; supraclypeal area rather dull, sparsely punctate, surface laterally rather dull, with well separated, rather fine punctures, becoming more shining above where punctures become relatively close, but with a shining, impunctate area laterad of each lateral ocellus; cheeks rather dull, very finely, closely and obscurely punctate; scutum dull, punctures shallow but rather coarse, quite sparse in median area of disc posteriorly; scutellum more shining, punctures fine, distinct, rather close and regular; pleura dull, very finely and closely punctate except along anterior margin where surface is shining and punctures obsolescent; posterior face of propodeum somewhat shining, punctures very fine, shallow and vague, lateral faces dull and tessellate, rather closely punctate posteriorly, the punctures becoming obsolescent anteriorly and below; dorsal surface of basal abdominal tergum rather coarsely and shallowly punctate medially, punctures well separated but hardly sparse, becoming finer but deeper and more distinct, very close at each side, apical margin rather broadly impunctate; apical impressed areas of terga 2-5 very finely and closely punctate, only the very narrow apical rims on 2 and 3 impunctate; pygidium triangular, with rather narrowly rounded apex; pubescence long and copious, entirely pale ochraceous on head and thorax, legs largely pale pubescent basally, becoming fuscous or blackish on the more apical segments, hind tibial scopa black; basal abdominal tergum with copious, elongate, pale ochraceous pubescence basally, disc apically with very short, suberect, fuscous or blackish pubescence evident on each side, median area largely bare; discs of remaining terga rather densely covered across base with short, suberect, blackish pubescence, this becoming much shorter and thinner on impressed areas of 2 and 3, with some more elongate, erect hairs on discs of the following terga.

MALE—Length 13-15 mm., breadth of abdomen 5-5.5 mm.; black, clypeus and labrum yellow, upper margin of clypeus narrowly invaded with black, and lateral and apical margins of labrum narrowly darkened; mandibles somewhat yellowish apically; apical tarsal segments becoming brownish-testaceous, spurs testaceous, tegulae piceous; wings subhyaline, veins testaceous to piceous, the 2nd recurrent vein reaching 3rd submarginal cell much nearer apex than 1st recurrent does to apex of 2nd submarginal; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes (fig. 87); eyes subparallel; mandibles obscurely bi-dentate apically, but this often invident due to wear;

basal segment of flagellum fully twice as long as pedicel, and segment 2 three times longer than first; tibial spurs straight and simple; punctures of clypeus rather coarse and evenly distributed, slightly separated, those on labrum finer and closer medially, becoming very sparse laterally; supraclypeal area dull but rather smooth, sparsely punctate, surface on each side below level of antennae dull and tessellate, punctures fine and well separated, somewhat coarser and closer above antennae; cheeks rather smooth but dull, punctures exceedingly minute and obscure; scutum dull, punctures rather shallow and coarse, slightly separated in center of disc posteriorly, becoming much finer and closer laterally and anteriorly; scutellum somewhat shining anteriorly, punctures rather fine,



ATRIVENTRIS



HAMATA

Figure 88

Genital armature in males of *Tetralonia atriventris* and *T. hamata*.

slightly separated, surface finely rugose along posterior margin; pleura dull, very finely and quite closely punctate; posterior face of propodeum rather dull, punctures very fine, shallow and obscure, the dorsal triangle becoming shallowly rugose along upper margin, lateral faces dull, very finely and obscurely punctate; punctures of abdominal terga shallow, rather fine and quite close in general, well separated medially on the more basal terga, becoming very close laterally and much closer on the more apical terga, the apical impressed areas finely and somewhat more sparsely punctate, with only the narrow apical rims impunctate; pubescence of head and thorax very long and copious, entirely pale ochraceous to whitish, and legs largely pale pubescent; basal abdominal tergum with copious, elongate, pale ochraceous pubescence basally, but with some darker pubescence apically, visible on each side; following terga entirely covered with short, erect, rather copious but thin, fuscous or blackish pubescence, that on 6 becoming somewhat paler, with some long pale hairs at each side; median length of pygidial plate considerably greater than basal width, margins carinate, nearly parallel, slightly but abruptly constricted near the subtruncate, rather broad apex; sterna 7 and 8 (fig. 89) and genital armature (fig. 88) as shown.

DISTRIBUTION—Minnesota to Pennsylvania, south to Georgia, March to July.

FLOWER RECORDS — *Aesculus*, *Lupinus*, *Mertensia*, *Robinia* and *Vicia*. Robertson (1929) records *atriventris* (as *T. robertsonii*) on *Astragalus mexicanus*.

Tetralonia belfragei (Cresson)

Melissodes belfragei Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 278. ♀.

Melissodes honesta Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 279. ♂.

Tetralonia belfragei Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 15 mm., breadth of abdomen 5.5 mm.; black, the antennae and legs somewhat more piceous, spurs pale testaceous, tegulae testaceous-hyaline; wings subhyaline, veins testaceous to piceous; cheeks subequal to eyes; clypeus slightly protuberant, its median length somewhat less than half the distance between eyes; eyes subparallel; mandibles entire apically; basal segment of flagellum slightly shorter than segments 2 and 3 combined; tibial spurs straight and simple; clypeus coarsely, confluent punctate throughout, labrum with very fine, close punctures medially, these becoming somewhat more

coarse and sparse laterally; supraclypeal area dull, rather sparsely punctate medially, lateral areas of face below level of antennae very finely and rather closely punctate, the surface dull, surface above antennae somewhat more coarsely but quite closely punctate, the polished areas adjacent to lateral ocelli with exceedingly minute, sparse punctures; cheeks rather dull, minutely and closely punctate below, somewhat more coarsely and deeply so above; punctures rather coarse and deep, only slightly separated in median area of scutum posteriorly, becoming finer, closer and rather obscure laterally and anteriorly; scutellum somewhat more finely but very deeply and closely punctate throughout; pleura dull, densely tessellate, punctures rather shallow but close throughout; posterior face of propodeum rather dull, punctures shallow and vague, rather sparse and irregular, dorsal area becoming somewhat coarsely roughened or rugose along upper margin, lateral areas dull, quite closely and shallowly punctate; disc of basal abdominal tergum quite coarsely and closely punctate across basal area, punctures becoming much finer and closer laterally, the rather broad, apical margin polished and impunctate, the more median punctures rather sparse; punctures of basal areas of terga 2-4 fine but deep and distinct, quite close on 2, becoming more densely crowded on 3 and 4, largely obscured by dense tomentum, the apical impressed areas minutely and sparsely punctate in part, the rather narrow, apical rims impunctate; median length of pygidium slightly greater than basal width, apex rather broadly rounded; pubescence copious and elongate, entirely pale on head and thorax, whitish on face below and on thorax laterally and posteriorly, the vertex and dorsum of thorax somewhat more yellowish pubescent; legs largely covered with pale pubescence, somewhat more brownish and quite dense on outer face of mid tibiae, basitarsi with reddish-brown hairs; hind tibial scopa whitish; pubescence of basal abdominal tergum whitish, rather copious and elongate, with no dark hairs in evidence, apical rim bare; basal areas of terga 2-5 densely covered with appressed black tomentum, this followed by a broad and dense, white tomentose fascia which is slightly removed from rim on 2 and 3, but is entirely apical on 4; tergum 5 brownish pubescent across median area of apical margin, but becoming white at extreme sides; pubescence of tergum 6 brownish on each side of pygidium.

MALE—Length 11-12.5 mm., breadth of abdomen 4-5 mm.; black, the clypeus and labrum largely or entirely whitish-yellow; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish, tegulae testaceous-hya-

line; wings subhyaline or very faintly brownish, veins testaceous to black; cheeks subequal to eyes in width; clypeus somewhat protuberant, its median length very slightly greater than half the distance between eyes below; eyes very slightly convergent below; mandibles obscurely bi-dentate apically; apical margin of labrum deeply, triangularly incised medially; basal segment of flagellum about twice length of pedicel, segment 2 about three times the length of segment 1 and pedicel combined; mid and hind tibial spurs straight and simple; punctures of clypeus rather coarse and close throughout, somewhat obscure on yellowish surface, labrum quite sparsely punctate throughout, but with a few fine, close punctures medially; supraclypeal area dull and densely tessellate, with only a few, very shallow, obscure, scattered punctures, lateral areas of face below level of antennae dull, punctures rather shallow but quite close, surface above antennae rather dull, punctures scattered and irregular, a limited area adjacent to lateral ocelli largely impunctate; cheeks rather dull, punctures shallow but fine and rather close; median area of scutum posteriorly somewhat shining, punctures deep and distinct, well separated but hardly sparse, becoming fine and close laterally, anteriorly, and to some degree posteriorly; scutellum with somewhat finer but deep, distinct, uniformly close punctures (punctures are quite sparse medially on scutum and scutellum in some specimens); pleura dull, punctures shallow and rather vague, usually quite close throughout; posterior face of propodeum rather dull, punctures scattered and irregular, rather sparse, dorsal area becoming somewhat vaguely rugose or striate along upper margin, lateral faces dull, rather finely and closely punctate; punctures of abdominal terga rather deep and distinct, fine in general, well separated on basal tergum medially, becoming very fine and quite close laterally, only the narrow apical margin impunctate; punctures of the following terga quite deep and distinct, finer and closer on the more apical terga, apical margins somewhat invaded by finer and more sparse punctures, apical rims narrowly impunctate; pubescence copious and elongate, pale ochraceous to almost whitish on head, deeper ochraceous on thorax, legs with entirely whitish pubescence, and basal abdominal tergum with long, copious, pale ochraceous to whitish pubescence, tergum 2 with somewhat shorter but erect thin pale pubescence across the base, the depressed apical margin very narrowly and thinly whitish fasciate, this rather widely interrupted medially; terga 2-4 with thin, rather short but erect, blackish pubescence across basal areas, apical impressed area fringed with a quite dense but narrow whitish fascia,

that on 5 more nearly apical in position; and apical margin of 6 with rather dense and elongate whitish pubescence medially, this becoming much narrower laterally; median length of pygidial plate somewhat greater than basal width, sharply carinate, nearly parallel, rather abruptly but only slightly constricted near the broadly truncate, apical margin.

DISTRIBUTION — Texas to Michigan, in April.

FLOWER RECORDS — Robertson (1929) records *belfragei* on the following: *Aesculus*, *Arabis*, *Camassia*, *Cercis*, *Claytonia*, *Collinsia*, *Dentaria*, *Dicentra*, *Erythronium*, *Geranium*, *Hydrophyllum*, *Isoopyrum*, *Lithospermum*, *Mertensia*, *Pentstemon*, *Polemonium*, *Ranunculus* and *Viola*.

Tetralonia dubitata (Cresson)

(Fig. 89)

Melissodes dubitata Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 194. ♀ ♂.
Tetralonia dubitata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 14.5-15 mm., breadth of abdomen 5.5-6 mm.; black, the antennal flagella more piceous beneath; legs blackish, the apical tarsal segments becoming brownish-testaceous, spurs pale yellowish, tegulae testaceous-hyaline; wings lightly but uniformly infuscated, veins brownish to piceous; cheeks subequal to eyes in width; clypeus slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes subparallel; mandibles rounded or subtruncate at apex; basal segment of flagellum slightly shorter than segments 2 and 3 combined; mid and hind tibial spurs relatively straight and simple, tips somewhat curved but not abruptly hooked or recurved; punctures of clypeus quite coarse but densely crowded in large part, those on labrum somewhat separated at each side; supraclypeal area with scattered, rather coarse, sparse punctures, lateral areas of face below level of antennae quite closely and deeply punctate, surface above antennae dull, sparsely and obscurely punctate adjacent to eye, becoming rather coarsely but shallowly rugoso-punctate medially, a limited area adjacent to lateral ocelli shining and impunctate; cheeks finely but rather deeply and closely punctate; median posterior area of scutum shining, punctures rather deep and quite coarse, well separated but hardly sparse, becoming somewhat finer and close laterally and anteriorly, and more narrowly across posterior margin; scu-

tellum very finely, closely and distinctly punctate; pleura dull, punctures quite close and rather fine; posterior face of propodeum dull and tessellate, punctures very shallow, quite sparse, dorsal area becoming narrowly and shallowly rugose along upper margin laterally, the lateral faces dull, closely and finely punctate below and posteriorly, more sparsely so above; basal abdominal tergum quite coarsely and closely punctate across the broad median area, becoming finer and closer laterally, the rather broad, apical margin shining and impunctate; punctures of terga 2-5 fine but deep and distinct, somewhat separated on 2-4, densely crowded on 5, apical impressed areas punctate in part, punctures somewhat finer and more sparse than on basal areas, apical margins rather narrowly shining and impunctate; pygidium triangular, tip narrowly rounded; pubescence rather copious and elongate, entirely pale ochraceous on head, thorax and legs, somewhat more brownish on outer surface of mid tibiae apically, and basitarsi with pale brownish hairs beneath, hind tibial scopa yellowish; pubescence of basal abdominal tergum quite copious and elongate, entirely pale, almost white, apical rim largely bare; discs of terga 2-5 with quite dense, short fuscous pubescence basally, median area following this more thinly, dark pubescent, apical impressed area with subappressed dark pubescence over the punctate area, the apical, impunctate rims bare; apical margin of tergum 5 narrowly pale brownish pubescent, and tergum 6 brownish pubescent on each side.

MALE—Length 11.5-12 mm., breadth of abdomen 4-4.5 mm.; black, the clypeus and labrum entirely yellow; legs more piceous, apical tarsal segments brownish-testaceous, spurs pale yellow, tegulae yellowish-hyaline; wings lightly but uniformly brownish, veins pale testaceous to piceous; apical margins of abdominal terga very narrowly testaceous-hyaline; cheeks subequal to eyes in width; clypeus only slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; mandibles entire or obscurely bidentate apically; basal segment of flagellum considerably longer than pedicel, segment 2 about three times longer than segment 1 and pedicel combined; tibial spurs slightly curved at tip, but neither hooked nor recurved; punctures of clypeus rather coarse and close throughout, those on labrum fine and close medially, becoming quite sparse laterally; supraclypeal area dull and rather sparsely punctate, lateral areas of face below level of antennae finely, closely and shallowly punctate, surface above antennae dull, very sparsely and obscurely punctate adjacent to eye margin, the more median punctures rather deep,

distinct and quite close, a limited area adjacent to lateral ocellus shining and impunctate; cheeks rather dull, punctures very fine, quite close but irregular; median area of scutum posteriorly somewhat shining, punctures quite deep, distinct and well separated, becoming close laterally, anteriorly, and to some degree posteriorly, scutellum somewhat shining anteriorly, punctures rather fine, slightly separated, becoming densely crowded laterally and posteriorly; pleura dull, punctures shallow rather close but not crowded; posterior face of propodeum somewhat shining, punctures shallow and vague, dorsal area becoming irregularly reticulate or striate along upper margin, lateral faces dull, shallowly and rather closely punctate; punctures of abdominal terga quite deep and distinct, surface more or less shining, apical impressed areas punctate in part, only the narrow apical rims impunctate, punctures becoming more minute on the more apical terga, slightly but not widely separated in general, not much closer at sides than in mid-line; pubescence long, copious and erect, entirely pale ochraceous to whitish on head and thorax, legs entirely pale pubescent, and basal tergum with elongate and rather copious pale pubescence, with a few short, dark hairs apically on each extreme side; terga 2-5 with or without narrow, subapical whitish fasciae, discs of 2-6 with rather short but erect dark pubescence which is rather thin and does not obscure the surface, impressed areas with more subappressed dark hairs, the hairs becoming more elongate on the more apical terga; tergum 6 more brownish pubescent apically; median length of pygidial plate slightly greater than basal width, margins carinate, rather strongly converging apically to the narrowly rounded or subtruncate apex; sterna 7 and 8 as shown (fig. 89); genital armature similar to *hamata* (fig. 88).

DISTRIBUTION — Minnesota to Pennsylvania, south to Georgia, April to June.

FLOWER RECORDS—*Aesculus*, *Melilotus*, *Robinia* and *Salvia*. Robertson (1929) records *dubitata* on *Astragalus*, *Dicentra* and *Mertensia*.

Tetralonia frater (Cresson)

Melissodes frater Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 197. ♂.

MALE—Length 12 mm., breadth of abdomen 5 mm.; black, the clypeus and labrum entirely yellow; legs black, apical tarsal segments brownish-testaceous, spurs pale yellow, tegulae black; wings subhyaline, veins testaceous to piceous; cheeks slightly broader than eyes; clypeus quite strongly protuberant, its

median length slightly greater than half the distance between eyes below; eyes very slightly convergent below; mandibles obscurely bidentate apically; basal segment of flagellum considerably longer than pedicel, segment 2 about two and one-half times longer than segment 1 and pedicel combined; tibial spurs straight apically, neither hooked nor recurved; punctures of clypeus rather coarse, slightly separated, those on labrum fine, shallow and rather obscure; supraclypeal area dull and sparsely punctate; lateral areas of face below level of antennae finely, closely and shallowly punctate, surface above antennae dull, finely and rather closely punctate, a limited area adjacent to lateral ocellus shining and impunctate; cheeks dull, punctures minute and hardly evident; scutum dull and tessellate, punctures fine, shallow and quite sparse posteriorly, hardly visible laterally and anteriorly; scutum dull, punctures somewhat more distinct and close; pleura dull, densely tessellate, punctures very fine and close; propodeum tessellate, punctures shallow and vague, dorsal area becoming obscurely rugose along upper margin; punctures of abdominal terga quite deep and distinct but fine and close on the more basal plates, surface more or less shining, apical impressed areas minutely punctate, the narrow apical rims impunctate, punctures becoming more minute and close on the more apical terga; pubescence long, copious and erect on head and thorax, pale ochraceous to whitish, entirely white on legs; basal abdominal tergum with elongate and rather copious whitish pubescence, discs of following terga with rather thin but erect whitish pubescence, impressed areas of 2-4 with a transverse line of black hairs; terga 5 and 6 rather densely white tomentose apically; median length of pygidial plate about twice the basal width, margins carinate, slightly converging apically to the truncate apex; sterna 7 and 8 and genital armature similar to those in *atriventris* (figs. 88 and 89).

DISTRIBUTION—This seems to be primarily western in its range, but has been recorded from Wisconsin and Illinois.

It seems possible that this should be considered a subspecies of *atriventris*. No positive opinion seems to be justified until the female has been recognized.

Tetralonia fulvohirta (Cresson)

(Fig. 89)

Melissodes fulvohirta Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 213. ♂.

FEMALE—Length 15-16 mm., breadth of abdomen 5.5-6.5 mm.; black, the apical tarsal

segments becoming brownish-testaceous; tegulate yellowish-hyaline; wings lightly infuscated, veins pale testaceous to piceous; abdominal terga broadly yellowish-hyaline and transparent apically beneath dense tomentum; cheeks slightly narrower than eyes; clypeus rather strongly protuberant, its median length about half the distance between eyes; eyes subparallel; mandibles entire or obscurely bidentate at apex; basal segment of flagellum about equal to segments 2 and 3 combined; tibial spurs straight and simple; punctures of clypeus quite coarse, deep and close, those on labrum very close medially, becoming slightly separated and coarser at each side; supraclypeal area rather closely but shallowly punctate, lateral areas of face below level of antennae finely and closely punctate, surface above antennae closely and finely punctate across entire width of face except for a shining, median impunctate line below the anterior ocellus; cheeks somewhat shining beneath dense pubescence, punctures fine and quite close throughout; median posterior area of scutum shining between deep, distinct, slightly separated punctures, becoming closer over anterior half and more narrowly along the lateral and posterior margins; scutellum shining between somewhat finer but quite deep and distinct, close punctures; pleura dull beneath dense pubescence, very finely and closely punctate throughout; posterior face of propodeum rather dull, punctures shallow, well separated but hardly sparse, dorsal area becoming narrowly and finely rugose along upper margin, lateral faces closely punctate, punctures rather coarse posteriorly, becoming very minute and densely crowded anteriorly and below; basal abdominal tergum deeply, distinctly and quite closely and coarsely punctate across disc, punctures becoming somewhat more minute and sparse toward the rather broadly hyaline apical margin; the more apical terga very finely and closely punctate basally, punctures becoming more minute and sparse apically on each, inevident on 4 and 5 due to dense tomentum; pygidium triangular, with rather narrowly rounded apex.

MALE—Length 12.5-13.5 mm., breadth of abdomen 5.5 mm.; black, the clypeus and labrum bright yellow, mandibles more or less yellowish toward apex, apical tarsal segments becoming brownish-testaceous, spurs pale yellowish, tegulae yellowish-hyaline; wings very lightly infuscated, veins testaceous to piceous; apical impressed areas of abdominal terga yellowish-hyaline and transparent; cheeks slightly narrower than eyes; clypeus rather strongly protuberant, its median length about half the distance between eyes; eyes subparallel; mandibles entire or obscurely bidentate at tips;

basal segment of flagellum fully twice as long as pedicel, segment 2 nearly five times longer; tibial spurs straight and simple; punctures of clypeus rather coarse, deep and close, those on labrum somewhat finer and closer medially, becoming somewhat coarser laterally; supraclypeal area dull, punctures fine and rather sparse, lateral areas of face below level of antennae very finely and closely punctate, surface above antennae quite closely and finely punctate across entire width except for a median impunctate line below anterior ocellus; cheeks very finely and rather closely punctate beneath dense pubescence; median posterior area of scutum shining, quite deeply and coarsely punctate, punctures only slightly separated, becoming much closer anteriorly, laterally and along the narrow posterior margin; scutellum shining, somewhat more finely but very closely punctate throughout; pleura dull, punctures fine and close throughout; posterior face of propodeum rather dull, punctures shallow and irregular, dorsal area becoming rather finely and irregularly rugose along upper margin, lateral faces dull, very finely and very closely punctate; punctures of basal abdominal tergum somewhat coarser than those on the following terga, well separated medially, becoming somewhat finer and closer laterally, and becoming very minute and rather sparse toward the apical, impunctate rim; terga 2-5 with very fine and quite close punctures across basal areas, the yellow apical impressed areas somewhat more finely and sparsely punctate, only the very narrow rims becoming impunctate; pubescence long and copious, entirely pale ochraceous on head, thorax and legs; basal abdominal tergum with copious, elongate, pale ochraceous pubescence, the following terga with short but erect, rather thin, pale yellowish pubescence, apical impressed areas with more decumbent and dense yellowish tomentum, forming rather distinct fasciae; tergum 6 with a distinct angle at each extreme side; median length of pygidial plate somewhat greater than basal width, margins carinate, rather strongly convergent apically, a very slight constriction near the broadly rounded apex; sterna 7 and 8 as shown (fig. 89); genital armature much as in *hamata* (fig. 88), but gonostyli short pubescent on outer sides.

DISTRIBUTION — North Carolina to Georgia, April to May.

FLOWER RECORDS — *Eleagnus* and *Vicia*.

***Tetralonia hamata* Bradley**

(Figs. 88 & 89)

Tetralonia dilecta Folsom (not Cresson), 1922.

Ent. Soc. Amer. Ann. 15, p. 182. (biology)
Tetralonia dilecta Robertson (not Cresson),
 1929. Flowers and Insects, Lancaster, Pa.,
 Science Press. (flower records)
Tetralonia hamata Bradley, 1942. Ent. News
 53, p. 189. ♂ ♀.

FEMALE—Length 16-17 mm., breadth of abdomen 5.5-6.5 mm.; black, the antennal flagella piceous beneath, blackish above; mandibles becoming obscurely yellowish apically; legs somewhat reddish-piceous, apical tarsal segments becoming more testaceous, spurs pale testaceous; tegulae yellowish-hyaline and transparent; wings subhyaline basally, becoming lightly clouded apically, veins pale testaceous to piceous; cheeks subequal to eyes in width; clypeus strongly protuberant its median length about half the distance between eyes; eyes subparallel; mandibles rather blunt and entire apically; basal segment of flagellum about one half times longer than segment 2; mid and hind tibial spurs abruptly hooked or reflexed apically; clypeus quite coarsely and closely punctate above, punctures becoming somewhat more distinctly separated below laterally; labrum with rather fine and very close punctures medially, these becoming somewhat coarser and more sparse laterally; supraclypeal area impunctate medially, becoming rather closely punctate on each side, lateral areas of face below level of antennae very closely and finely punctate, surface above antennae with somewhat more definitely separated but still rather fine and close punctures; cheeks rather dull beneath the pubescence, very finely and quite closely punctate; posterior half of scutum somewhat shining, punctures quite coarse, deep and close, becoming much finer and closer laterally and anteriorly; scutellum more finely and quite closely punctate except for the narrow, anterior margin which is shining and impunctate; pleura dull, very finely and closely punctate throughout; posterior face of propodeum somewhat shining, punctures very fine, shallow and obscure, rather sparse, dorsal area becoming finely rugose along upper margin, more striate at each extreme side, lateral faces dull, finely and quite closely punctate; basal abdominal tergum quite closely and distinctly punctate across basal half, punctures well separated medially, becoming very fine and close laterally, the broad, apical, impressed area shining and impunctate; basal area of tergum 2 very finely and closely punctate, but this covered in large part by dense tomentum, apical impressed area largely shining and impunctate, but invaded slightly by very minute, scattered punctures; basal area of tergum 3 apparently finely and closely punctate, but largely obscured by dense tomentum, about half of apical im-

pressed area also minutely and rather closely punctate, only the rather narrow, apical rim entirely impunctate; surface of terga 4 and 5 entirely obscured by dense tomentum; pygidium rather broadly triangular, apex rather narrowly rounded; pubescence long and copious, entirely pale ochraceous on head, thorax and legs, scopa pale ochraceous; basal abdominal tergum with rather copious, elongate, pale ochraceous or whitish pubescence across basal half, disc with a very small amount of subappressed, dark pubescence at extreme sides; tergum 2 with a narrow basal area of dense fuscous pubescence, partially hidden by preceding tergum, followed by a band of dense, white tomentum that barely reaches margin of apical impressed area which is bare, forming a rather conspicuous, transverse fascia; tergum 3 with a basal, fuscous, tomentose band, followed by a band of white tomentum that partially covers the apical impressed area, apical half of this bare; tergum 4 largely fuscous tomentose across disc, apical impressed area entirely white tomentose; and disc of tergum 5 fuscous tomentose basally, apical impressed area densely white tomentose at sides, but more narrowly brownish-tomentose medially; tergum 6 more brownish pubescent on each side.

MALE—Length 13.5-14.5 mm., breadth of abdomen 5-5.5 mm.; black, clypeus and labrum entirely yellow, supraclypeal area narrowly yellow over margin of clypeus, the mandibles more or less yellowish apically, flagella brownish-piceous, tarsal segments of legs becoming brownish-testaceous, spurs pale yellowish, tegulate yellowish-hyaline; wings subhyaline, becoming very faintly infuscated apically, veins testaceous to piceous; cheeks very slightly narrower than eyes; clypeus quite strongly protuberant, its median length considerably greater than half the distance between eyes; eyes subparallel; mandibles obscurely bi-dentate apically; shorter side of basal segment of flagellum fully twice the length of pedicel, segment 2 three times longer; mid and hind tibial spurs abruptly hooked or reflexed apically; punctures of clypeus quite coarse and deep, close above and laterally, becoming somewhat separated toward apex medially, obscure on the yellow surface, those on labrum much finer and closer medially, becoming rather sparse on each side; supraclypeal area largely impunctate, lateral areas of face below antennae dull, finely, closely and rather obscurely punctate, surface above antennae closely and finely punctate, but a limited area laterad of lateral ocelli shining and impunctate; cheeks very finely and closely punctate beneath dense pubescence; median posterior area of scutum somewhat shining, punctures rather fine, somewhat separated becoming close laterally and

anteriorly, and more narrowly across posterior margin; scutellum shining, punctures somewhat finer and quite close throughout; pleura dull, very finely and closely punctate throughout; posterior face of propodeum dull and tessellate, punctures shallow but quite close, dorsal area dull, becoming rather coarsely and shallowly reticulate along upper margin, lateral faces dull, finely and rather closely punctate; discs of abdominal terga finely and rather closely and uniformly punctate across basal areas, punctures becoming somewhat more minute and more widely separated on apical impressed areas, only the narrow, apical margins impunctate; punctures of basal tergum somewhat coarser and deeper than on the others, becoming increasingly fine on the more apical terga; tergum 6 with a rather pronounced angle on each extreme side; pubescence quite copious and elongate, entirely pale ochraceous on head, thorax, legs and basal abdominal tergum; tergum 2 with abundant, erect but rather thin pale pubescence across base, apical impressed area fuscous pubescent, hairs somewhat decumbent; terga 3 and 4 with short, pale, rather thin, suberect tomentum across basal areas, with interspersed longer, erect, black hairs, margin of impressed area thinly whitish fasciate, rims becoming black pubescent; basal area of tergum 5 black pubescent, impressed apical area almost completely covered with whitish tomentum, forming a rather broad, subapical fascia, the rim narrowly bare, but without dense black pubescence; tergum 6 black pubescent basally, with a broad, whitish, apical fascia and elongate white hairs at each side; pubescence of tergum 7 more yellowish on each side of pygidial plate; median length of pygidial plate slightly greater than basal width, margins carinate, slightly converging apically to the rather abruptly constricted, broadly rounded apex; sterna 7 and 8 (fig. 89) and genital armature (fig. 88) as shown.

DISTRIBUTION — Wisconsin to Maryland, south to Mississippi and Georgia, April to August.

FLOWER RECORDS — *Brassica*, *Robinia*, *Rubus*, *Salvia*, *Trifolium* and *Vicia*. Robertson (1929) records this species (as *dilecta* Cresson) on the following: *Aesculus*, *Asclepias*, *Astragalus*, *Baptisia*, *Blephilia*, *Camassia*, *Capsella*, *Cardamine*, *Cercis*, *Claytonia*, *Collinsia*, *Commandra*, *Convolvulus*, *Cornus*, *Crataegus*, *Delphinium*, *Dianthera*, *Dodecatheon*, *Ellisia*, *Fragaria*, *Geranium*, *Gymnocladus*, *Heracleum*, *Hydrophyllum*, *Iris*, *Krigia*, *Lithospermum*, *Lithrum*, *Lobelia*, *Melilotus*, *Mertensia*,

Monarda, *Nepeta*, *Oenothera*, *Oxalis*, *Pentstemon*, *Petalostemum*, *Phlox*, *Podophyllum*, *Polemonium*, *Prunus*, *Ptelea*, *Pyrus*, *Ranunculus*, *Ribes*, *Rosa*, *Ruellia*, *Salix*, *Scutellaria*, *Senecio*, *Stellaria*, *Tradescantia*, *Verbena*, *Verbesina*, *Viburnum*, *Viola*, *Vitis* and *Zizia*.

Tetralonia speciosa (Cresson)

Melissodes speciosa Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 198. ♀.

Melissodes dilecta Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 199. ♂. New synonymy.

This species is nearly identical with *T. hamata* Bradley, and the two have been confused in the past. The type specimen of *speciosa* has been compared with the female of *hamata*, and the type of *dilecta* with the male. The only apparent difference is the form of the hind tibial spurs in both sexes, these being straight and simple in *speciosa*, not at all curved or reflexed apically. There is also an apparent difference in the range, although this may have resulted from an insufficient amount of material. The type locality of *speciosa* is Colorado, and all of the specimens seen by this writer have been from the West, while all specimens from the East have been *hamata*. A more thorough study of the distribution of these two forms is needed.

Tetralonia illinoensis (Robertson)

Synhalonia illinoensis Robertson, 1902. Canad. Ent. 34, p. 49. ♂.

Tetralonia illinoensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

No specimens of this species have been collected or received from other collectors, and the only one seen is the holotype male in the Robertson collection in the Illinois Natural History Survey. The following brief note was made during an examination of the specimen: Resembles the male of *atriventris*, but basal segment of flagellum nearly half the length of segment 2; clypeus entirely yellow, this color invading slightly the supraclypeal area; 2nd submarginal cell broader than long, and 1st recurrent vein joins this cell about one-third from its apex. In *atriventris* the length and breadth of the 2nd submarginal cell are about equal, and it is joined by the 1st recurrent vein near the middle.

DISTRIBUTION—Illinois.

FLOWER RECORD—Robertson (1929) records *illinoensis* only on *Lithospermum canescens*.

Possibly this is a variant of *T. belfragei*.

Tetralonia rosae (Robertson)

(Fig. 89)

Synhalonia rosae Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 54. ♀.

Tetralonia fedoris Cockerell, 1906. Amer. Ent. Soc. Trans. 32. ♂.

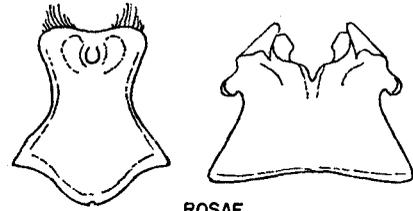
Tetralonia rosae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 13-15 mm., breadth of abdomen 5-5.5 mm.; black, spurs pale yellowish, tegulae yellowish-hyaline; wings very lightly and uniformly infuscated, veins testaceous to piceous, recurrent veins reaching 2nd and 3rd submarginal cells subequally distant from their tips; cheeks very slightly narrower than eyes; clypeus slightly protuberant, its median length slightly less than half the distance between eyes; eyes subparallel; mandibles simple or obscurely bi-dentate apically; basal segment of flagellum not quite equalling segments 2 and 3 combined in length; tibial spurs straight and simple; punctures of clypeus coarse and close, those on labrum much finer and crowded medially, becoming rather coarse and sparse laterally; supraclypeal area rather sparsely punctate, surface laterally with rather fine and close punctures, those above antennae close across entire width of face; cheeks somewhat shining, punctures fine, slightly separated; scutum shining, median punctures quite coarse and well separated but hardly sparse, becoming fine and close around periphery; scutellum with much finer and very close punctures throughout; pleura dull, punctures fine and close throughout; posterior face of propodeum rather dull, punctures rather sparse on each side, dorsal area becoming rather coarsely rugose along upper margin, becoming more definitely striate at each extreme side, lateral faces dull, punctures rather fine, shallow and obscure; discs of abdominal terga quite closely punctate across basal areas, rather coarsely so on basal tergum, apical impressed areas shining and impunctate on 1 and 2, punctures very fine and quite sparse on 3, and rather close and minute on 4; pygidium subtriangular, with narrowly rounded apex; pubescence copious and elongate, entirely pale ochraceous on head, largely so on thorax, but with a few darker hairs in center of scutum posteriorly; legs largely pale pubescent basally, becoming somewhat darker apically, brownish on front tarsi beneath and

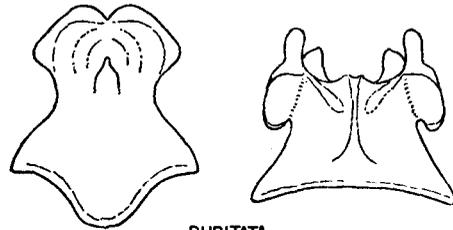
on outer surface of mid tibiae, that on basitarsi more fuscous, hind tibial scopa fuscous to blackish; basal abdominal tergum with rather copious, erect, pale ochraceous pubescence basally, disc with very short, subappressed, blackish pubescence toward each side but largely bare medially; following terga with only very short, inconspicuous, subappressed, dark pubescence, becoming somewhat brownish apically on tergum 5, fuscous on each side of tergum 6.

MALE—Length 10.5-13.5 mm., breadth of abdomen 4-5 mm.; black, the clypeus and labrum entirely yellow, mandibles entirely black, legs black, apical tarsal segments becoming more testaceous, spurs pale yellowish, tegulae yellowish-hyaline; wings subhyaline, veins pale testaceous to piceous, recurrent veins reaching 2nd and 3rd submarginal cells subequally distant from apex; cheeks slightly narrower than eyes; clypeus slightly protuberant, its median length slightly greater than half the distance between eyes; eyes subparallel; mandibles simple or obscurely bi-dentate at apex, becoming more or less testaceous apically; shorter side of basal segment of flagellum only very slightly longer than pedicel, segment 2 about five times longer; tibial spurs straight and simple; clypeal punctures quite coarse and deep, rather close along upper margin, becoming more definitely but not widely separated below and laterally, those on labrum much finer and quite close, becoming somewhat more sparse at extreme sides; supraclypeal area dull, rather irregularly and sparsely punctate, lateral areas below antennae with quite close and fine punctures, those above antennae very close throughout; cheeks somewhat shining, punctures shallow but fine and rather close; median posterior area of scutum shining, rather coarsely punctate, punctures well separated but not sparse over a limited area, becoming finer and quite densely crowded over anterior half and more narrowly on lateral and posterior margins; scutellum shining anteriorly, punctures rather fine and close, becoming crowded laterally and posteriorly; pleura dull, punctures very fine and close throughout; posterior face of propodeum rather dull, punctures shallow but rather close and irregular, dorsal face becoming more rugose along upper margin, striate at extreme sides, lateral faces closely and finely punctate; abdominal terga somewhat shining, punctures rather deep and distinct, rather coarse on basal tergum, well separated medially, becoming much finer and closer laterally, and much more sparse toward the very narrow, impunctate, apical margin; apical impressed areas of terga 2-5 well punctured, but punctures somewhat more sparse than on basal areas,

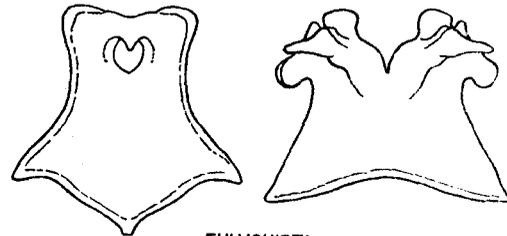
apical margins very narrowly impunctate; tergum 6 very finely and rather densely punctate.



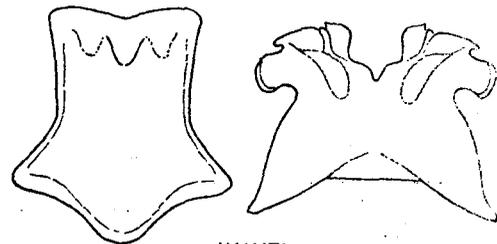
ROSAE



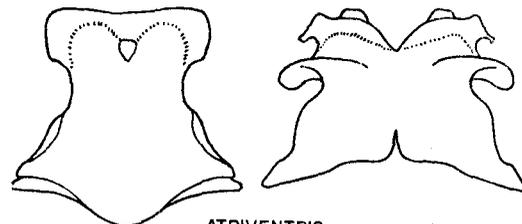
DUBITATA



FULVOHIRTA



HAMATA



ATRIVENTRIS

Figure 89
Sterna 7 (right) and 8 in males of *Tetralonia*.

tate throughout; pubescence of head, thorax and basal abdominal tergum long, copious and erect, pale ochraceous, becoming rather bright fulvous on thorax above, and legs entirely pale pubescent; tergum 2 with an intermixture of very short, dark and light hairs across basal half, forming an obscure, pale pruinose band, apical half covered with suberect, rather elongate, black hairs; terga 3-6 with erect but rather short black hairs across basal areas, the impressed apical margins bearing some thin pale tomentum that forms obscure, barely evident, thin fasciae, apical margin of 6 with a fringe of intermixed light and dark hairs; median length of pygidial plate considerably greater than basal width, margins carinate, converging toward the rather narrowly rounded apex; sterna 7 and 8 as shown (fig. 89); genital armature much as in *atriventris* (fig. 88), but gonostyli short pubescent toward base.

DISTRIBUTION — Missouri to Ohio, Virginia and Florida, April to June.

FLOWER RECORDS — *Batodendron*, *Diospyros*, *Eleagnus*, *Linaria*, *Melilotus*, *Pentstemon*, *Rubus* and *Stachys*. Robertson (1929) records *rosae* also on *Asclepias*, *Blephilia*, *Cornus*, *Dianthera*, *Geranium*, *Houstonia*, *Hydrophyllum*, *Iris*, *Monarda*, *Rosa* and *Trifolium*.

Anthophora Latreille

(Fig. 67)

Lasius Panzer [1801-1802]. Faunae Ins. German., 86, no. 16. Name suppressed by Internatl. Comm. Zool. Nomencl., Op. 151, 1944.

Podalirius Latreille, 1802. Hist. Nat. Fourmis, p. 430. Name suppressed by Internatl. Comm. Zool. Nomencl., Op. 151, 1944.

Anthophora Latreille, 1803. Nouv. Dict. Hist. Nat. 18, p. 167. Type: (*Apis pilipes* Fabricius) = *Apis acervorum* Linnaeus. Desig. by Internatl. Comm. Zool. Nomencl., Op. 151, 1944.

Clisodon Patton, 1879. U. S. Geol. and Geog. Survey Bul. 5, p. 479. Type: (*Anthophora terminalis* Cresson) = *Anthophora furcata terminalis* Cresson. Monob. and orig. desig.

Podalirius subg. *Amegilla* Friese, 1897. Die Bienen Europas 3, p. 18. Type: *Apis quadrifasciata* Villers. Desig. by Cockerell, 1931.

Podalirius subg. *Paramegilla* Friese, 1897. Die Bienen Europas 3, p. 18. Type: *Apis ireos* Pallas. Desig. by Sandhouse, 1943.

Anthophoroides Cockerell and Cockerell, 1901. Ann. Mag. Nat. Hist. (7) 7, p. 48. Type: *Podalirius vallorum* Cockerell. Monob. and orig. desig.

Anthemoëssa Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 372. Preocc. Type: *Anthophora abrupta* Say. Monob. and orig. desig.

Anthophora subg. *Micranthophora* Cockerell, 1906. Amer. Ent. Soc. Trans. 32, p. 66. Type: *Anthophora curta* Provancher. Orig. desig.

Alfkenella Börner, 1919. Biol. Zentbl. 39, p. 168. Type: *Apis quadrifasciata* Villers. Orig. desig.

Melea Sandhouse, 1943. U. S. Natl. Mus. Proc. 92, p. 526. (new name)

These are robust, hairy bees, the clypeus black in the females, yellow in the males. In the front wings the stigma is very small, the marginal cell short, and there are three submarginal cells. The marginal cell extends somewhat beyond the 3rd submarginal, the latter only slightly longer than the 2nd, the 1st somewhat longer. The scopal hairs on the hind tibiae and basitarsi are simple, those on the tibiae longer than those on the basitarsi.

KEY TO SPECIES

Females

1. Mandibles tri-dentate apically
 *terminalis* Cresson (p. 328)
 Mandibles bi-dentate at apex 2
2. Abdomen with conspicuous, apical, whitish, integumental bands
 *walshii* Cresson (p. 330)
 Abdomen unbanded 3
3. First segment of flagellum longer than segments 2-5 combined
 *ursina* Cresson (p. 327)
 Basal segment of flagellum at most no longer than segments 2-4 combined .. 4
4. Pale pubescence of abdomen limited to basal tergum .. *abrupta* Say (p. 324)
 At least segments 1 and 2 pale pubescent 5
5. Pale pubescence covering abdominal terga 1-3 *bomboides* Kirby (p. 325)
 Third abdominal tergum entirely black pubescent *raui* Rohwer (p. 326)

Males

1. Hind basitarsi straight and simple, not at all angulate 2
 Hind basitarsi conspicuously angulate on anterior margin 4
2. Abdominal terga with conspicuous apical, whitish, integumental bands
 *walshii* Cresson (p. 330)
 Abdominal terga entirely black 3

3. Clypeus entirely yellow; hind basitarsi shorter than tarsal segments 2-5; basal segment of flagellum shorter than scape *terminalis* Cresson (p. 328)
 Clypeus with limited black areas; hind basitarsi subequal in length to the following segments combined; basal segment of flagellum longer than scape *ursina* Cresson (p. 327)
- 4(1). Pale pubescence of abdomen limited to the basal tergum *abrupta* Say (p. 324)
 Pubescence of tergum 2 entirely pale . . . 5
5. Face with large yellow maculae laterad of the clypeus; thorax entirely pale pubescent; tergum 3 entirely black pubescent *raui* Rohwer (p. 326)
 Face with lateral maculae reduced to mere lines parallel to clypeal margin; scutum with a posterior patch of black pubescence; tergum 3 with considerable pale pubescence *bomboides* Kirby (p. 325)

***Anthophora (Anthophora) abrupta*
 Say**

(Figs. 90-92)

- Anthophora abrupta* Say, 1837. Boston Jour. Nat. Hist. 1, p. 409. ♂.
Anthophora sponsa Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 339. ♀.
Anthophora sponsa Walsh, 1868. Amer. Ent. 1, p. 9. (biology)
Anthophora abrupta Ashmead, 1894. Psyche 7, p. 25. (biology)
Anthophora abrupta Frison, 1922. Amer. Ent. Soc. Trans. 48, pp. 137-156. (biology)
Anthophora abrupta Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7), p. 35. (biology)
Anthophora abrupta Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 166. (biology)
Anthophora abrupta Rau, 1929. Jour. Compar. Psychol. 9, p. 53. (biology)
Anthophora abrupta Rau, 1929. Psyche 36, p. 156. (biology)
Anthemoessa abrupta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower record)
Anthophora abrupta Rau, 1931. Jour. Compar. Psychol. 12, p. 257. (biology)
Anthophora abrupta Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1080, figs. 232 and 233. (larva)

FEMALE—Length 14.5-17 mm., breadth of abdomen 5.5-6.5 mm.; black, legs brownish-piceous to blackish, spurs black or piceous, tegulae brownish to piceous; wings subhyaline, faintly clouded apically, veins brownish

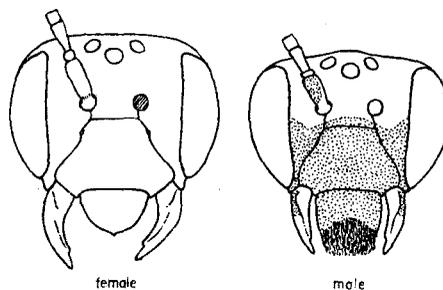


Figure 90
 Facial view of head in both sexes of
Anthophora abrupta.

to piceous; cheeks about equal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below (fig. 90); eyes very slightly convergent below; mandibles with a distinct, inner, subapical tooth; basal segment of flagellum as long as segments 2 and 3 combined; clypeus rather dull, the more median punctures rather shallow and well separated, becoming closer along lateral and upper margins; punctures quite coarse in general below level of antennae, becoming very fine and close above antennae and on cheeks; punctures very fine and close over most of thorax, but somewhat separated in center of scutum, shallow and more distinctly separated on propodeum, its posterior face smooth and impunctate along mid-line; abdominal terga very finely and closely punctate throughout, surface dull; pygidium narrow and elongate, narrowly rounded at apex; pubescence of head largely blackish, more or less intermixed with pale ochraceous hairs on vertex and around antennae; pubescence of thorax largely pale ochraceous, lateral faces of propodeum with some fuscous or blackish pubescence, and legs chiefly black pubescent, hind tibial scopa fuscous to black, hairs simple; abdominal terga quite densely covered with very short but erect black pubescence, basal tergum with some intermixed pale hairs on anterior face.

MALE—Length 12-17 mm., breadth of abdomen 5-6 mm.; black, clypeus entirely, mandibles at base, basal half of labrum, anterior face of antennal scape, lateral facial maculae, and inferior margin of supraclypeal area, yellow (fig. 90); apical third of labrum black, densely covered with pubescence; legs and spurs piceous to black; tegulae brownish-piceous; wings subhyaline, veins brownish to piceous; cheeks about equal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes subparallel; median length of labrum about equal to the breadth;

basal segment of flagellum only very slightly longer than segment 2, about equal to segment 3; hind basitarsi strongly angulate on lower margin; maculated areas of face and clypeus with shallow, rather fine punctures, well separated on clypeus medially, black areas of face above very finely and densely punctate; cheeks somewhat more shining but with very fine, somewhat separated punctures; posterior median area of scutum shining and sparsely punctate, and propodeum somewhat shining, punctures slightly separated although fine and obscure, otherwise thorax very finely and densely punctate; the more basal abdominal terga very finely and densely punctate, punctures becoming more minute but quite sparse and less definite on the more apical terga; pubescence of cheeks, vertex and lateral faces of propodeum more or less fuscous, otherwise pale ochraceous on head and thorax; basal abdominal tergum with considerable long, erect, pale pubescence, that on the following terga short but dense and erect, fuscous to blackish; legs largely black or fuscous pubescent, but front legs more or less fringed posteriorly with elongate pale hairs; apical margin of tergum 7 carinate, rather broadly incurved, the resulting pair of angles subacute; sterna 7 and 8 and genital armature as shown (figs. 91 and 92).

DISTRIBUTION — Illinois and Michigan to New York, south to Louisiana and Florida, March to September.

FLOWER RECORDS—*Azalea*, *Cirsium*, *Oenothera*, *Pentstemon*, *Rubus* and *Vicia*. Robertson (1929) records this species on the following additional genera: *Aesculus*, *Asclepias*, *Blephilia*, *Convolvulus*, *Cornus*, *Delphinium*, *Dianthera*, *Diospyros*, *Frasera*, *Gillenia*, *Hydrophyllum*, *Iris*, *Leonurus*, *Melilotus*, *Mertensia*, *Monarda*, *Nepeta*, *Pastinaca*, *Polygonatum*, *Rosa*, *Scutellaria*, *Stachys*, *Teucrium*, *Trifolium* and *Triosteum*.

***Anthophora (Anthophora) bomboides bomboides* Kirby**

(Fig. 92)

Anthophora bomboides Kirby, 1837. In Richardson, Faune Bor.-Amer. 4, p. 271. ♂.

Anthophora canadensis Cresson, 1869. Amer. Ent. Soc. Trans. 2, p. 292. ♂.

FEMALE—Length 14-14.5 mm., breadth of abdomen 5.5-6 mm.; black in general, legs somewhat more piceous, mid and hind spurs brownish-piceous, and hind tarsi becoming somewhat brownish; wings lightly and rather

uniformly infuscated, veins piceous; mandibles with a distinct, inner, subapical tooth; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length very slightly greater than half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum much longer than segments 2 and 3 combined, nearly equal to segments 2-4; labrum considerably broader than its median length; cheeks and upper part of face with very fine and densely crowded punctures, these becoming somewhat coarser below level of antennae, quite coarse and well separated on clypeus, and very coarse and irregular on labrum medially; punctures in median area of scutum posteriorly fine and very sparse, the scutum, scutellum and pleura otherwise finely and densely punctate throughout; propodeum somewhat more shining, impunctate along median area of posterior face, otherwise punctures rather coarse and distinct, somewhat separated; punctures on the more basal abdominal terga very close, rather fine but distinct, becoming somewhat more shallow and indistinct but more widely separated on the more apical terga, apical margins narrowly smooth and impunctate; pygidium elongate, slightly narrowed apically, apex narrowly rounded; pubescence of head copious and elongate, largely black, with pale hairs around antennae and ocelli and across vertex; scutum with some inconspicuous fuscous or black hairs in the median, sparsely punctate area, and venter of thorax with some black pubescence beneath, otherwise thorax with copious, dense, pale ochraceous pubescence; legs chiefly black pubescent, but front femora fringed posteriorly with long pale hairs; abdominal terga 1-3 entirely covered with copious, rather short, pale ochraceous pubescence, that on the remaining terga black.

MALE—Length 13.5-14.5 mm., breadth of abdomen 4.5-5.5 mm.; black, clypeus entirely yellow and face narrowly yellow along its lateral and upper margins; labrum broadly yellow, but with some black at lateral angles and along apical margin; mandibles with a small basal yellow maculation; antennal scape with a small anterior, subapical, yellow maculation; tegulae and legs largely black, tarsal segments somewhat tinged with brownish or piceous, spurs brownish-piceous; wings subhyaline to very faintly brownish, veins brownish to piceous; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum slightly shorter than segments 2 and 3 combined; hind basitarsi dilated at base, with a strong, subacute, inferior angle; upper part

of face very finely and densely punctate, punctures becoming more distinct and coarse below, those on clypeus becoming quite sparse but rather shallow and vague apically, irregular but quite coarse on labrum; median area of scutum posteriorly very minutely and sparsely punctate, the scutum, scutellum and pleura otherwise very finely and densely punctate, propodeum somewhat more deeply and distinctly so, the punctures slightly separated, rather coarse, but shallow and sparse on lateral faces, median area of posterior face narrowly impunctate; punctures of abdominal terga very fine, quite close but distinct on the more basal terga, becoming minute and more sparse on the more apical terga, apical margins rather broadly impunctate; face largely pale pubescent, hairs long and erect, cheeks pale pubescent beneath, becoming blackish or fuscous above, and with intermixed black hairs across vertex and below ocelli; scutum with a median, posterior patch of black pubescence, thorax otherwise entirely covered with dense, copious and erect, pale ochraceous pubescence; legs largely black pubescent, but front femora and tibiae fringed posteriorly with elongate, pale hairs; terga 1-3 largely or entirely covered with dense, erect, quite copious, pale ochraceous pubescence, that on the more posterior terga elongate, darker but thinner, becoming pale at extreme sides; apical margin of tergum 7 subcarinate, broadly but rather deeply emarginate, the two resulting angles subacute; sterna 7 and 8 as shown (fig. 92); genital armature similar to *abrupta* (fig. 91).

DISTRIBUTION — Michigan to Maine, south to Georgia, June to August.

FLOWER RECORDS — *Ceanothus* and *Pentstemon*.

The recognition of several subspecific forms of *bomboides* in the West necessitates the subspecific designation of this typical form.

***Anthophora (Anthophora) raii*
Rohwer**

Anthophora raii Rohwer, 1923. Ent. Soc. Wash. Proc. 25, p. 100.

Anthophora (Anthemöessa) raii Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 179. (biology)

Anthophora raii Rau, 1929. Psyche 36, p. 555. (biology)

Anthophora raii Rau, 1931. Jour. Compar. Psychol. 12, p. 257. (biology)

FEMALE—Length 12.5-14.5 mm., breadth of abdomen 5-5.5 mm.; black, the more apical flagellar segments reddish-piceous beneath,

tegulae and legs largely black, the more apical tarsal segments somewhat more piceous, and spurs piceous; wings very lightly infuscated, veins piceous to black; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length very slightly greater than half the distance between eyes below; eyes very slightly convergent below; mandibles with a low, inner, subapical angle or tooth; width of labrum considerably greater than its median length; basal segment of flagellum slightly exceeding segments 2 and 3 combined in length; face very finely and densely punctate, punctures of clypeus considerably coarser and deeper, becoming somewhat separated toward apical margin, those on labrum very coarse and irregular; cheeks with rather deep and distinct but quite fine and close punctures; median area of scutum posteriorly shining and impunctate over a limited area, the scutum, scutellum and pleura otherwise finely and very closely punctate; propodeum somewhat more deeply and distinctly punctate, posterior surface somewhat shining, punctures rather sparse, lateral faces dull, punctures quite close in general; the more basal abdominal terga quite finely and closely punctate, but punctures rather deep and distinct, becoming more sparse on the more apical terga; pygidium narrow and elongate, tip narrowly rounded; pubescence of head largely blackish or fuscous, with some intermixed pale hairs between antennae and on vertex, cheeks below with some very long pale hairs; scutum with a median black patch of erect hairs posteriorly, thorax otherwise quite densely covered with copious, pale ochraceous pubescence; abdominal terga 1 and 2 quite copiously pale ochraceous pubescent, more elongate on the basal segment, somewhat shorter on 2, short and fuscous on 3-5; pubescence of legs largely black, anterior femora with some pale hairs in the posterior fringe.

MALE—Length 13-15 mm., breadth of abdomen 4.5-5.5 mm.; black, clypeus entirely yellow; labrum largely yellow, but black laterally and very narrowly across apical margin; supraclypeal area with an apical, yellow strip adjacent to margin of clypeus, and lateral areas of face adjacent to clypeus more or less completely yellow maculated; antennal scape and base of mandibles yellow maculated or not; legs black, spurs fuscous to blackish; tegulae brownish-piceous; wings subhyaline basally, becoming faintly clouded apically, veins piceous to black; mandibles slender and simple; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum about

equal to segments 2 and 3 combined; hind basitarsi strongly dilated at base, acutely angulate beneath; black areas of face above very finely and densely punctate, surface dull, maculated areas below much more distinctly punctate, the punctures becoming rather irregular and somewhat sparse on clypeus apically, those on labrum quite coarse but rather close and irregular; a limited median area of scutum posteriorly somewhat shining and sparsely punctate, otherwise scutum, scutellum and pleura very finely and densely punctate; propodeum somewhat more shining, deeply and distinctly punctate, rather sparsely so on posterior face, rather closely so on lateral faces; punctures of abdominal terga fine, close and quite distinct, becoming rather sparse and irregular on the more apical terga; head with quite copious and elongate, pale pubescence, more yellowish above, whitish below, sometimes fuscous or blackish on upper part of cheeks, and with intermixed dark hairs around ocelli and across vertex; scutum posteriorly usually with some intermixture of black hairs in the generally light pubescence, thorax otherwise quite copiously covered with elongate, pale ochraceous pubescence; legs black pubescent in general, but front pair fringed posteriorly with pale hairs, and mid and hind coxae and trochanters with considerable pale pubescence; abdominal terga 1 and 2 densely covered with pale ochraceous pubescence, that on 3-7 entirely fuscous or blackish; tergum 7 subcarinate apically, with a broad but deep, somewhat rounded emargination, the two resulting lateral projections narrowly rounded; sterna 7 and 8 resembling those in *bomboides* (fig. 92); genital armature as in *abrupta* (fig. 91).

DISTRIBUTION — Colorado to New York, May to July.

Anthophora (Anthophora) ursina
ursina Cresson

(Figs. 91 and 92)

Anthophora ursina Cresson, 1869. Amer. Ent. Soc. Trans. 2, p. 291. ♂.

Anthophora pyralitarsis Dours, 1869. Soc. Linn. Nord France, Mem. 2, p. 160. ♂.

Anthophora ursina Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 372. ♀ ♂.

Anthophora ursina Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Anthophora ursina ursina Timberlake, 1951. N. Y. Ent. Soc. Jour. 59, p. 57 (synonymy)

FEMALE—Length 15-16 mm., breadth of abdomen 6.5 mm.; black, antennal flagella somewhat more piceous beneath, legs black, spurs and tegulae piceous; wings uniformly,

lightly infuscated, veins brownish to piceous; cheeks about equal to eyes in width; clypeus strongly protuberant, its median length about equal to half the distance between eyes below; mandibles with a low, subapical, inner tooth; median length of labrum about equal to basal width; eyes subparallel; basal segment of flagellum equal in length to segments 2-5 combined; face around and above antennae very finely and densely punctate, a limited shining area adjacent to lateral ocelli impunctate; clypeus quite coarsely and rather closely punctate, punctures becoming minute, irregular and vague apically, labrum rather coarsely reticulate; scutum dull and very densely tessellate, punctures fine, shallow, rather sparse in central area posteriorly, becoming much finer and closer laterally, fine and crowded on scutellum; pleura dull, punctures very fine and close; propodeum dull, rather smooth, punctures shallow, irregularly scattered, rather coarse on each side, lateral surfaces more shining, punctures rather shallow but distinct; punctures of abdominal terga very fine and quite close, becoming more widely separated on tergum 3, and to a lesser degree on 4; pygidium narrow at base, elongate, apex rather broadly rounded; pubescence of head entirely black, that on scutum, scutellum, propodeum, and pleura largely pale ochraceous above, long and copious, with a few scattered, dark hairs on scutum, black in large part on legs, pleura below and lateral faces of propodeum; hind tibial scopa of elongate, slender, relatively simple, black hairs; basal abdominal tergum with copious, elongate, pale ochraceous pubescence, this short and dark laterally, that on the remaining terga short but rather dense, erect and blackish or fuscous throughout.

MALE—Length 14.5-16 mm., breadth of abdomen 5.5-6.5 mm.; black, labrum largely yellow, clypeus yellow apically, with a narrow median yellow line reaching upper margin; lateral yellow maculae very narrowly produced along eye margin about to level of antennae; supraclypeal area very narrowly yellow along margin of clypeus; antennal scape yellow anteriorly; legs largely black, hind tarsi somewhat reddened, spurs fuscous to blackish; tegulae brownish-piceous; wings uniformly, very lightly infuscated, veins piceous to black; cheeks slightly narrower than eyes; clypeus strongly protuberant, its median length equal to about half the distance between eyes below; eyes subparallel; length and breadth of labrum about equal; mandibles with a distinct, inner, subapical tooth; basal segment of flagellum about equal to segments 2-4 combined; hind basitarsi slender and parallel-sided; median and upper areas of face very finely and

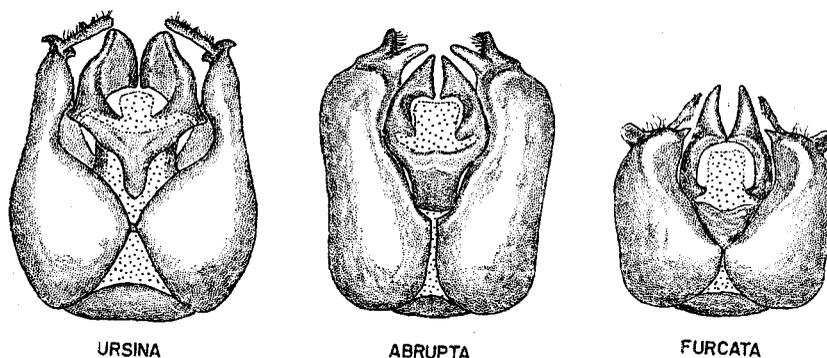


Figure 91—Genital armatures in males of *Anthophora*.

densely punctate, becoming sparsely and minutely so below on each side of clypeus, the clypeal punctures fine and well separated medially, becoming somewhat closer laterally, apical punctures quite close; labrum shining, punctures very minute, irregularly scattered and sparse; cheeks dull, punctures very fine, close and obscure; vertex smooth and polished adjacent to each lateral ocellus, this area impunctate; scutum dull and densely tessellate, median posterior area nearly impunctate, the anterior and lateral areas very finely and densely punctate; scutellum finely and densely punctate except narrowly along anterior margin; pleura dull, very finely and densely punctate throughout; posterior face of propodeum rather dull, punctures fine and close, dorsal triangle somewhat smoother, with sparse, scattered, shallow punctures, lateral faces dull, very finely and closely punctate; basal abdominal tergum with fine, quite close and deep punctures, those on the following terga minute and more widely separated, becoming somewhat coarser, deeper and closer laterally, well separated but hardly sparse medially, fine and crowded on tergum 7; pubescence largely whitish on head, with scattered, erect, fuscous or blackish hairs across vertex and along lateral margins of face; scutum with generally pale pubescence but with numerous, scattered, intermixed dark hairs, that on scutellum, propodeum and pleura entirely whitish; pubescence of legs blackish in large part, but anterior trochanters and femora fringed posteriorly with long pale hairs; basal abdominal tergum with copious, elongate, pale ochraceous pubescence, following terga with short but erect, quite copious, black pubescence; tergum 7 narrowly produced medially, this process shallowly emarginate; sterna 7 and 8 and genital armature as shown (figs. 91 and 92).

DISTRIBUTION — New York and the New England states, south to Georgia, March to June.

FLOWER RECORDS — *Azalea*, *Pedicularia*, *Pentstemon*, *Vaccinium* and *Vicia*. Robertson (1929) records *ursina* on the following: *Aesculus*, *Asclepias*, *Astragalus*, *Cercis*, *Collinsia*, *Delphinium*, *Dicentra*, *Dodecatheon*, *Geranium*, *Lithospermum*, *Lonicera*, *Mertensia*, *Monarda*, *Phlox*, *Physalis*, *Polygonatum*, *Polymonium*, *Ribes*, *Scutellaria*, *Trifolium* and *Viola*.

The subspecific designation of *ursina* results from recognition of two additional subspecies found in the West.

Anthophora (Clisodon) furcata terminalis Cresson

(Figs. 91 and 92)

- Anthophora terminalis* Cresson, 1869. Amer. Ent. Soc. Trans. 2, p. 292. ♀ ♂.
Ceratina bidentata Provancher, 1882. Nat. Canad. 13, p. 234. ♂. New synonymy.
Anthophora nudata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 336. ♂. New synonymy.
Anthophora subglobulosa Provancher, 1888. Addit. Corr. Faune Ent. Canad, Hym. 2, p. 297. ♂. New synonymy.
Anthophora nubiterrae Viereck, 1903. Amer. Ent. Soc. Trans. 29, p. 45. ♂.
Anthophora terminalis W. P. Cockerell, 1903. Birds and Nature 14, p. 127. (biology)
Clisodon terminalis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 11-13.5 mm., breadth of abdomen 4.5-5 mm.; black, including antennae and legs, spurs more piceous, apical tarsal segments becoming somewhat brownish; tegulae brownish to piceous; wings lightly infuscated, veins brownish to piceous; cheeks slightly narrower than eyes; clypeus moderately protuberant, its median length slightly great-

er than half the distance between eyes below; eyes very slightly convergent below; mandibles distinctly tridentate apically, the median tooth more elongate; basal segment of flagellum fully equal to segments 2-4 combined; labrum somewhat broader than its median length; surface of face dull, punctures on median area very fine and close, becoming more shallow, indistinct and rather sparse above, minute, close and indistinct on cheeks, considerably coarser, deeper and quite close on clypeus, the labrum more irregularly reticulate; scutum rather smooth but dull, punctures very shallow, obscure and very sparse medially, becoming much closer but very obscure peripherally, those on scutellum very shallow, vague and rather close; pleura dull and densely tessellate, punctures very shallow and vague, hardly evident; propodeum dull and tessellate, punctures of posterior face quite distinct and rather close, lateral faces dull but rather smooth, nearly impunctate; abdominal terga rather smooth but dull, median punctures very vague and indistinct, becoming somewhat more distinct laterally, fine and rather widely separated in general, becoming somewhat closer on tergum 5, apical margins of all rather narrowly impunctate; pygidium rather broad at base, narrowly produced apically, tip subacute; pubescence of face below level of antennae, and lower part of cheeks largely pale and quite dense, upper part of cheeks, vertex and face above antennae with erect, fuscous pubescence, a few dark hairs between antennae and eye margins below; scutellum and much of scutum with erect fuscous pubescence, that on anterior third of scutum erect and cream-colored, dense and entirely pale on pleura and propodeum; pubescence of legs pale in large part, some dark hairs on fore and mid tibiae and on tarsi beneath, hind tibial scopa whitish; basal abdominal tergum with rather thin but elongate, whitish pubescence, a few dark hairs across the disc medially; terga 2-4 with rather sparse, short, erect pubescence which is dark medially, becoming light laterally; tergum 5 quite copiously covered with rather short, dense, orange pubescence.

MALE—Length 10-12.5 mm., breadth of abdomen 4-5 mm.; black, clypeus entirely yellow, labrum largely yellow, the apical rim and spots on lateral angles above, dark; margin of supraclypeal area adjacent to clypeus very narrowly yellow, and lateral yellow maculae narrowly produced along eye margin to level of antennae; antennal scape entirely black or with small yellow maculations; legs black, apical tarsal segments becoming somewhat brownish-testaceous, spurs dull testaceous, tegulae piceous; wings subhyaline, or very faintly brownish, veins piceous to black; cheeks

subequal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; median length of labrum about two-thirds the breadth; mandibles tridentate apically; basal segment of flagellum equal to segments 2 and 3 combined; hind basitarsi slender and unmodified; median area of face finely and densely punctate, punctures becoming more shallow, sparse and obscure above, coarser and deeper below, those on clypeus slightly but not widely separated, quite obscure on the yellow surface, quite deep and distinct on labrum, becoming sparse at extreme sides; cheeks with very minute, obscure but rather close punctures, becoming somewhat deeper and more distinct posteriorly; scutum quite smooth but dull medially, with sparse, very fine, scattered punctures, becoming somewhat coarser and closer but very shallow around periphery; scutellum dull, densely tessellate, closely but very obscurely punctate; pleura tessellate, punctures very shallow, slightly separated in median area, becoming minute and sparse anteriorly where the surface is shining, especially above front coxae; posterior face of propodeum rather dull but smooth, punctures rather close and shallow, becoming more minute and indefinite on lateral faces; abdominal terga somewhat shining, punctures minute and quite close on basal tergum, more widely separated on following terga, becoming quite sparse on 3-6; pubescence of face and lower half of cheeks long and erect, pale yellowish or white, cheeks above, vertex and area below ocelli with long, erect fuscous hairs; posterior two-thirds of scutum and anterior half of scutellum with erect, rather copious, fuscous pubescence, that on thorax otherwise more whitish, entirely pale on legs; basal abdominal tergum rather copiously covered with elongate pale hairs, discs of the following terga with shorter but erect and largely dark hairs, becoming quite elongate on the more apical terga, margins of 2-5 with thin, indefinite and very narrow, apical fasciae that are widely interrupted medially, sometimes not evident; tergum 7 narrowly produced medially, this process triangularly emarginate, the resulting pair of projections rather narrowly rounded; sterna 7 and 8 and genital armature as shown (figs. 91 and 92).

DISTRIBUTION — Alberta to Maine, south to North Carolina, May to September.

FLOWER RECORDS — *Medicago*, *Pentstemon* and *Salvia*. Robertson (1929) also lists *Blephilia*, *Monarda*, *Prunella*, *Rosa* and *Scutellaria*.

Typical *furcata* is Palearctic in distribution and does not occur in North America.

Anthophora (Amegilla) walshii

Cresson

(Fig. 93)

Anthophora walshii Cresson, 1869. Amer. Ent. Soc. Trans. 2, p. 290. ♂ ♀.

Amegilla walshii Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 14-16 mm., breadth of abdomen 5.5-6.5 mm.; black, the antennae black, legs piceous to black, spurs and tegulae brownish-piceous; wings subhyaline, veins brownish to piceous; apical margin of basal abdominal tergum narrowly ivory and the rather narrow, apical, impressed areas of terga 2-4 ivory, in marked contrast to the otherwise black integument; cheeks slightly narrower than eyes; clypeus only slightly protuberant, its median length about half the distance between eyes below; labrum somewhat broader than the median length; mandible with a distinct, inner, subapical tooth; eyes very slightly convergent below; basal segment of flagellum only slightly shorter than segments 2-4 combined; punctures of face laterally fine and densely crowded, becoming very minute and vague above, the more median punctures much coarser and quite close; clypeus with rather coarse punctures above, these becoming much finer and closer laterally and apically; labrum rather finely and irregularly reticulate or rugose; cheeks rather smooth but dull, punctures exceedingly minute and obscure but rather close; scutum dull and densely tessellate, without evident punctures, and scutellum largely impunctate medially, becoming rather finely, obscurely and closely punctate laterally; pleura dull and tessellate, without evident punctures; posterior face of propodeum somewhat more shining, with exceedingly minute, rather vague and close punctures, lateral faces dull and tessellate, punctures hardly evident; basal abdominal tergum dull, very minutely and densely punctate beneath the pubescence; terga 2-5 dull but quite smooth, punctures exceedingly minute, hardly visible, well separated but hardly sparse; pygidium narrowly triangular, apex narrowly rounded; clypeus and supraclypeal area with numerous, rather short but erect, dark hairs, the pubescence on face laterally and above, and on cheeks quite copious and elongate, rather yellowish above, whitish below; entire thorax rather densely covered with pale pubescence, that on dorsum rather short, pale yellowish, becoming more elongate and whitish

below; pubescence very long and dense on propodeum laterally, behind wing bases; legs largely blackish or dark pubescent, but front

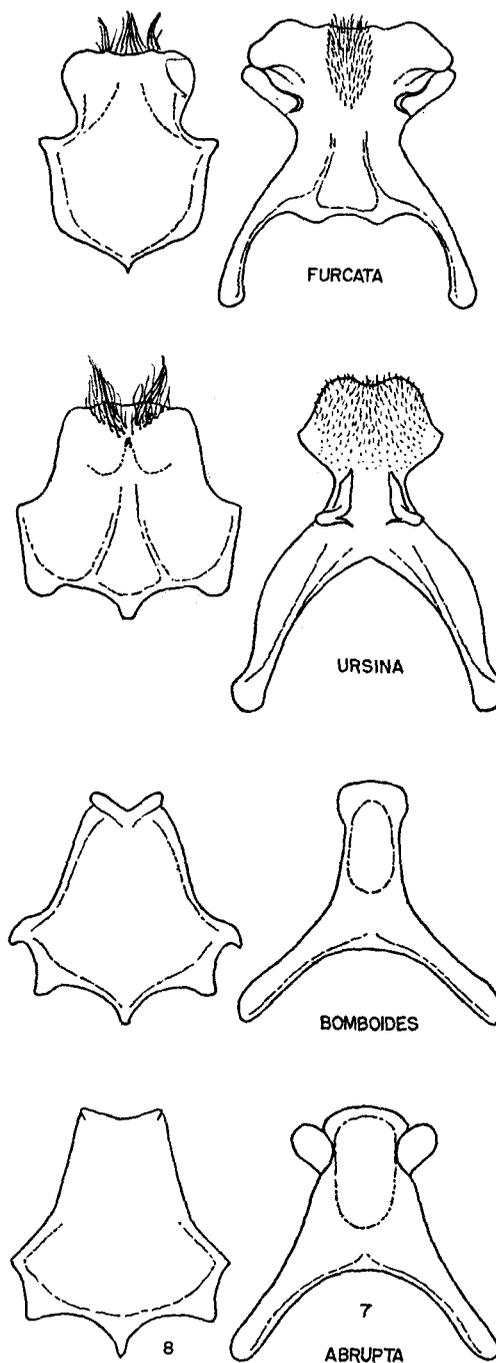


Figure 92
Sterna 7 and 8 in males of *Anthophora*.

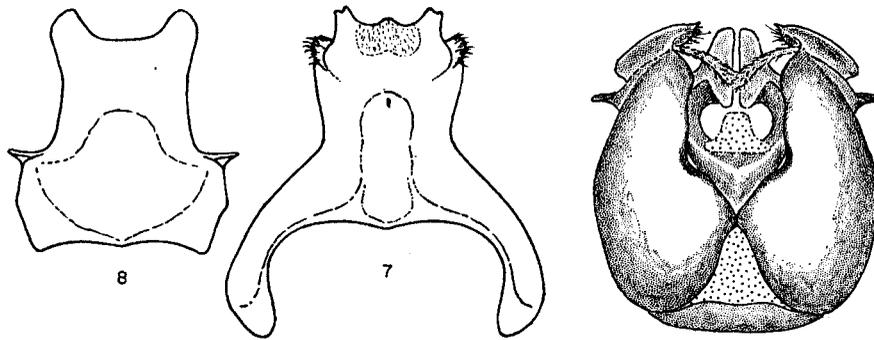


Figure 93—Genital armature and sterna 7 and 8 in male of *Anthophora walshii*.

and mid tibiae with some short, appressed, pale pubescence on outer face apically, the femora fringed posteriorly with pale hairs, hind tibial scopa pale yellow; basal abdominal tergum densely pale ochraceous pubescent, discs of the following terga with very short, suberect, scattered black hairs evident only under high magnification, these becoming more elongate, erect and conspicuous on the more apical terga, and tergum 5 with some pale hairs along lateral margins.

MALE—Length 16 mm., breadth of abdomen 6 mm.; black, apical half of clypeus and entire labrum yellow, upper half of clypeus with a median yellow line; mandibles broadly yellow at base; margin of supraclypeal area adjacent to clypeus narrowly yellow, and broad, lateral, yellow maculations filling area between clypeus and eye margin, extending narrowly up margin of eye to level of antennae; antennal scape yellow anteriorly; legs and spurs brownish-piceous, tegulae brownish-testaceous; wings subhyaline, veins brownish to piceous; apical rim of basal abdominal tergum, and the rather narrow, apical impressed areas of terga 2-6 ivory, in marked contrast to the otherwise black surface; cheeks somewhat narrower than eyes; clypeus rather strongly protuberant, its median length slightly greater than half the distance between eyes below; eyes subparallel; mandible with an inner, subapical tooth; basal segment of flagellum slightly shorter than segments 2 and 3 combined; hind basitarsi relatively straight and unmodified; lateral punctures on upper part of face minute and very close, the more median area below ocelli dull, very finely and obscurely punctate, maculated areas below very finely, quite sparsely and obscurely punctate, clypeus quite smooth, punctures hardly evident; punctures of labrum somewhat more distinct but scattered and irregular, becoming sparse laterally; apical margin of labrum with a pair of small, median denticles; cheeks quite smooth beneath pubescence, very minutely, ob-

scurely and rather closely punctate; surface of scutum, scutellum and pleura smooth but dull, without evident punctures; propodeum somewhat more shining, posterior face with exceedingly minute, scattered and rather sparse punctures barely evident, lateral faces impunctate; basal abdominal tergum obscured by dense pubescence, punctures inevident; terga 2-6 smooth but dull, punctures exceedingly minute and barely visible, well separated but not sparse; head, thorax, legs and basal abdominal tergum entirely pale ochraceous pubescent, becoming somewhat more whitish on cheeks below and on legs and venter of thorax; discs of abdominal terga 2-5 with very fine, short, erect, dark pubescence, this becoming pale laterally and more elongate on the more apical terga; tergum 7 rather narrowly produced medially, this area slightly incurved; sterna 7 and 8 and genital armature as shown (fig. 93).

DISTRIBUTION—Kansas and Nebraska, east to the New England states, in August.

FLOWER RECORDS — *Baptisia* and *Chamaecrista*. This is recorded by Robertson (1929) on *Abutilon*, *Blephilia*, *Cassia*, *Cirsium*, *Helianthus*, *Lepedeza*, *Lobelia*, *Petalostemum*, *Ruellia* and *Teucrium*.

Emphoropsis Ashmead

(Fig. 67)

Emphoropsis Ashmead, 1899. Amer. Ent. Soc.

Trans. 26, p. 60. Type: (*Habropoda floridana* Smith) = *Bombus laboriosus* Fabricius. Desig. by Cockerell and Cockerell, 1901.

Meliturgopsis Ashmead, 1899. Amer. Ent. Soc.

Trans. 26, p. 62. Type: (*Emphoropsis murihirta* Cockerell) = *Emphoropsis murina* Cockerell. First included species, Cockerell, 1909.

Emphoropsis Cockerell, 1905. South. Calif. Acad. Sci. Bul. 4, pp. 99-100. Revision.

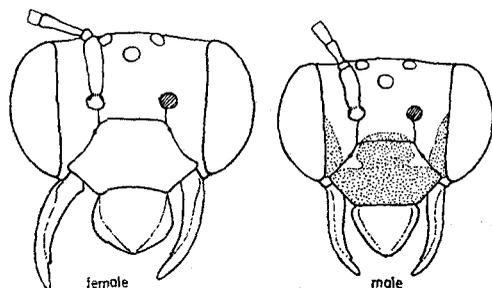


Figure 94
Facial view of head in both sexes of
Emphoropsis laboriosa.

This genus bears a resemblance to *Anthophora* and can easily be mistaken for it. It differs in having a more elongate marginal cell in the front wing, and the 3rd submarginal is distinctly longer than the 2nd. The clypeus is black in the female, yellow in the male. The scopal hairs on the hind tibiae and basitarsi of the female are plumose. Only one species is found in the Eastern United States, but the genus is well represented in the West.

Emphoropsis laboriosa (Fabricius)

(Figs. 94 & 95)

Bombus laboriosus Fabricius, 1804. *Systema Piezatorum*, p. 352.

Anthophora floridana Smith, 1854. *Cat. Hym. Brit. Mus.* 2, p. 339. ♀ ♂. New synonymy.

Emphoropsis floridana Robertson, 1929. *Flowers and Insects*, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 15.5-16 mm., breadth of abdomen 6.5-7 mm.; entirely black; wings lightly but uniformly infuscated, veins piceous to black; cheeks subequal to eyes in width; clypeus quite strongly protuberant, its median length somewhat greater than half the distance between eyes below (fig. 94); eyes very slightly convergent below; median length of labrum about two-thirds the breadth, apical margin rather broadly rounded; mandibles with a small, inner, subapical tooth; basal segment of flagellum equalling segments 2 and 3 combined in length; hind basitibial plate short and broadly rounded, tibia with an elongate, apically narrowed, densely pale tomentose area immediately beyond the plate; clypeus somewhat shining, punctures quite deep, and rather coarse, irregularly scattered and rather sparse; labrum somewhat shining, more sparsely and finely punctate; supra-clypeal area narrowly shining and impunctate along mid-line, becoming very closely and fine-

ly punctate on each side, lateral surfaces of face below level of antennae closely and finely but quite distinctly punctate, becoming much more minutely and closely punctate above antennae; surface shining between eyes and ocelli, punctures minute and vague; cheeks with fine and close punctures below, these becoming more sparse and indistinct above; scutum with a median posterior area with well separated but hardly sparse, shallow punctures, scutum, scutellum and pleura otherwise very minutely and closely punctate; posterior face of propodeum somewhat more shining, punctures exceedingly minute and indistinct, lateral surfaces dull, minutely and closely punctate; abdominal terga somewhat shining, punctures minute and rather close but distinct on the more basal terga, becoming somewhat closer along lateral margins and closer on the more apical terga; pygidium elongate triangular, apex rather narrowly rounded, margins carinate; scutum, scutellum and posterior face of propodeum entirely and densely pale ochraceous pubescent, pleura with a limited area of ochraceous pubescence above, otherwise black on head, thorax and legs; basal abdominal tergum with intermixed black and light pubescence which is quite long and copious, the following terga with very short, inconspicuous, suberect black pubescence, that on the more apical terga more elongate; tergum 5 with a quite dense, black or fuscous, apical fimbria.

MALE—Length 13-14 mm., breadth of abdomen 6-6.5 mm.; black, clypeus largely yellow, with only a small amount of black on each side above, the narrow adjacent margin of supra-clypeal area and rather small lateral maculations, ending narrowly on eye margin at level of antennae, yellow (fig. 94); spurs brownish-testaceous; wings subhyaline basally, becoming very lightly infuscated apically, veins piceous to black; cheeks slightly narrower than eyes; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; labrum broadly rounded, its median length somewhat less than basal width; mandibles with a very small, inner, subapical tooth; basal segment of flagellum about equal to segment 2 in length; punctures of clypeus quite deep and distinct but rather fine and well separated, somewhat obscure on the yellow surface, those on labrum rather close and fine medially at base, becoming sparse on the shining surface on each side, the inflexed lateral margins quite closely and finely punctate; supra-clypeal area very finely and closely punctate above the maculated margin, lateral areas of face below level of antennae somewhat shining, punctures fine and

distinct, slightly separated, surface above becoming very minutely and closely punctate; cheeks with very fine and close punctures below, becoming minute and indistinct above; median posterior area of scutum rather dull but smooth, with distinctly separated, scattered punctures, the scutum, scutellum and pleura otherwise very minutely and closely punctate throughout; posterior face of propodeum somewhat more shining, punctures minute and obscure, dorsal area largely impunctate medially; abdominal terga somewhat shining, punctures very fine and quite close, becoming much closer along lateral margins, and quite close on disc of tergum 6; pygidial area somewhat indefinite, the margins obscure, median length about equal to basal width, apex rather narrowly truncate; pubescence of scutum, scutellum, basal abdominal tergum and posterior face of propodeum long and copious, entirely pale ochraceous, pleura with some similar pubescence above beneath wing bases; vertex with some intermixed pale hairs below ocelli and across vertex, pubescence otherwise black on face, cheeks, pleura below, lateral surfaces of propodeum, legs entirely, and abdominal terga 2-7, very short and suberect on abdomen, hairs becoming somewhat more elongate on the more apical terga, especially at sides; sterna 7 and 8 and genital armature as shown (fig. 95).

DISTRIBUTION — Illinois to the New England states, south to Mississippi and

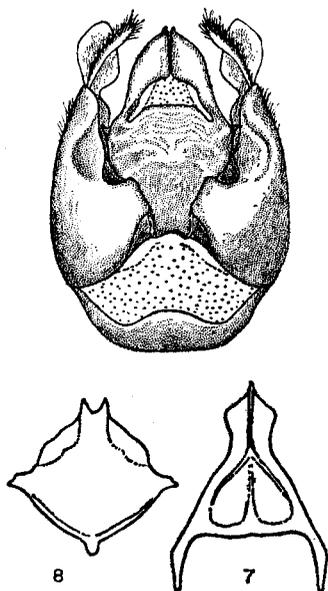


Figure 95
Genital armature and sterna 7 and 8 in male
of *Emphoropsis laboriosa*.

Florida, November, January and February in Florida, elsewhere March to May.

FLOWER RECORDS — *Cirsium*, *Lupinus*, *Malus*, *Melilotus*, *Prunus*, *Vaccinium* and *Vicia*. Recorded by Robertson (1929) on *Cercis* and *Dicentra*.

The type of *Bombus laboriosus* Fabricius has been studied by H. E. Milliron at the Universitetets Zoologiske Museum in Copenhagen and found to be an anthophorid bee rather than a *Bombus* or *Psithyrus*. His description of the specimen leaves no doubt that it is conspecific with *Emphoropsis floridana* (Smith).

Centris Fabricius

(Fig. 67)

Centris Fabricius, 1804. Syst. Piez., p. 354. n. 68. Type: *Apis haemorrhoidalis* Fabricius. Desig. by Cockerell, 1906.

Hemisia Klug, 1807. Mag. Insektenk. 6, p. 227. Type: *Apis haemorrhoidalis* Fabricius. Desig. by Cockerell, 1906.

Trachina Klug, 1807. Mag. Insektenk. 6, p. 226. Type: *Centris longimana* Fabricius. Desig. by Cockerell, 1906.

Ptilotopus Klug, 1810. Mag. Gesell. Naturf. Freunde Berlin 4, p. 31. Type: *Ptilotopus americanorum* Klug. Monob.

Gundlachia Cresson, 1865. Ent. Soc. Phila. Proc. 4, p. 195. Preocc. Type: (*Centris* ? *cornuta* Cresson) = *Centris difformis* Smith.

Heterocentris Cockerell, 1899. Entomologist 32, p. 14. (new name) Type: (*Centris* ? *cornuta* Cresson) = *Centris difformis* Smith. Autob.

Centris subg. *Cyanocentris* Friese, 1900. K. K. Naturhist. Hofmus. Ann. 15, p. 244. Type: *Apis versicolor* Fabricius. Desig. by Sandhouse, 1943.

Centris subg. *Poecilocentris* Friese, 1900. K. K. Naturhist. Hofmus. Ann. 15, p. 244. Type: *Centris fasciatella* Friese. Desig. by Sandhouse, 1943.

Centris (*Penthemisia*) Moure, 1950. Dusenya 1, p. 390. Type: *Hemisia chilensis* Spinola. Orig. desig.

Hemisia Michener, 1951. Kans. Ent. Soc. Jour. 24, pp. 1-11. Subgenera.

Centris Michener, 1957. Bul. Zool. Nomencl. 13, pp. 287-291. Proposal to validate name.

This is primarily a tropical group, represented in the Eastern U. S. by only 2 species. They are rather robust, the males with a yellow clypeus and that in female either black or with yellow maculations.

The stigma is very small, the marginal cell short, reaching only slightly beyond the 3rd submarginal cell. The 2nd submarginal exceeds both the 1st and the 3rd in length. The scape is short, usually exceeded in length by the much elongated basal segment of the flagellum. In the female the scopa is well developed on the hind tibiae and basitarsi, the hairs plumose, and very long, dense and copious.

The proposal by Michener (1957) to validate the name *Centris* has been made to conserve that name in its present usage. Were this not done, the name *Hemisia* would replace it, and the name *Centris* would replace *Eulema*, a tropical genus related to *Bombus* and *Apis*.

KEY TO SPECIES

- 1. Females 2
Males 3
- 2. Clypeus entirely black; abdomen black, without metallic reflections ~~subhyalina~~ Fox (below)
Clypeus yellow apically and along midline above; abdomen largely ferruginous, with tergum 1 and median areas of 2-4 metallic green *versicolor* (Fabricius) (p. 335)
- 3. Clypeus entirely yellow; legs, except the more apical tarsal segments, piceous; abdominal terga beyond the base largely black ~~subhyalina~~ Fox
Clypeus with narrow black lines along the lateral margins; abdomen ferruginous in large part *versicolor* (Fabricius) (p. 335)

Centris lanosa lanosa Cresson

(Figs. 96 & 97)

Centris lanosa Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 284. ♂.

Centris nyalina Fox, 1899. Acad. Nat. Sci. Phila. Proc. 51, p. 68. ♀.

Centris lanosa Cockerell, 1904. South. Calif. Acad. Sci. Bul. 3, p. 160. ♀.

FEMALE—Length 11 mm., breadth of abdomen 5 mm.; largely black, mandibles with a limited testaceous area apically, legs somewhat more piceous beneath, the mid and hind spurs brownish-testaceous, tegulae yellow; wings whitish-hyaline, veins piceous to black; cheeks slightly narrower than eyes; clypeus very slightly protuberant, its median length somewhat greater than half the distance between eyes; eyes subparallel (fig. 96); median length of labrum somewhat more than

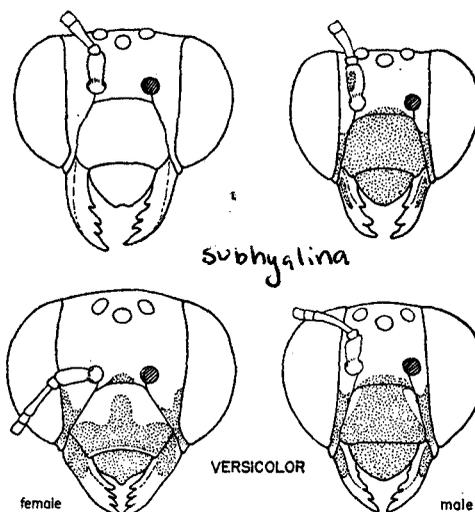


Figure 96
Facial views of head in species of *Centris*.

half the basal width, apical margin rather evenly rounded; mandibles distinctly quadridentate; basal segment of flagellum equal to segments 2-4 combined; front basitarsi only slightly longer than the maximum width; mid basitarsi quite broad and flat, width slightly more than half the length; clypeus shining, punctures deep and distinct, slightly separated, median line impunctate; punctures of labrum fine and very close throughout, becoming somewhat coarser apically; face very finely and quite closely punctate, becoming sparsely so between eyes and lateral ocelli where surface is polished, vertex with minute, rather close punctures; cheeks shining beneath the pubescence, with very minute and rather close punctures barely evident; surface of scutum and scutellum shining beneath dense pubescence, punctures minute and only slightly separated but quite uniform; pleura somewhat more deeply but still very finely punctate, the punctures well separated but hardly sparse; propodeum shining posteriorly, punctures minute and obscure, lateral faces shining, punctures minute but quite close; abdominal terga 1 and 2 with minute, quite close, evenly distributed punctures throughout; punctures of terga 3-5 becoming more distinct, deep and somewhat more widely separated, but still quite close; pygidium narrow and elongate, narrowly rounded at apex; pubescence of head rather copious but not very long, quite dense and whitish on cheeks, becoming more yellowish on face around antennae and across vertex where it is quite dense and elongate; dorsum of thorax, propodeum and upper portion of pleura densely, short, ochraceous pubescent, largely hiding surface; pleura lateral-

ly and below, and legs, fuscous to blackish pubescent, the hind tibial scopa black; basal abdominal tergum with some rather short, pale pubescence anteriorly, terga otherwise entirely covered with very short, suberect, entirely black pubescence, the hairs becoming more elongate on the more apical terga.

MALE—Length 11 mm., breadth of abdomen 5 mm.; black, the clypeus, labrum, mandibles at base, antennal scape anteriorly, lower margin of supraclypeal area and very small lateral facial maculae, yellow (fig. 96); legs somewhat more brownish-piceous, apical tarsal segments becoming brownish-testaceous, spurs brownish-piceous, tegulae yellow; wings whitish-hyaline, veins testaceous to piceous; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length considerably more than half the distance between eyes; eyes subparallel; labrum broadly rounded, its median length slightly more than half the basal width; mandibles distinctly tridentate apically; basal segment of flagellum somewhat longer than segments 2 and 3 combined, the 2nd somewhat broader than long; front and mid basitarsi quite slender and elongate, the middle pair with a long, dense, posterior fringe; hind basitarsi quite broad and flat, apex abruptly narrowed, prominently fringed over entire length; punctures of clypeus quite deep and distinct, rather fine, only slightly separated, the mid-line narrowly impunctate; punctures of labrum fine and quite close throughout, especially around margin; face above antennae finely and closely punctate, becoming shining and nearly impunctate below anterior ocellus and between lateral ocelli and eyes; vertex quite closely and deeply punctate; cheeks shining beneath the rather dense pubescence, with fine and rather close punctures; scutum and scutellum shining beneath dense pubescence, punctures fine, rather sparse on scutum posteriorly, becoming somewhat closer but still fine anteriorly and laterally, rather coarse and slightly separated over most of scutellum, deep, rather coarse and well separated on pleura above, becoming slightly finer and closer below; propodeum shining, punctures minute and quite sparse; punctures of abdominal terga 1 and 2 uniform, very fine and quite close, those on 3-5 somewhat more distinct and more widely separated, becoming more minute and close toward apical margins; pubescence of head largely pale, with a few, obscure, dark hairs around ocelli, nearly white on cheeks below, more ochraceous on vertex; scutum, scutellum, propodeum and basal abdominal tergum entirely pale ochraceous pubescent, pleura above more whitish pubescent becoming abruptly black beneath; pubescence of front legs large-

ly pale, but femora with a few dark hairs intermixed with the generally light posterior fringe; mid tibiae with a considerable amount of pale ochraceous pubescence in the posterior fringe, this intermixed with long fuscous hairs, and mid tarsi entirely fuscous, the posterior basitarsal fringe of very long hairs that are fuscous and quite densely plumose; hind legs largely dark pubescent, tibiae with a small amount of short, yellowish pubescence at base, conspicuously fringed toward apex, with elongate, fuscous, plumose hairs and basitarsus with a similar dense fringe; abdominal terga 2-6 entirely blackish pubescent, very short, subappressed on the more basal terga, becoming more elongate and erect on the more apical terga; sterna 7 and 8 and genital armature as shown (fig. 97).

DISTRIBUTION—Oklahoma and Texas, to Florida, June.

Another subspecies of *lanosa* occurs in the Southwest, making necessary the subspecific designation of this typical form.

Centris versicolor (Fabricius)

(Figs. 96 & 97)

Apis versicolor Fabricius, 1775. Syst. Ent. p. 386.

?*Centris ardens* Smith, 1874. Ann. Mag. Nat. Hist. (4) 13, p. 367. ♀.

Centris errans Fox, 1899. Acad. Nat. Sci. Phila. Proc. 51, p. 65. ♀.

Centris versicolor Moure, 1945. Rev. de Ent. 16, p. 404. (synonymy)

FEMALE—Length 13-14 mm., breadth of abdomen 5.5-6 mm.; head and thorax largely black; apical half of clypeus yellow, the maculation produced medially nearly to the dorsal margin; labrum entirely yellow, basal half of mandibles yellow and triangular yellow maculae at sides of face ending narrowly on eye margin about at level of antennae (fig. 96); antennal scape narrowly yellow anteriorly, the flagella piceous below, blackish above; legs bright ferruginous, spurs dull testaceous; tegulae yellowish; wings subhyaline, veins piceous to black; basal abdominal tergum metallic blue-green, becoming narrowly ferruginous along the rim, the following terga largely ferruginous, but terga 2-4 to some degree metallic greenish medially; cheeks slightly narrower than eyes; clypeus slightly protuberant, its median length considerably greater than half the distance between eyes; eyes subparallel; mandibles rather short, quadridentate apically; labrum subtriangular, its median length about half the basal width, apex subacute; basal segment of flagellum slightly longer than segments 2-4 combined; clypeus shining, punc-

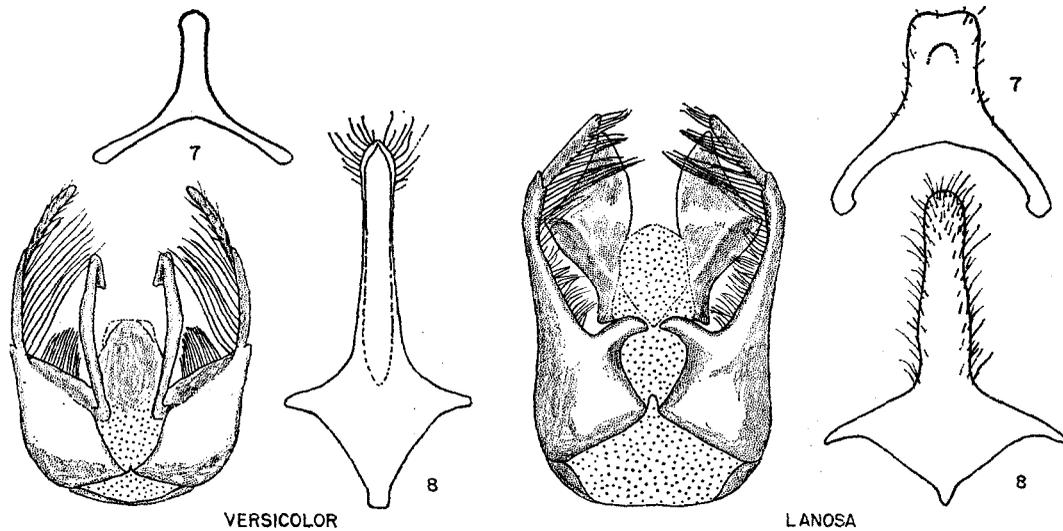


Figure 97—Genital armature and sterna 7 and 8 in males of *Centris*.

tures fine, rather sparse, those on labrum fine but somewhat closer apically, face above antennae finely and densely punctate, surface between eyes and ocelli shining, punctures becoming more minute and sparse, but vertex finely and closely punctate; cheeks with minute, densely crowded punctures; scutum, scutellum and pleura finely and closely punctate, becoming somewhat more coarsely so on pleura below; propodeum shining posteriorly, punctures minute and rather vague, lateral faces shining, punctures somewhat more distinct but very fine and well separated; front basitarsi slender and very short, with a posterior fringe of much elongated hairs, and with two or three robust, apically dilated setae; mid basitarsi broad and flat, gradually narrowed apically; the more basal abdominal terga very minutely and closely punctate throughout, punctures becoming somewhat more distinct and more widely separated but still very fine on terga 4 and 5; pygidium quite small, narrowly triangular, apex narrowly rounded; pubescence largely yellowish-white on cheeks and face, vertex with intermixed, erect, fuscous hairs and a few shorter fuscous hairs below ocelli; thorax entirely covered with dense, short, entirely pale pubescence, yellowish-white laterally, becoming ochraceous on dorsum; pubescence on legs entirely yellowish-white to fulvous, the scopa on tibiae and basitarsi yellowish, of elongate, quite densely plumose hairs, the basitarsi beneath with brownish-fuscous hairs; basal abdominal tergum with some thin, rather short but erect, yellowish-white pubescence; terga 2 and 3 with extremely short, subappressed, barely visible

pubescence, 4 and 5 with more elongate and erect yellowish pubescence.

MALE—Length 11-13 mm., breadth of abdomen 5-5.5 mm.; head and thorax chiefly black; clypeus largely yellow, with a narrow band of black on each side; labrum entirely yellow, and mandibles yellow except at apex and along the margins; antennal scape broadly yellow anteriorly; the supraclypeal area narrowly yellow along clypeal margin; lateral facial maculae yellow, ending acutely on eye margin about at level of upper margin of clypeus (fig. 96); legs largely ferruginous, mid and hind coxae, trochanters and base of femora to some degree blackish, spurs pale ferruginous, tegulae bright yellow; wings subhyaline, veins piceous to black; basal abdominal tergum largely blackish basally, the disc rather broadly yellowish-hyaline apically, following terga largely ferruginous, more or less infused with metallic greenish medially, apical margins rather broadly pale yellowish-hyaline; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length much greater than half the distance between eyes; eyes subparallel; mandibles distinctly tridentate apically; labrum subtriangular, median length slightly more than half the basal width, apex rather narrowly rounded; basal segment of flagellum about equal to segments 2-4 combined; front and mid basitarsi quite slender and elongate, hind basitarsi broad and flat, abruptly narrowed at apex; punctures of maculated areas of face minute and sparse, surface above antennae closely and finely punctate, punctures becoming quite

more apical terga; terga 5 and 6 with elongate, curled hairs laterally; sterna 7 and 8 and genital armature as shown (fig. 97).

DISTRIBUTION — Florida, March and April.

FLOWER RECORDS — *Borrichia*, *Byrsonima*, *Carymbola*, *Eugenia*, *Ocimum*, *Securidaca* and *Thryallis*.

Nomada Scopoli

(Fig. 67)

- Nomada* Scopoli, 1770. *Historico Naturalis Ann.* 4, p. 44. Type: *Nomada ruficornis* (Linnaeus). Desig. by Curtis, 1832.
- Nomada* Cresson, 1887. *Amer. Ent. Soc. Trans. Sup.* (2), pp. 296-297. (revision)
- Nomada* subg. *Heminomada* Cockerell and Atkins, 1902. *Ann. Mag. Nat. Hist.* (7) 10, p. 42. Type: *Nomada obliterated* Cresson. Monob. and orig. desig.
- Nomada* subg. *Micronomada* Cockerell and Atkins, 1902. *Ann. Mag. Nat. Hist.* (7) 10, p. 44. Type: *Nomada modesta* Cresson. Monob. and orig. desig.
- Gnathias* Robertson, 1903. *Canad. Ent.* 35, p. 173. Type: *Nomada bella* Cresson. Orig. desig.
- Phor* Robertson, 1903. *Canad. Ent.* 35, pp. 173 & 177. Type: (*Nomada integra* Robertson) = *Nomada integerrima* Dalla Torre. Monob. and orig. desig.
- Xanthidium* Robertson, 1903. (not Ehrenberg). *Canad. Ent.* 35, pp. 174 & 177. Type: *Nomada luteola* Olivier. Orig. desig.
- Holonomada* Robertson, 1903. *Canad. Ent.* 35, pp. 174 & 177. Type: *Nomada superba* Cresson. Orig. desig.
- Cephen* Robertson, 1903. *Canad. Ent.* 35, pp. 174 & 176. Type: *Nomada texana* Cresson. Monob. and orig. desig.
- Centrias* Robertson, 1903. *Canad. Ent.* 35, pp. 174 & 176. Type: *Nomada erigeronis* Robertson. Orig. desig.
- Nomada* subg. *Nomadula* Cockerell, 1903. *Acad. Nat. Sci. Phila. Proc.* 55, p. 611. Type: (*Nomada americana* ? Kirby) = *Nomada articulata* Smith. Orig. desig.
- Nomada* Cockerell, 1904. *Colo. Exp. Sta. Rpt. of Ent. Bul.* 94, pp. 65-85.
- Nomada* Cockerell, 1905. *Amer. Ent. Soc. Trans.* 31, pp. 309-312. (Smith types)
- Nomada* Cockerell, 1911. *U. S. Natl. Mus. Proc.* 41, pp. 225-243.
- Nomada* Swenk, 1912. *Univ. Nebr. Stud.* 12, pp. 1-113.

Nomada Rodeck, 1931. *Amer. Mus. Novitates* 496, pp. 1-11.

Nomada subg. *Pachynomada* Rodeck, 1945. *Ent. News* 56, p. 180. Type: *Nomada (Holonomada) vineta* Say. Orig. desig.

Nomada subg. *Callinomada* Rodeck, 1945. *Ent. News* 56, p. 181. Type: *Nomada (Holonomada) antonita* Cockerell. Orig. desig.

Nomada subg. *Laminomada* Rodeck, 1947. *Ent. Soc. Amer. Ann.* 40, p. 266. Type: *Nomada (Holonomada) hesperia* Cockerell. Orig. desig.

Nomada subg. *Callinomada* Rodeck, 1949. *Ent. Soc. Amer. Ann.* 42, pp. 174-186. (revision)

This is a very large genus of wasp-like, parasitic bees, usually red or black in color, with yellow or red integumental maculations. They are parasitic chiefly on *Andrena*. In the front wing the stigma is well developed, the marginal cell is elongate, acute at tip and not divergent from the costal margin, and usually there are three submarginal cells. The 1st submarginal cell equals the 2nd and 3rd combined in length. The pubescence is usually very short, thin and inconspicuous. The maxillary palpi are 6-segmented. The abdomen differs from that in most other genera in the form of the basal tergum, the lateral margins of which are produced as free flaps that overlie the margins of the sternum. In the female, sternum 6 is broadened and exposed apically, and conspicuously spinose on each latero-apical angle. The pygidium is well developed in both sexes, but is usually hidden by tergum 5 in the female, this plate having a more or less conspicuous pseudo-pygidial area apically.

Ten subgenera of *Nomada* have been recognized in the Nearctic region. Some of these (*Gnathias*, *Holonomada*, *Pachynomada*, *Callinomada*, *Micronomada* and *Nomadula*) are quite distinct and easy to recognize, once the characters are comprehended and observed. The subgenus *Centrias* is represented by a single species which shows marked similarities to the species of *Nomadula*, and its recognition as a distinct group seems questionable. *Heminomada* is a rather large group of species having complete yellow abdominal bands in both sexes, but the line of demarkation separating it from the subgenus *Nomada* is obscure. Furthermore, if a species is known in but one sex, it may be difficult to place it with confidence in one or the other of these groups. *Phor* is a very small

group, closely related to *Nomada* and its status seems to this writer to be questionable.

Of the 87 species which are keyed out and described in the following pages, 40 are either assigned to the subgenus *Nomada* or cannot be placed with certainty in any of the other subgenera. For this reason, a number of them are not placed in any subgeneric group. Their future inclusion in any of these depends upon a more intensive and comprehensive study of the genus, and upon more collecting at the nesting sites of the hosts, with a consequent basis for correlation of the sexes and the degree of variation within the species. This variation is very marked in certain of the subgenera, notably in *Gnathias*, where specific limits are very difficult to determine. No character, or combination of characters, seems entirely reliable, and the degree of sexual dimorphism makes correlation of the sexes difficult.

Because of these difficulties, no new species are proposed in the subgenus *Gnathias*. The types of those species or forms which occur in the Eastern United States have been studied and some opinions regarding synonymy have been formed. Those species which seem valid have been included in the comprehensive key to species of the genus, and specimens which agree reasonably well with these type specimens should be identifiable. Others, however, which are less typical in character, will need to be indicated as of doubtful identity.

Summary of key to females of *Nomada*

- A—Mandibles bidentate—couplet 2
- B—Front coxae spinose—couplet 8 (p. 340)
- C—Short side of segment 1 of flagellum equal to segment 2—couplet 18 (p. 340)
- D—Abdominal terga with complete yellow bands—couplet 26 (p. 341)
- E—Head and thorax yellow maculated—couplet 36 (p. 341)
- F—Pseudopygidium extensive—couplet 44 (p. 342)
- G—Abdominal terga black, with yellow maculations—couplet 47 (p. 342)
- H—Face with erect fuscous hairs—couplet 49 (p. 342)
- I—With but two submarginal cells
..... *decepta*

J—Abdominal terga red, without maculae—couplet 53 (p. 342)

K—Long side of segment 1 of flagellum equal to segment 2—couplet 56 (p. 342)

L—Basal flagellar segment much shorter than segment 2—couplet 60 (p. 343)

Summary of key to males of *Nomada*

- A—Mandibles bidentate—couplet 2 (p. 343)
- B—Segment 3 of flagellum spinose beneath—couplet 8 (p. 343)
- C—Segment 1 of flagellum fully equal to segment 2—couplet 13 (p. 343)
- D—Pygidium entire—couplet 25 (p. 344)
- E—With but two submarginal cells—couplet 28 (p. 344)
- F—Abdominal terga with broad, complete bands—couplet 30 (p. 344)
- G—Segments 2-7 of flagellum excavated beneath—couplet 41 (p. 345)
- H—Basal vein interstitial with transverse median—couplet 44 (p. 345)
- I—Clypeus black, at least in part—couplet 47 (p. 345)
- J—Terga 2 and 3 with transverse bands—couplet 49 (p. 345)
- K—Scutum red or ferruginous—couplet 55 (p. 346)
- L—Scutum entirely black—couplet 59 (p. 346)

KEY TO SPECIES

Females

1. Mandibles bidentate, having a distinct, subapical, inner tooth (*Gnathias*) ... 2
Mandibles simple 8
2. Head and thorax with much black; propodeum almost entirely so
..... *perplexa* Cresson (p. 352)
Head and thorax red in large part, black areas more restricted, and propodeum usually with much red 3
3. Usually larger (11 mm.); 2nd submarginal cell nearly as broad anteriorly as it is long, nearly square, 3rd narrowed nearly to a point 4
Smaller (8 mm. or less); 2nd and 3rd submarginal cells usually more nearly equal anteriorly 5
4. Abdominal terga 2-5 conspicuously yellow maculated; metapleura usually red and head almost entirely red
..... *maculata* Cresson (p. 350)

- Only 2nd and 3rd abdominal terga maculated; metapleura and anterior portion of propodeum black; face with a blackened area between antennae *cuneata* Robertson (p. 347)
- 5(3). Smaller (5-6 mm.); head and thorax, including metapleura, light ferruginous *louisianae* Cockerell (p. 349)
- Somewhat larger (7 mm. or more); head and thorax usually dark red, the metapleura black 6
6. Tegulae minutely and rather sparsely punctate; abdominal terga quite smooth, with only exceedingly minute, vague and obscure punctures *subnigrocincta* Swenk (p. 353)
- Tegulae deeply, distinctly and quite closely punctate; and basal half of tergum 2 with fine, but distinct and close punctures 7
7. Segment 1 of flagellum, measured on the longer side, equal to segment 2; abdominal terga dark red, with contrasting yellow maculations *lepida* Cresson (p. 347)
- Segment 1 of flagellum considerably shorter than segment 2, even on upper side; light red, the yellow maculations not so strongly contrasting, and face often yellowish between clypeus and eyes *ovata* Robertson (p. 351)
- 8(1). Front coxae with distinct, acute spines, often obscured by the pubescence 9
- Front coxae without spines or with very short obscure spines or denticles 18
9. Segment 2 of flagellum slightly shorter than basal segment, not much longer than broad (*Micronomada*) 10
- Segment 2 of flagellum much longer than broad, usually distinctly longer than basal segment (*Nomadula* and *Centrias*) 14
10. Propodeum with conspicuous yellow maculae *modesta* Cresson (p. 356)
- Propodeum entirely black 11
11. Abdominal terga 3-5 largely black, with only narrow, interrupted, yellow or reddish bands or lateral spots *fervida* Smith (p. 354)
- Abdominal terga 3-5 with bright yellow, transverse bands, that on 3 interrupted or much narrowed medially 12
12. Transverse yellow band on tergum 2 strongly constricted medially, not much wider than that on tergum 3, which is uninterrupted *texana* Cresson (p. 358)
- Transverse band on tergum 2 not so strongly constricted, much wider than that on 3, the latter usually interrupted medially 13
13. Supraclypeal area densely and coarsely rugoso-punctate *wisconsinensis* Graenicher (p. 359)
- Supraclypeal area shining between deep, distinct punctures *heiligbrodtii* Cresson (p. 355)
- 14(9). Basal segment of flagellum very short, length about equal to the apical width; abdominal terga 2-5 with small, inconspicuous, yellow maculae *seneciophila* new species (p. 370)
- Basal segment of flagellum much longer than the apical width 15
15. Scutum largely black; 2nd abdominal tergum black along posterior border, and with a narrow median black line connecting this band with a similar basal band, the resulting lateral areas red or yellow; vertex black; more robust *erigeronis* Robertson (p. 364)
- Smaller; scutum, vertex and 2nd tergum of abdomen almost entirely red 16
16. Terga 3-5 with ivory bands or maculae *rubicunda* Olivier (p. 368)
- Abdomen entirely red, without pale maculae 17
17. Hind tibiae with a row of five elongate black setae at apex *australis* new species (p. 367)
- Hind tibiae without these elongate apical setae, or if at all evident, then very short *articulata* Smith (p. 365)
- 18(8). Basal segment of flagellum, measured along the shorter side, at least equal to segment 2 19
- Length of segment 2 somewhat greater than the shorter side of basal segment 26
19. Scutum largely or entirely red (*Phor*) *integerrima* Dalla Torre (p. 377)
- Scutum largely black, possibly with yellow or reddish stripes 20
20. Propodeum conspicuously swollen or tuberculate on each side, posterior to the spiracles (*Holonomada*) 21
- Propodeum not at all swollen or tuberculate 22
21. Scutum and propodeum entirely black *superba* Cresson (p. 362)
- Scutum margined with yellow on each side, and with a pair of narrow, more median, yellow lines; propodeum with large, yellow maculations *affabilis* Cresson (p. 361)
- 22(20). Mandibles robust, subangulate me-

- dially on outer margin, apical third abruptly narrowed to tip; scutum usually yellow-striped
(Heminomada) annulata Smith (p. 380)
 Mandibles relatively slender, gradually narrowed to the tip; scutum entirely black 23
23. Scutum, propodeum, upper half of head, and basal abdominal tergum entirely black (*Callinomada*) 24
 At least some of these areas with red or yellow maculations 25
24. Maculations ivory; clypeus largely or entirely black; lateral facial maculae very short *aquilarum* Cockerell (p. 372)
 Maculations bright yellow; clypeus yellow, possibly with reddish infusions; lateral facial maculae nearly reaching top of eye *placida* Cresson (p. 374)
- 25(23). Labrum and clypeus black in part ..
 ..(*Heminomada) graenicheri* Cockerell (p. 391)
 Labrum and clypeus entirely yellow
 ..(*Pachynomada) vineta* Robertson (p. 379)
- 26(18). Abdominal terga with conspicuous, entire, bright yellow, transverse bands (*Heminomada*) 27
 Abdominal bands, if present, interrupted medially at least on terga 2 and 3 .. 36
27. With but two submarginal cells
 .. *obliterata* Cresson (p. 395)
 With the usual three submarginal cells 28
28. Scutum black or red, narrowly bright yellow laterally, and usually with a pair of submedian, longitudinal yellow lines 29
 Scutum without yellow lines 31
29. Dorsal surface of scutellum rather flat, smooth and shining between the coarse, deep and distinct punctures; flagellar segment 2 only very slightly longer than shorter side of segment 1
 .. *bishoppi* Cockerell (p. 383)
 Scutellum more rounded, coarsely rugose or closely punctate; segment 2 of flagellum much longer than shorter side of segment 1 30
30. Head and thorax with much black, in addition to the yellow, with little or no red; segment 2 of flagellum fully twice the length of segment 1 on its shorter side *sulphurata* Smith (p. 398)
 Head and thorax with a considerable amount of red, in addition to the yellow, with but very little black; segment 2 of flagellum not twice the length of segment 1 on its shorter side
 .. *luteola* Lepeletier (p. 393)
- 31(28). Scutum entirely black
 .. *colorata* new species (p. 386)
 Scutum red in general, possibly with a narrow, median, black line, but without yellow 32
32. Head yellow in large part, with a limited area of black above antennae, another surrounding ocelli, and over posterior area of cheeks
 .. *dentariae* Robertson (p. 386)
 Head largely red, often with limited areas of yellow or black, or lower half of face yellow, upper portion chiefly red 33
33. Scutellum entirely red, concolorous with scutum, the punctures coarse and confluent 34
 Scutellum bright yellow dorsally, this area with coarse, well separated punctures 35
34. Basal segment of flagellum much longer than its apical width, the longer side equal in length to segment 2
 .. *wanthura* Cockerell (p. 400)
 Basal segment of flagellum much shorter than segment 2, the shorter side no longer than its apical width
 .. *pseudops* Cockerell (p. 397)
- 35(33). Face mostly yellow below level of antennae .. *capitalis* new species (p. 385)
 Face more reddish below level of antennae *imbricata* Smith (p. 392)
- 36(26). Head and thorax more or less conspicuously yellow maculated 37
 Head and thorax largely black or red, without yellow maculations (*Nomada*) 44
37. Scutum chiefly red 38
 Scutum black 40
38. Mandibles long and slender, tip of one nearly reaching base of other when closed; yellow maculations limited to tergum 2
 .. (*Heminomada) miniata* Smith (p. 394)
 Mandibles of ordinary length; terga 2-5 conspicuously maculated 39
39. Scutum dark red, finely and closely punctate; scutellum yellow dorsally
 .. *augustiana* new species (p. 402)
 Scutum light red, coarsely and deeply punctate; scutellum entirely red, concolorous with scutum
 .. (*Heminomada) pseudops* Cockerell (p. 397)
- 40(37). Tegulae unusually large, punctures deep and distinct, rather sparse; scutum with a small yellow maculation adjacent to each tubercle
 .. (*Heminomada) electa* Cresson (p. 388)
 Tegulae not unusually large 41

41. Basal segment of flagellum very short, less than half the length of segment 2, even when measured on the longer, upper side
 (*Heminomada*) *electella* Cockerell (p. 389)
 Basal segment of flagellum more than half length of segment 2 42
42. Small (6.5 mm.); abdominal terga dark, without yellow bands, but the broad, apical, impressed areas yellowish-hyaline *kingstonensis* new species (p. 420)
 Larger (8 mm. or more); abdominal terga with conspicuous, bright yellow bands 43
43. Clypeus quite flat, very broad and short, largely yellow, with numerous erect, rather dark hairs; propodeum largely black, with only a pair of very small yellow spots on basal triangle
 *sphaerogaster* Cockerell (p. 432)
 Clypeus strongly protuberant, yellow apically, black along basal margin, pubescence very short, entirely pale and barely visible; propodeum with a pair of large yellow blotches
 (*Heminomada*) *festiva* Cresson (p. 390)
- 44(36). Pseudopygidial area unusually extensive, covering about half the surface of tergum 5 along mid-line 45
 Pseudopygidial area of the usual narrow form 47
45. Punctures of scutellum, and of scutum posteriorly, well separated, pseudopygidial area relatively narrow, occupying no more than a third of the apical margin of tergum 5
 *skinneri* Cockerell (p. 429)
 Punctures of scutum and scutellum contiguous, if not crowded; pseudopygidial area usually much broader, lateral portions of apical margin of the tergum much shorter than breadth of the area 46
46. Scutum rather finely and quite densely punctate; tegulae closely punctate toward inner side; propodeum largely red *depressa* Cresson (p. 413)
 Scutum more coarsely punctate, the punctures not crowded; tegulae very minutely and sparsely punctate; lateral faces of propodeum largely black
 *media* new species (p. 421)
- 47(44). Abdominal terga piceous or black, ornamented with contrasting, bright yellow maculations 48
 Abdominal terga chiefly red, more or less ornamented with yellow 49
48. Clypeus black, with only the apical rim narrowly red; inner orbits red
 *vicina* Cresson (p. 434)
- Clypeus entirely reddish; lower inner orbits bright yellow
 *banksi* Cockerell (p. 404)
- 49(47). Face with long, erect or suberect, fuscous hairs; tegulae very sparsely and minutely punctate 50
 Hairs on face and clypeus entirely pale, largely decumbent 52
50. Terga 4 and 5 conspicuously yellow maculated *inepta* new species (p. 419)
 Terga 4 and 5 entirely red 51
51. Scutellum rounded, little if any impressed medially; abdominal terga entirely red, not maculated
 *valida* Smith (p. 434)
 Scutellum quite deeply grooved medially; tergum 2 and sometimes 3, with conspicuous, lateral, yellow maculae
 *composita* new species (p. 408)
- 52(49). First transverse cubital vein absent, thus with only two submarginal cells
 *decepta* new species (p. 411)
 With the usual three submarginals 53
53. Abdominal terga entirely red, without any evident yellow areas 54
 At least tergum 2 with lateral, yellow maculations 56
54. Apical depressed areas of terga smooth and impunctate
 *lehighensis* Cockerell (p. 420)
 Apical depressed areas of abdominal terga closely and distinctly punctate, with only the narrow rims impunctate 55
55. Scutellum deeply grooved medially
 *crudelis* Cresson (p. 410)
 Scutellum evenly rounded posteriorly, not at all bilobed
 *nigrocincta* Smith (p. 424)
- 56(53). Segment 1 of flagellum as long as segment 2 when measured on the longer, upper side 57
 Long side of segment 1 at least slightly shorter than segment 2 60
57. Front coxae with short, triangular spines *denticulata* Robertson (p. 411)
 Front coxae simple 58
58. Very small (5 mm.); abdominal terga nearly impunctate, with only very minute and obscure punctures visible laterally *parva* Robertson (p. 425)
 Larger (7 mm. or more); abdominal terga distinctly, even though finely, punctate
59. Scutellum rounded, the median groove or impression very shallow or absent
 *lehighensis* Cockerell (p. 420)
 Scutellum distinctly grooved or impressed medially, thus more or less bilobed
 *illinoensis* Robertson (p. 417)

- 60(56). Apical abdominal terga to some degree maculated
cressonii Robertson (p. 409)
 Yellow maculations limited to lateral areas of terga 2 and 3 61
61. Propodeum red, at least in part 62
 Propodeum largely or entirely black, and pleura black in large part 64
62. Tegulae very finely and closely punctate; face with little or no black between antennae
tyrrellensis new species (p. 433)
 Tegulae more coarsely or sparsely punctate; face blackened between and above antennae 63
63. Larger (9 mm.); very dark red; tegulae more reddish, the punctures deep, distinct and close except over posterior third *pygmaea* Cresson (p. 426)
 Smaller (6 mm.); light red; tegulae more yellowish, the punctures minute
sayi Robertson (p. 428)
- 64(61). Smaller (6 mm.); segment 1 of flagellum very short, not much longer than its apex is broad; terga 2 and 3 with large, lemon yellow spots; scutellum only slightly grooved
ceanothi Cockerell (p. 406)
 Larger (8 mm.); segment 1 of flagellum much longer than its apex is broad; tergum 3 without maculae, 2 with a pair of very small, lateral, yellow spots ...
florilega Lovell & Cockerell (p. 415)
- Males*
1. Mandibles bidentate, having a distinct, subapical, inner tooth (*Gnathias*) ... 2
 Mandibles simple 8
2. Scutellum rounded, the median groove barely evident or entirely absent; abdominal bands nearly complete; segment 1 of flagellum nearly as long as segment 2, measured on the longer side, much longer than broad 3
 Scutellum with a distinct median groove, or segment 1 of flagellum not much longer than broad, and much shorter than segment 2 4
3. Scutellum and usually the scape also entirely black *bella* Cresson (p. 346)
 Scape yellow anteriorly; scutellum red ...
maculata Cresson (p. 350)
- 4(2). Scutum and mesopleura largely red . 5
 Scutum and mesopleura largely or entirely black 6
5. Basal segment of flagellum very short, the shorter side no longer than apical width ... *hydrophylli* Swenk (p. 348)
 Basal segment of flagellum much longer than its apical width, the longer side about equal in length to segment 2 ...
ovata Robertson (p. 351)
- 6(4). Mid antennal segments slightly longer than wide (1:1.2)
perplexa Cresson (p. 352)
 Mid antennal segments as broad as long 7
7. Abdominal maculae limited to small, widely separated, yellow spots on terga 2 and 3 *louisianae* Cockerell (p. 349)
 Abdominal terga 2-5 with entire or slightly interrupted yellow bands
lepida Cresson (p. 347)
- 8(1). Segment 3 of flagellum spinose beneath; pedicel nearly or quite hidden in the deeply concave apex of the scape (*Nomadula* and *Centrias*) 9
 Segment 3 of flagellum not spinose; pedicel usually not so enclosed by the scape 13
9. Segments 2 and 3 of flagellum subequal in length, the length not much exceeding the breadth
seneciophila new species (p. 370)
 Segment 2 of flagellum considerably longer than 3, fully twice as long as it is broad 10
10. Hind femora simple, ventral surface rounded; scutellum bright yellow
rubicunda Olivier (p. 368)
 Hind femora arcuate, lower surface flattened or slightly concave, the margins subcarinate 11
11. Tegulae, tubercles, axillae, and an anterior blotch on mesopleura bright yellow *erigeronis* Robertson (p. 364)
 Tegulae ferruginous, axillae black or reddish, pleura largely black 12
12. Scutum partly, and scutellum entirely, ferruginous; metanotum usually yellow in part *articulata* Smith (p. 365)
 Thorax entirely black except the tubercles and a pair of small inconspicuous yellowish maculae on collar; scutellum sometimes red, but metanotum black...
australis new species (p. 367)
- 13(8). Basal segment of flagellum equal to segment 2, even if measured along its shorter side 14
 Basal segment of flagellum considerably shorter than segment 2, at least if measured along its shorter side 25
14. Apex of pygidium deeply incised or emarginate 15
 Apex of pygidium entire, rounded, or truncate 20

15. Abdominal sterna almost entirely bright yellow; front coxae simple (not spinose) (*Heminomada*) *annulata* Smith (p. 380)
Abdominal sterna almost entirely black or piceous; front coxae with slender pubescent spines (*Micronomada*) .. 16
16. Propodeum conspicuously yellow maculated *modesta* Cresson (p. 356)
Propodeum usually entirely black, sometimes reddened, but not maculated . 17
17. Scape ferruginous; transverse yellow bands on terga 3-5 very narrow; tergum 6 entirely black *fervida* Smith (p. 354)
Scape yellow anteriorly; transverse bands on terga 3-5 broad laterally, narrowed medially; tergum 6 yellow maculated 18
18. Transverse yellow band on tergum 3 to some degree interrupted medially, that on 2 only slightly constricted medially *heiligbrodtii* Cresson (p. 355)
Transverse yellow band on tergum 3 very narrow medially, but not interrupted 19
19. Transverse band on tergum 2 much constricted medially, not much wider than that on 3 at mid point *texana* Cresson (p. 358)
Transverse band on tergum 2 only slightly constricted medially, being very much wider than that on tergum 3 *wisconsinensis* Graenicher (p. 359)
- 20(14). Scape of antennae bulbous, the length only about 1.5 times the breadth at apex (*Pachynomada*) *vineta* Say (p. 379)
Scape relatively slender, fully twice as long as the greatest breadth 21
21. Smaller (9 mm. or less); abdominal terga with lateral spots or interrupted bands (*Callinomada*) 22
Larger (12 mm. or more); abdominal terga with broad, conspicuous, entire, yellow bands (*Holonomada*) 24
22. Propodeum with a pair of large yellow maculae .. *rodecki* new species (p. 376)
Propodeum entirely black 23
23. Upper portion of clypeus black over nearly half of the median length; femora largely dark; tubercles strongly produced ... *aquilarum* Cockerell (p. 372)
Only the narrow upper margin of clypeus black; femora in large part testaceous; tubercles not greatly produced *placida* Cresson (p. 374)
- 24(21). Basal vein interstitial with transverse median; propodeum entirely black, and pleura black except for a very small, anterior, yellow spot *superba* Cresson (p. 362)
Basal vein much basad of transverse median; pleura and propodeum with large yellow maculae *affabilis* Cresson (p. 361)
- 25(13). Pygidium entire; basal vein usually interstitial with transverse median vein 26
Pygidium distinctly notched at apex . 28
26. Scutellum grooved medially (*Phor*) *integerrima* Dalla Torre (p. 377)
Scutellum rounded 27
27. Clypeus black across basal half, only the apical half yellow; scape entirely black (*Phor*) *proxima* Cresson (p. 378)
Clypeus yellow, only the very narrow basal margin black; scape yellowish anteriorly *orba* new species (p. 424)
- 28(25). With but two submarginal cells . 29
With the usual three submarginal cells 30
29. First recurrent vein interstitial with first transverse cubitus; all coxae black; face black between antennae and upper margin of clypeus *detrita* new species (p. 414)
First transverse cubitus absent, the first recurrent far basad of second transverse cubitus; face entirely yellow below level of antennae (*Heminomada*) *obliterata* Cresson (p. 395)
- 30(28). Abdominal terga with broad, uninterrupted, transverse, yellow bands (*Heminomada*) 31
Abdominal terga either with lateral, widely separated, yellow maculations, or with transverse bands that are to some degree interrupted medially 41
31. Basal vein interstitial with transverse, median vein 32
Basal vein to some degree basad of transverse median 34
32. Median segments of flagellum broader than long . *salicis* Robertson (p. 428)
Median segments of flagellum longer than broad 33
33. Scutellum entirely yellow, and propodeum with small, but distinct, yellow maculations *fragariae* new species (p. 391)
Scutellum black, with a pair of small, rounded, yellow maculations; propodeum entirely black *subrutilla* Lovell & Cockerell (p. 398)
- 34(31). Propodeum entirely black 35
Propodeum with yellow maculations .. 38

35. Basal segment of flagellum fully as long as segment 2, measured on the longer, upper side; scutum and scutellum entirely black 36
 Basal segment of flagellum little more than half the length of segment 2, even on upper side; scutellum with yellow maculations 37
36. Pronotal collar and scutellum bright yellow *bishoppi* Cockerell (p. 383)
 Pronotal collar, scutum and scutellum entirely black *autumnalis* new species (p. 382)
- 37(35). Smaller (7 mm.); pronotum entirely black; antennal scape quite slender, only slightly broader than segments of flagellum *ochlerata* new species (p. 396)
 Larger; pronotum yellow; antennal scape bulbous, nearly twice as broad as the flagellar segments *dentariae* Robertson (p. 386)
- 38(34). Basal segment of flagellum, measured along the longer side, nearly as long as segment 2 *bishoppi* Cockerell (p. 383)
 Segment 2 of flagellum about twice as long as basal segment 39
39. Scutum and scutellum red in large part *bethuni* Cockerell (p. 382)
 Scutum entirely black, scutellum with yellow maculations 40
40. Propodeal maculations small; mesopleura mostly black, with only an anterior yellow blotch; abdominal bands narrow *sulphurata* Smith (p. 398)
 Propodeal maculations large; mesopleura with a large yellow spot just beneath base of fore wing; abdominal bands broad, occupying a considerable portion of each tergum *luteola* Lepeletier (p. 393)
- 41(30). Segments 2-7 of flagellum excavated beneath *denticulata* Robertson (p. 411)
 Flagellar segments not so modified .. 42
42. Apex of pygidium broadly truncate, very slightly incurved; scutellum red, deeply grooved *mendica* new species (p. 422)
 Apex of pygidium usually narrowed, quite deeply and distinctly notched; if at all broad, then scutellum rounded, and entirely black 43
43. Basal vein interstitial or nearly with transverse median vein 44
 Basal vein distinctly basad of transverse median 47
44. Scutellum rounded, entirely black 45
- Scutellum deeply grooved, either red or yellow 46
45. Abdominal terga 2 and 3 with lateral, widely separated, yellow maculations, the apical terga not maculated *ulsterensis* new species (p. 433)
 Terga 2-6 with transverse, yellow bands, those on 2 and 3 subinterrupted medially, the others entire *townesi* new species (p. 432)
- 46(44). Abdominal terga with transverse, yellow bands that are entire or only slightly interrupted medially; scutum and propodeum in large part red *indusata* new species (p. 418)
 Abdominal terga 2 and 3 with lateral, widely separated, yellow maculations, remaining terga dark *media* new species (p. 421)
- 47(42). At least upper half of clypeus black 48
 Clypeus yellow in large part 49
48. Only the narrow apical rim of the clypeus yellowish or ferruginous, otherwise black; scape testaceous or yellow anteriorly *vicina* Cresson (p. 434)
 Apical half of clypeus yellow; scape black, with only the apex narrowly yellow *gracilis* Cresson (p. 416)
- 49(47). Abdominal terga 2 and 3 with transverse, yellow bands which are only slightly interrupted medially 50
 Tergum 3, and usually 2 also, with lateral, yellow maculations which are rather widely separated 53
50. Scutellum yellow, at least in part *armatella* Cockerell (p. 402)
 Scutellum black or red, with no trace of yellow 51
51. Scutellum rounded posteriorly, median groove very shallow if at all evident. 52
 Scutellum bilobed, having a distinct and often deep median groove *cressonii* Robertson (p. 409)
52. Smaller (5.5-6.5 mm.); segment 2 of flagellum less than twice the length of segment 1 ... *sayi* Robertson (p. 428)
 Larger (8-9 mm.); segment 2 of flagellum fully twice as long as segment 1. *dreisbachi* new species (p. 414)
- 53(49). Scutum to some degree red or ferruginous 55 54
 Scutum entirely black 58
54. Very small (5 mm.); pleura and propodeum entirely black *minima* new species (p. 423)
 Somewhat larger; mesopleura to some degree red or yellow 55

55. Pronotum and scutellum bright yellow
 *sobrina* new species (p. 431)
 Pronotum and scutellum red or black . 56
56. Segments 2 and 3 of flagellum subequal
 in length; abdominal terga 4-6 yellow
 maculated. *azaleae* new species (p. 403)
 Segment 2 of flagellum considerably long-
 er than 3; terga 4-6 usually not macu-
 lated *pygmaea* Cresson (p. 426)
- 57(53). Tegulae unusually large, closely and
 coarsely punctate
 (*Heminomada electa* Cresson (p. 388)
 Tegulae of normal size, usually rather
 finely or sparsely punctate 58
58. Pleura entirely black; or very dark red
 59
 Pleura with small, anterior, yellow macu-
 lations 62
59. Very small (5 mm.); median antennal
 segments very short, breadth fully equal
 to length; scutellum rounded, entirely
 black *parva* Robertson (p. 425)
 Larger; median segments of antennae
 somewhat longer than broad; scutellum
 with reddish maculae, to some degree
 grooved or impressed medially 60
60. Upper surface of scutellum shining be-
 tween coarse and distinctly separated
 punctures . . . *skinneri* Cockerell (p. 429)
 Scutellum closely punctate 61
61. Scutellum entirely dark red, very deeply
 grooved; abdominal terga 4-6 not yellow
 maculated. *media* new species (p. 421)
 Scutellum with a pair of small, red macu-
 lations, the median groove shallow;
 terga 4-6 to some degree yellow macu-
 lated . . . *illinoensis* Robertson (p. 417)
- 62(58). Scutellum yellow
 *capillata* new species (p. 406)
 Scutellum in part ferruginous, or largely
 black, with a pair of small yellow
 spots 63
63. Pronotum yellow, the lateral angles
 rounded; supraclypeal area yellow and
 pleura with small, anterior, yellow macu-
 lae *ceanothi* Cockerell (p. 406)
 Pronotum black, acutely angled laterally;
 supraclypeal area entirely black
 *banksi* Cockerell (p. 404)

Nomada (Gnathias) bella bella
 Cresson

- Nomada bella* Cresson, 1863. Ent. Soc. Phila.
 Proc. 2, p. 287. ♂.
Nomada bella Snodgrass, 1941. Smithsonian
 Misc. Coll. 99, pp. 55-56, pl. 27, fig. F-J.
Nomada albofasciata Smith, 1879. Descr. New
 Species Hym. Brit. Mus. p. 100. ♂. New
 synonymy.

MALE—Length 5.5-8.5 mm.; lateral ocelli
 somewhat nearer margin of vertex than to
 each other; cheeks slightly narrower than
 eyes; longer side of basal segment of flagellum
 somewhat shorter than segment 2, median
 segments very slightly longer than broad,
 pedicel almost completely enclosed in the deep,
 apical excavation of the scape which is slight-
 ly broader than segments of flagellum; man-
 dible with a distinct, inner, subapical tooth;
 wings hyaline basally, becoming lightly in-
 fuscated along apical margin and in marginal
 cell, with the usual three submarginal cells,
 2nd and 3rd subequal in width anteriorly,
 veins chiefly testaceous, basal vein much basad
 of transverse median; tegulae somewhat shin-
 ing, but with numerous, rather close, shallow
 and fine punctures; scutellum rounded, pos-
 terior margin only slightly grooved medially,
 if at all; front coxae simple; hind femora
 unmodified; head and thorax chiefly black,
 scape usually entirely black, clypeus except
 upper margin, labrum, mandibles except tips,
 and narrow lateral maculae extending nar-
 rowly up inner margin of eye to level of an-
 tennae, bright yellow; flagellum, tegulae and
 tarsi more reddish-testaceous; front and mid-
 dle tibiae more or less testaceous, with some
 dark infusions, hind tibiae largely piceous,
 femora and coxae largely dark, spurs pale
 yellow; basal abdominal tergum largely pice-
 ous on basal half, with a pair of rather nar-
 row, transverse, yellowish maculae on each
 side, apical area largely ferruginous; terga
 2-6 with transverse, yellowish-white bands
 that are usually entire, apical margins of the
 plates broad, slightly depressed, largely yel-
 lowish-hyaline; head and thorax in large part
 coarsely rugoso-punctate, punctures becoming
 very fine and close below antennae and on
 clypeus, lateral maculated areas very sparsely
 and minutely punctate; abdominal terga mi-
 nutely and very closely punctate basally, pun-
 ctures very shallow and inconspicuous, becom-
 ing minute and indefinite toward the apical
 impressed areas, these smooth, shining, very
 sparsely punctate and yellowish-hyaline; py-
 gidial plate rather strongly narrowed apically,
 tip narrow but deeply emarginate, lateral mar-
 gins conspicuously carinate, surface very fine-
 ly, closely and rather shallowly punctate;
 sternum 8 much as in *maculata* (fig. 98); gen-
 ital armature somewhat as in *maculata*, but the
 elongate setae of the gonostyli forming a
 laterally projecting pencil, and setae on inner
 side of the gonostylus directed mesally; pub-
 escence quite thin, entirely pale, erect and
 relatively elongate, more yellowish on head
 and thorax above, becoming whitish and more
 conspicuous below antennae, on cheeks below,
 and on thorax laterally.

DISTRIBUTION—Minnesota to Quebec

and Maine, south to Florida, March to August.

The recognition of a subspecies of *bella* in Colorado makes the subspecific designation of this typical form necessary.

Nomada (Gnathias) cuneata
(Robertson)

Gnathias cuneatus Robertson, 1903. Canad. Ent. 35, p. 175. ♀ (♂?)

Gnathias cuneatus form *decemnotatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias cuneatus form *octonotatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias cuneatus form *sexnotatus* Robertson, 1903. Canad. Ent. 35, p. 176. ♀.

Gnathias cuneatus form *quadrisignatus* Robertson, 1903. Canad. Ent. 35, p. 176. ♀.

Gnathias cuneatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes; longer side of basal segment of flagellum nearly equal to segment 2, median segments considerably longer than broad; mandibles with a distinct, inner, subapical tooth; wings subhyaline, becoming quite deeply infuscated along outer margin and in region of marginal cell, with the usual three submarginal cells, 2nd very broad and 3rd much constricted anteriorly, veins piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct, and slightly separated punctures, these somewhat closer anteriorly and along inner margin; posterior margin of scutellum quite deeply grooved medially; front coxae simple; hind tibiae with 4 or 5 robust, elongate, dark, spine-like, apical setae; head and thorax red in large part, with black areas between and somewhat above antennae, in the ocellar triangle, on posterior half of cheeks, lateral and ventral portions of prothorax, a narrow median line on scutum, mid coxae, metapleura and adjacent area of propodeum, and median area of propodeal triangle; flagellum, tubercles, tegulae, and legs in part, somewhat more testaceous, spurs pale yellow; abdominal terga red in large part, basal tergum narrowly piceous at base, terga 2 and 3 with large, widely separated, bright yellow maculae; punctures of head and dorsum of thorax coarse, close, deep and distinct, somewhat more finely and closely so on scutellum and on cheeks below, very fine and close but quite distinct on clypeus; mesopleura rather coarsely rugoso-punctate, black areas of metapleura and propodeum somewhat more shallowly and obscurely rugose; basal area of terga 2-5 finely and very closely punctate, the apical im-

pressed areas practically impunctate; pseudopygidium transverse, very narrow, forming the truncate apical margin of tergum 5; pubescence very short and inconspicuous, entirely pale, somewhat more copious on propodeum, pleura, cheeks and face.

DISTRIBUTION — Minnesota to Nova Scotia, south to North Carolina, May to July.

FLOWER RECORDS—Robertson (1929) records *cuneata* on *Achillea*, *Arabis*, *Arunchus*, *Cercis*, *Claytonia*, *Dentaria*, *Dirca*, *Ellisia*, *Nothoscordum*, *Osmorrhiza*, *Rhamnus*, *Rhus*, *Ribes*, *Salix*, *Taenidia*, *Viburnum* and *Zanthoxylum*.

It seems desirable to remove *cuneata* from synonymy with *lepida* Cresson because of the uncertainty with respect to this association of the sexes. Males which have been compared with the type of *lepida* have a somewhat different distribution from that of *cuneata* females in North Carolina, having been collected in the vicinity of Raleigh, in association with females which differ from *cuneata*. Females of *cuneata* have been collected only in the higher elevations, from 3,500 to 6,000 feet.

Nomada (Gnathias) lepida Cresson

Nomada lepida Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 288. ♂.

FEMALE—Length 7-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks considerably narrower than eyes; longer side of basal segment of flagellum nearly equal to segment 2, median segments considerably longer than broad; mandibles with a distinct, inner, subapical tooth; wings subhyaline, becoming quite deeply infuscated along outer margin and in region of marginal cell, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, veins piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct and slightly separated punctures, these somewhat closer anteriorly and along inner margin; posterior margin of scutellum quite deeply grooved medially; front coxae simple; hind tibiae with 3 or 4 robust, dark, spine-like, apical setae; head and thorax red in large part, with black areas between and somewhat above antennae, in the ocellar triangle, and on posterior half of cheeks, lateral and ventral portions of prothorax, a narrow median line on scutum, mid coxae, metapleura and adjacent area of propodeum, and median area of propodeal triangle; flagellum somewhat more brownish, tubercles, tegulae, and

legs in part, somewhat more testaceous, spurs pale yellow; abdominal terga red in large part, basal tergum narrowly piceous at base, terga 2 and 3 with large, widely separated, bright yellow maculae, 4 and 5 with faint yellowish maculae on each side, and 6 with a pair of subapical yellowish spots; punctures of head and thorax coarse, close, deep and distinct, somewhat more finely and closely so on scutellum and on cheeks below, very fine and close on clypeus; black areas of metapleura and propodeum somewhat more shallowly and obscurely rugose; upper half of propodeal triangle coarsely rugoso-striate; basal area of terga 2-5 finely and rather closely punctate, the apical impressed areas more minutely and sparsely punctate, apical margins becoming impunctate; pseudopygidium transverse, very narrow, forming the truncate apical margin of tergum 5; pubescence very short and inconspicuous, entirely pale, somewhat more copious on propodeum, pleura, cheeks and face.

MALE—Length 6.5-9 mm.; lateral ocelli slightly nearer margins of vertex than to each other; cheeks subequal to eyes in width; basal segment of flagellum shorter than segment 2, median segments no longer than broad, pedicel partially enclosed in excavated apex of scape which is considerably swollen; mandible with a distinct, inner, subapical tooth; wings subhyaline, somewhat infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd about as broad anteriorly as 3rd, veins brownish-testaceous, basal vein much basad of transverse median; tegulae shining between rather deep, distinct, fine punctures, these somewhat closer anteriorly; posterior margin of scutellum only very shallowly impressed medially; front coxae simple; hind femora unmodified; head and thorax black in large part, but clypeus, labrum, mandibles except tips, scape anteriorly, and lateral facial maculations extending narrowly up margin of eye to level of antennae, bright yellow; pronotum dorsally, tubercles and tegulae yellowish-testaceous; legs testaceous in large part, hind femora and coxae dark, spurs pale yellow; scutellum with a pair of small, slightly separated, yellow maculae, and mesopleura with a very small, anterior, yellow maculation, otherwise pleura, propodeum and scutum black; abdomen red in large part, basal tergum piceous at extreme base, with a pair of very small, submedian, widely separated, yellow maculations, terga 2 and 3 with broad, yellow maculations which nearly meet at mid-line, 4 and 5 with narrow and rather indefinite, transverse, yellow bands that are more or less interrupted medially and on each side, and 5 with a median, relatively short maculation; head and thorax rather

coarsely rugoso-punctate, punctures closely crowded if individually distinct, face below antennae becoming minutely and very closely and obscurely punctate, especially on clypeus; discs of abdominal terga very finely and closely punctate basally, the broad, apical areas largely impunctate, more or less yellowish-hyaline; pygidial plate slightly narrowed apically, rather broadly subtruncate, apical emargination very shallow, if evident, lateral margins carinate, surface closely and shallowly punctate; sternum 8 and genital armature much as in *maculata* (fig. 98); pubescence very short, rather inconspicuous, entirely pale, hardly evident on the more basal segments of the abdomen.

DISTRIBUTION—Minnesota to Maine, south to Georgia, March to July.

FLOWER RECORDS — *Brassica*, *Fragaria*, *Geranium*, *Ilex*, *Prunus*, *Pyracantha*, *Pyrus* and *Rubus*.

Nomada (Gnathias) hydrophylli
Swenk

Nomada (Gnathias) hydrophylli Swenk, 1915.
Nebr. Univ., Studies 15, p. 25. ♂.

Gnathias xanthoparius Robertson MS, 1928.
Nom. nud. Flowers and Insects, Carlinville, Ill., pp. 9, 101, 111, 152. ♂.

MALE—Length 6.5-9.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks subequal to eyes in width; basal segment of flagellum much shorter than segment 2, median segments slightly longer than broad, pedicel enclosed in the deeply excavated apex of the scape, the latter considerably swollen; mandible with a distinct, inner, subapical tooth; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd subequal in width anteriorly, veins testaceous, basal vein much basad of transverse median; tegulae finely, rather closely and obscurely punctate; posterior margin of scutellum quite deeply grooved; front coxae simple; hind femora unmodified; median area of face and most of cheeks black, the clypeus, labrum, mandibles except tips, and lower angle of cheeks back of eyes, yellow, with yellow lateral facial maculae which extend narrowly up inner margin of eye to level of antennae; upper portion of face adjacent to eyes more ferruginous, this extending narrowly back of ocelli across vertex; scape and flagella more yellowish-testaceous, somewhat darker above; mesopleura with a large, lateral, testaceous maculation which encloses a bright yellow anterior spot; scutum with a rather broad, median, black band, ferruginous on each side,

scutellum, metanotum and two parallel areas on propodeum, ferruginous; propodeum black medially and on each side, metapleura, mid coxae and venter of thorax black in large part; pronotum, tubercles and tegulae more yellowish-testaceous, legs largely testaceous apically, but mid and hind femora more or less darkened, spurs pale yellow; abdominal terga dull red in large part, basal tergum piceous across basal half, terga 2 and 3 with broad, extensive, bright yellow maculae laterally which are rather widely separated medially, following terga usually not maculated; punctures coarse, deep and contiguous over most of head and thorax, becoming somewhat finer but very close on cheeks below, and fine and close on lower half of face, minute and obscure but very close on clypeus; punctures of abdominal terga minute, quite close over basal areas, becoming somewhat more minute and indefinite toward the narrowly impunctate apical margins, these becoming somewhat yellowish-hyaline; pygidial plate rather strongly narrowed apically, apex quite deeply emarginate, lateral margins carinate, surface very finely and closely punctate; sternum 8 and genital armature much as in *maculata* (fig. 98); pubescence entirely pale, short and thin, but rather copious, over head and thorax, hardly evident on abdomen basally but becoming copious on the more apical segments.

DISTRIBUTION—North Dakota, Illinois and Maryland, May and June.

FLOWER RECORDS—The type series was collected on *Hydrophyllum*, *Viola* and *Zizia*. Robertson (1929) records this species (as *xanthoparius* MS) also on *Arabis* and *Polemonium*.

Nomada (Gnathias) louisianae
Cockerell

Nomada (Gnathias) louisianae Cockerell, 1903.
Acad. Nat. Sci. Phila. Proc. 55, p. 602. ♀.

FEMALE—Length 5-6.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks considerably narrower than eyes; longer side of basal segment of flagellum about equal to segment 2, the more median segments little if any longer than broad; mandible with a distinct, inner, subapical tooth; wings hyaline basally, becoming lightly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd about equal on anterior margin, veins testaceous to piceous, basal vein much basad of transverse median; tegulae very finely, closely punctate throughout; posterior margin of scutellum very slightly impressed medially; front coxae simple; hind tibiae with

a pair of elongate, rather robust, apical, seta-like hairs; head and thorax chiefly red, with a very small, black area between antennae and between the ocelli, pronotum with a limited black area on each side anterior to tubercles; scutum with a median, conspicuous, black line that reaches nearly to posterior margin, posterior face of propodeum with a narrower median, black line, mid coxae and adjacent area of metapleura black above, and some black areas immediately back of wings bases; lower part of face becoming somewhat paler yellowish, the antennae, tubercles and tegulae largely testaceous; legs testaceous in part, spurs pale yellow; abdomen largely red, with only very obscure, widely separated, small, yellow maculations on 2 and 3; head and thorax quite coarsely rugoso-punctate in general, punctures becoming much finer and quite densely crowded below antennae and on clypeus, relatively coarse on cheeks below, discs of abdominal terga minutely and quite closely punctate basally, becoming impunctate on the broad, rather shallowly impressed, apical margins, these becoming more yellowish-hyaline; pseudopygidium very short, transverse, forming the rather short, truncate, apical margin of tergum 5; pubescence short and inconspicuous, entirely pale, somewhat more copious on face and cheeks below, on pleura and on propodeum.

MALE—Length 6-6.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks considerably narrower than eyes; longer side of basal segment of flagellum fully equal to segment 2 in length, median segments about as broad as long, pedicel largely hidden in the deeply excavated apex of the scape which is somewhat swollen; mandible with a distinct, inner, subapical tooth; wings subhyaline, faintly clouded along apical margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd nearly equal on anterior margin, veins testaceous, basal vein much basad of transverse median; tegulae shining, punctures minute and rather sparse and irregular; posterior margin of scutellum only faintly impressed medially, if at all; front coxae simple; hind femora unmodified; head and thorax chiefly black, clypeus, labrum, mandibles except tips, scape anteriorly, and lateral facial maculae extending narrowly up margin of eye to level of antennae, bright yellow; tubercles, tegulae, and a small anterior spot on mesopleura, yellowish, the legs largely testaceous, spurs pale yellow; propodeum and metanotum ferruginous; abdominal terga reddish in large part, basal tergum piceous over basal half, following terga with lateral, more or less transverse, yellow maculations which nearly meet medially on 2 and 3, rather widely separated on 4, becoming

narrower and less evident on 5 and 6; head and thorax in large part densely and rather coarsely rugoso-punctate, punctures becoming very fine and close on clypeus, very sparse on maculated areas at each side; discs of abdominal terga with minute and quite close punctures, apical impressed areas becoming more sparsely and minutely punctate to the impunctate rims, these largely yellowish-hyaline; pygidial plate rather strongly narrowed apically, tip rather narrowly and deeply emarginate, margins carinate, surface very finely and obscurely rugose; sternum 8 and genital armature much as in *maculata* (fig. 98); pubescence entirely pale, short, thin and rather inconspicuous, but somewhat more copious on face and cheeks below, on pleura, and on propodeum.

DISTRIBUTION—Nebraska and Minnesota to New York and South Carolina, April and May.

The male of *louisianae* has not been recognized before. Its recognition and description here is based on a series of 5 males and one female bearing the same data—from Afton, Minnesota (Don Murray). The female has been compared with the holotype and appears to be identical.

***Nomada (Gnathias) maculata* Cresson**
(Figs. 98 & 100)

Nomada maculata Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 303. ♀ ♂.?

Nomada volatilis Smith, 1879. Descrip. New Species Hym. Brit. Mus., p. 100. ♂.

FEMALE—Length 8.5-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes; longer side of basal segment of flagellum subequal to segment 2, median segments considerably longer than broad; mandible with a distinct, inner, subapical tooth; wings subhyaline, narrowly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, the 2nd very broad anteriorly, 3rd narrowed nearly to a point, veins piceous, basal vein much basad of transverse median; tegulae shining between rather coarse, close, deep and distinct punctures, these becoming more sparse toward outer and posterior margins; posterior margin of scutellum shallowly impressed medially; front coxae simple; hind femora unmodified, their tibiae with a pair of robust, rather elongate, piceous, apical setae; head and thorax red in large part, with a small amount of black on cheeks posteriorly, metapleural sutures, mid coxae, and a narrow, median, black line on scutum; antennal flagellum more brownish, tegulae

more testaceous; abdominal terga red, depressed apical margins becoming more yellowish-hyaline toward rims, terga 1 and 2 with widely separated, lateral, yellow maculations, 3 with a median, yellow, transverse band which is interrupted medially and to some degree on each side; tergum 5 with a pair of large, submedian, yellow maculae which are nearly continuous medially; upper part of face and dorsum of thorax with coarse, deep, distinct and close punctures, these crowded in large part but distinct, becoming somewhat finer and closer on cheeks below, very fine, close and rather indefinite on clypeus, but quite coarse and well separated on each side below antennae; mesopleura somewhat more finely rugose; discs of abdominal terga finely, closely and quite distinctly punctate, punctures becoming minute and indefinite toward apical margin of each plate; pseudopygidium very narrow, transverse, covered with silvery tomentum, and forming the truncate, apical margin of tergum 5; pubescence entirely pale, very short and inconspicuous in general, but rather dense on mesopleura, on front and hind coxae, and on posterior face of propodeum, but triangle bare.

MALE—Length 8.5-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks subequal to eyes in width; longer side of basal segment of flagellum slightly shorter than segment 2, median segments considerably longer than broad, pedicel partially enclosed in the deeply concave apex of scape; mandibles with a distinct, inner, subapical tooth; wings subhyaline, rather narrowly and lightly infuscated along apical margin and in region of marginal cell, with the usual three submarginal cells, 2nd very broad anteriorly, 3rd narrowly constricted, veins piceous, basal vein much basad of transverse median; tegulae shining between rather close, deep and distinct punctures; posterior margin of scutellum only very shallowly impressed medially, front coxae simple; hind femora unmodified; hind tibiae with two or three slender, rather elongate, spine-like, apical setae; head in large part black, the clypeus, labrum, mandibles except apex, scape anteriorly, a pair of lateral facial maculae that extend narrowly up margin of eye about to level of antennae, and a pair of small yellow maculations above, bright yellow (fig. 100); thorax black, scutum with more or less extensive ferruginous infusions, scutellum and metanotum entirely ferruginous, margin of pronotum yellow, tubercles becoming more testaceous, and tegulae testaceous, legs testaceous to ferruginous, spurs pale yellow; abdominal terga largely red, with transverse, yellow bands, basal tergum black at extreme base, with a pair of rather small, median, interrupted

transverse bands, tergum 2 largely yellow across basal part of disc, the shallowly impressed apical area red; tergum 3 quite similar to 2, 4 and 5 with narrower, transverse, yellow bands which are subinterrupted medially, impressed apical areas becoming somewhat more yellowish; tergum 6 with a subapical, more median, yellow area, blackish at base; head and thorax in general very coarsely and closely punctate, punctures of face above and vertex quite distinct, becoming minute and close on clypeus, and becoming densely crowded but quite coarse on cheeks below; punctures densely crowded over most of thorax; abdominal terga finely, closely and rather shallowly punctate basally, impressed apical margins becoming very minutely and obscurely punctate; pygidial plate (fig. 98) rather strongly narrowed apically, with a deep, apical, rounded emargination, lateral margin strongly carinate, surface quite closely and very finely punctate; pubescence entirely pale, quite short, more or less erect, rather copious over most of head and thorax, very short on abdomen basally, becoming somewhat more elongate and conspicuous apically; sternum 8

with a slender apical projection which is slightly down-curved at apex, conspicuously fringed on each side; gonostyli of genital armature (fig. 98) robust, nearly equal to gonocoxites in length, densely clothed with fine, elongate hairs, and with a basal protuberance beneath which bears a tuft of elongate hairs.

DISTRIBUTION—Minnesota to Maine, south to Virginia, March to June.

Nomada (Gnathias) ovata (Robertson)

Gnathias ovatus Robertson, 1903 (June).
Canad. Ent. 35, p. 175. ♀ ♂.

Gnathias ovatus form *plenus* Robertson, 1903.
Canad. Ent. 35, p. 175. ♀.

Gnathias ovatus form *octomaculatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias ovatus form *sexmaculatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias ovatus form *quadrinaculatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias ovatus form *binotatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias ovatus form *unicolor* Robertson, 1903.
Canad. Ent. 35, p. 175. ♀.

Nomada (Gnathias) carolinæ Cockerell, 1903.
(Aug.) Acad. Nat. Sci. Phil. Proc. 55, p. 602. ♀. New synonymy

Gnathias ovatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

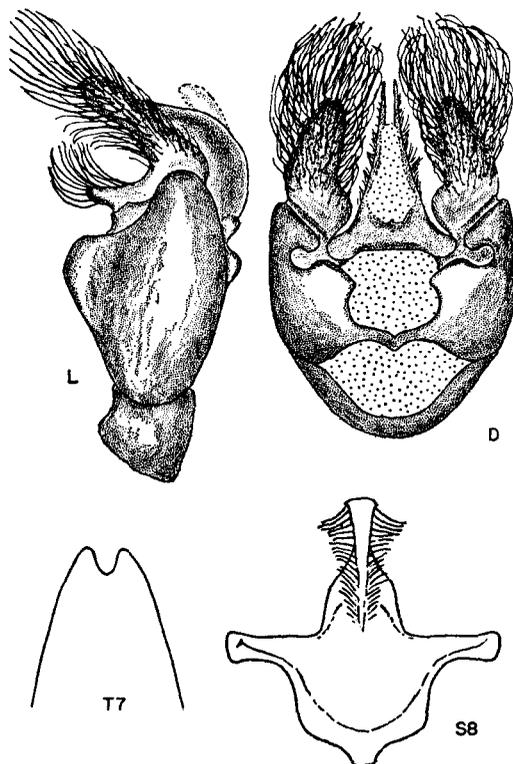


Figure 98

Tergum 7, sternum 8, and dorsal and lateral views of genital armature in male of *Nomada maculata*.

FEMALE—Length 6.5-10 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks much narrower than eyes; longer side of basal segment of flagellum considerably shorter than segment 2, median segments slightly longer than broad; mandible with a distinct, subapical, inner tooth; wings subhyaline, rather deeply infuscated along the narrow apical margin and in marginal cell, with the usual three submarginal cells, 2nd quite broad anteriorly, 3rd much more restricted, veins piceous, basal vein much basad of transverse median; tegulae somewhat shining between deep, distinct, uniformly close punctures; posterior margin of scutellum slightly impressed medially; front coxae simple; hind tibiae with two or three elongate, rather robust, seta-like, apical hairs; head and thorax chiefly red, with some black between and above antennae, in ocellar triangle and along posterior margin of cheeks, narrowly yellow along margin of eyes below antennae; pronotum black in part on each side anterior to tubercles, metapleura largely black, scutum with a median black line, and posterior face of propodeum narrowly black medially;

tubercles, tegulae, and legs in part, testaceous, spurs pale yellow; abdominal terga largely ferruginous, terga 2 and 3 with rather small, and widely separated, bright yellow maculae; apical margins of all terga becoming more or less yellowish-hyaline toward rims; pseudo-pygidium transverse and very short, forming the rather short, truncate, apical margin of tergum 5; pubescence short, thin, suberect, rather copious over most of head and thorax, very thin and sparse, hardly evident on abdomen.

MALE—Length 7-9.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes; longer side of basal segment of flagellum about equal to segment 2 in length, median segments only about as long as broad, pedicel largely hidden in the deeply concave apex of the scape, the latter quite broad, diameter considerably greater than that of flagellum; mandible with a distinct, inner, subapical tooth; wings subhyaline, somewhat narrowly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd not much broader anteriorly than 3rd, veins piceous, basal vein much basad of the transverse median; tegulae shining, punctures very fine and close in large part; posterior margin of scutellum quite deeply grooved medially; front coxae simple; hind femora unmodified; head largely black, the clypeus, labrum, mandibles except tips, lateral facial maculations which extend narrowly up margin of eye to level of antennae, and narrow, posterior border of eye below, bright yellow; antennal scape and flagellum more testaceous; upper surface of pronotum, tubercles and tegulae reddish-testaceous; scutum, scutellum and mesopleura red, scutum with a median black line, pleura with a small, anterior, yellow spot; propodeum and metapleura black; legs largely testaceous, mid and hind femora black in part, spurs pale yellow; propodeum and metapleura entirely black; abdominal terga ferruginous, 2 and 3 with lateral, more or less widely separated, yellow maculae, nearly contiguous in some specimens, and terga 1 and 4-6 sometimes maculated; head and thorax rather coarsely rugoso-punctate, especially on upper part of head and on dorsum of thorax, punctures minute, very close and obscure on clypeus; triangle of propodeum coarsely striate; abdominal terga shining, very finely and closely punctate on discs basally, punctures becoming more sparse, minute and obscure toward apical margins; pygidial plate narrowed apically, tip deeply incised or emarginate, lateral margins carinate, surface quite closely and finely punctate; sternum 8 and genital armature much as in *maculata* (fig. 98); pubescence entirely whitish, short and thin in general, but rather

copious on face and cheeks below and on mesopleura and propodeum, very thin, barely evident on abdominal terga, becoming somewhat more elongate apically.

DISTRIBUTION—Minnesota to Maine, south to South Carolina, March to July.

FLOWER RECORDS—*Ceanothus*, *Fragaria*, *Rubus*, *Salix* and *Toxicodendron*. Robertson (1929) records *ovata* on *Anemone*, *Antennaria*, *Arabis*, *Aruncus*, *Claytonia*, *Dentaria*, *Hydrophyllum*, *Lithospermum*, *Nothoscordum*, *Polemonium*, *Prunus*, *Ptelea*, *Ranunculus*, *Ribes*, *Stellaria*, *Taenidia*, *Viburnum*, *Zanthoxylum* and *Zizia*.

Nomada (Gnathias) perplexa Cresson

Nomada perplexa Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 306. ♀ ♂.

Nomada (Gnathias) perplexa Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 600. ♀ ♂.

Nomada lehighensis Cockerell, 1903. Op. cit., p. 605. (♂ only)

Nomada (Gnathias) cornelliana Cockerell, 1908. Ent. Soc. Wash. Proc. 10, p. 84. ♂. New synonymy.

FEMALE—Length 6-8 mm.; lateral ocelli nearer margin of vertex than to each other; cheeks subequal to eyes in width; longer side of basal segment of flagellum slightly shorter than segment 2, median segments considerably longer than broad; mandibles with a distinct, inner, subapical tooth; wings lightly infuscated, more deeply so along the narrow apical margin, with the usual three submarginal cells, basal vein much basad of transverse median vein, the veins piceous; tegulae shining between quite deep and distinct, well separated punctures, these becoming quite close anteriorly; posterior margin of scutellum deeply depressed medially; front coxae simple; hind tibiae with 3 or 4 long, robust setae apically; clypeus, labrum, mandibles, and a narrow line encircling eyes, ferruginous, head otherwise chiefly black, scape and basal segment of flagellum more ferruginous in front, the flagellum otherwise brownish-ferruginous beneath, blackish or piceous above; scutellum and metanotum chiefly ferruginous, scutum largely black, with ferruginous infusions, and pleura to some degree ferruginous medially; margin of pronotum, tubercles, tegulae, and legs in large part, testaceous, the femora more or less blackened toward base, spurs pale yellow; metapleura and propodeum entirely black; abdominal terga largely red, becoming piceous at extreme base and somewhat yellowish-hyaline on apical margins of the more apical terga; terga 2 and 3 with lateral, wide-

ly separated, yellow maculations; head and thorax very coarsely, deeply and closely punctate, becoming somewhat finer below antennae, very fine and indefinite on clypeus; abdominal terga largely smooth and shining, punctures very obscure except over basal area of disc on tergum 2 where punctures are distinct but fine and slightly separated, interspaces somewhat exceeding diameter of punctures; pseudopygidium transverse, pale in color, forming the narrow, apical margin of tergum 5; pubescence short, thin and inconspicuous, entirely pale over head and thorax, and pale also on abdomen where evident.

MALE—Length 6-9 mm.; lateral ocelli nearer margin of vertex than to each other; cheeks subequal to eyes in width; longer side of basal segment of flagellum slightly shorter than segment 2, median segments only slightly longer than broad, pedicel largely hidden in the deeply excavated apex of the scape; mandible with a distinct, inner, subapical tooth; wings subhyaline or faintly infuscated, rather deeply so along the narrow apical margin, with the usual three submarginal cells, veins brownish, basal vein much basad of transverse median vein; tegulae shining between deep, distinct, slightly separated and rather coarse punctures; posterior margin of scutellum quite deeply depressed medially; front coxae entirely simple; hind femora simple, hind tibiae with two or three elongate setae apically; head and thorax black in general, the clypeus, labrum, mandibles basally, and narrow area between clypeus laterally and lower end of eye, bright yellow; antennae brownish-ferruginous; scutellum and a small anterior maculation on pleura, ferruginous; margin of pronotum, tubercles, tegulae, and legs in large part, somewhat reddish-testaceous, spurs yellow; abdomen chiefly ferruginous, the extreme base blackish, apical margins of the terga more or less yellowish-hyaline, terga 2 and 3 with lateral, widely separated, bright yellow maculations; head and thorax in general coarsely rugoso-punctate, punctures becoming finer below antennae, very minute and obscure on clypeus; abdominal terga shining, punctures very fine but evident on discs, separated by slightly more than their diameter, the depressed apical margins shining and impunctate; pygidial plate carinate laterally, slightly narrowed toward the deeply incised apex, surface finely and rather closely punctate; sternum 8 and genital armature much as in *maculata* (fig. 98).

DISTRIBUTION—Minnesota to Massachusetts, south to Tennessee and North Carolina, April to July.

FLOWER RECORDS — *Ceanothus*, *Chrysanthemum* and *Salix*.

Nomada (Gnathias) subnigrocincta Swenk

Nomada (Nomada) subnigrocincta Swenk, 1915. Nebr. Univ. Studies 15, p. 155. ♀. (♂ misident.)

FEMALE—Length 7 mm.; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; cheeks about equal to eyes in width, posterior margin obscurely carinate; longer side of basal segment of flagellum equal to segment 2, median segments considerably longer than broad; mandibles with a distinct, inner, subapical tooth; wings hyaline basally becoming faintly brownish apically, a hyaline area just beyond the discoidal and submarginal cells, veins and stigma brownish-testaceous, with the usual three submarginal cells, 2nd considerably broader than 3rd anteriorly, basal vein much basad of transverse median; tegulae testaceous, smooth and shining, with very minute and rather close punctures which become very sparse along outer margin; scutellum with a very faint, median impression or groove; anterior coxae not spined; apex of hind tibiae with 4 or 5 elongate, seta-like hairs; head testaceous in large part, antennal scape, clypeus, labrum and mandibles somewhat more yellowish, supraclypeal area, surface above antennae, around ocelli and posterior half of cheeks, black, antennal flagellum, more brownish-testaceous; scutum, scutellum and mesopleura reddish-testaceous, scutum with a median black line which broadens posteriorly toward scutellum, mesopleura with a large blackened area beneath, metapleura and adjacent lateral faces of propodeum blackish, propodeum posteriorly more testaceous; legs largely testaceous, spurs pale yellow; abdominal terga yellowish-red medially, darker apically, 2 and 3 with obscure, lateral, yellow maculations which are broadly separated and rather indefinite; sterna yellowish-testaceous, margins somewhat darker; head coarsely and closely punctate above and on cheeks, somewhat more finely so on lower part of face and clypeus; scutum, scutellum and mesopleura very coarsely rugoso-punctate, propodeum much more finely so, but triangle impunctate below, becoming rather broadly striate toward upper margin; punctures of abdominal terga very minute and close, barely visible; pseudopygidium transverse and very narrow, of the usual form; pubescence very short and thin, somewhat more copious on head and on thorax laterally and posteriorly, very thin but evident on dorsum of thorax, very short and obscure, barely evident on abdomen basally, the more apical terga with some thin, more elongate, pale hairs.

DISTRIBUTION — The type specimen was collected in New Jersey, in May.

This description and the modification of the classification of this species is based on the holotype. Two additional specimens have been found, one from Massachusetts and the other from North Carolina, which are quite similar to the holotype, but their true identity is uncertain. The male appears to be the same as *ulsterensis* (p. 000) and is not in *Gnathias*.

Nomada (Micronomada) fervida
Smith

(Fig. 99)

Nomada fervida Smith, 1854. Cat. Hym. Brit. Mus., 2, p. 247. ♀.

Nomada (Micronomada) crassula Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 610.

FEMALE—Length 10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks narrow, less than half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments about as broad as long; mandibles slender and simple; wings quite deeply infuscated, with the usual three submarginal cells, the 2nd very broad anteriorly, 3rd much narrowed, veins piceous, basal vein interstitial with transverse median; tegulae shining, with only a few scattered, very sparse punctures; posterior margin of scutellum quite deeply depressed medially, front coxae with elongate spines, these often obscured by pubescence; apex of hind tibiae with a dense transverse patch of extremely short, dark setae, without elongate hairs or setae; labrum, mandibles, scape and pedicel yellowish-ferruginous, the clypeus yellowish or black, face with extensive, lateral, yellow maculae reaching from lateral margins of clypeus nearly to top of eye, cheeks narrowly ferruginous along margin of eye, head otherwise black, the antennal flagellum brownish-piceous; pronotal collar, tubercles, tegulae, scutellum laterally, metanotum and a posterior spot on mesopleura, bright yellow; scutellum ferruginous medially and narrowly across anterior margin, legs ferruginous basally, becoming somewhat more testaceous on apical tarsal segments, spurs pale yellow; basal abdominal tergum with a very narrow, transverse, subapical, yellow band; tergum 2 with a similar yellow band which is quite broad laterally, somewhat narrowed medially; transverse band of tergum 3 interrupted medially and at each side, resulting in four transverse spots which may be much reduced or lacking in some specimens; tergum 4 with a transverse band which is interrupted on each

extreme side; and tergum 5 with a pair of more or less separated yellow spots on each side of mid-line; abdominal sterna entirely black; punctures of head and thorax very coarse and deep in general, close between antennae and ocelli, somewhat more sparse on maculated areas at sides of face, deep and close on supraclypeal area, and somewhat finer but distinct and slightly separated on clypeus, fine but deep and distinct on vertex and cheeks; scutum very coarsely rugoso-punctate, but with a very few narrow, shining, interspaces evident, somewhat finer and distinct on scutellum, well separated on pleura below, becoming very close above; propodeum dull, very finely and closely punctate laterally, somewhat more coarsely so on posterior face, triangle smooth but rather dull; abdominal tergum 1 shining, punctures extremely minute across base, but with some more definite and distinct punctures between the transverse yellow band and apical margin, these becoming more minute toward the rim; discs of terga 2-4 with deep, distinct, close and uniform punctures, apical rims narrowly impunctate; punctures of tergum 5 deep and distinct but much more widely separated; pseudopygidium transverse, forming the truncate apical rim of tergum 5, densely covered with very short, subappressed, yellowish setae; pubescence extremely short, thin, sparse and obscure throughout, entirely whitish.

MALE—Length 10 mm.; lateral ocelli slightly nearer to each other than to margin of vertex; cheeks narrow, about half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments very short, slightly broader than long; mandibles slender and simple; wings quite deeply infuscated, with the usual three submarginal cells, the 2nd very broad anteriorly, 3rd strongly narrowed, veins piceous, stigma more yellowish, basal vein interstitial with transverse median; tegulae shining, with only a few scattered, very sparse punctures; posterior margin of scutellum quite deeply depressed medially; front coxae with slender, elongate spines that are usually obscured by pubescence; hind femora unmodified; lower half of face largely yellow, only the supraclypeal area black, this sometimes extending downward onto upper portion of clypeus, the lateral maculations extending more narrowly along margin nearly to top of eye, basal half of mandibles bright yellow, becoming darker at tip, labrum more yellowish-ferruginous, head otherwise black, but cheeks above with a small yellow spot; pronotal collar, tubercles, tegulae, scutellum on each side, metanotum, and a posterior spot on mesopleura, bright yellow; scutellum ferruginous medially and along anterior margin, legs more testaceous, spurs pale

yellowish; basal abdominal tergum with a narrow, entire, subapical yellow band; tergum 2 with a similar but very broad, entire band which is slightly narrowed medially; terga 3-5 with very narrow yellow bands which are more or less interrupted medially and at each side, resulting in four rather narrow, transverse, yellow maculations, 6 entirely black; abdominal sterna entirely black; punctures of head and thorax in general very coarse, deep and close, somewhat finer and more widely separated on face laterally and below, rather fine but distinct and slightly separated on clypeus, somewhat finer and close on vertex and cheeks; scutum more rugoso-punctate, punctures of scutellum somewhat more distinct, pleura below with some shining interspaces evident but becoming rather densely rugose above; propodeum dull, very finely and rather densely punctate laterally, punctures of posterior face somewhat coarser but very close, triangle smooth but rather dull and tessellate; basal abdominal tergum shining, almost impunctate, with only very fine but distinct punctures between transverse band and apical rim; discs of terga 2-5 deeply, distinctly, quite closely and rather coarsely punctate, with only the narrow apical rims becoming impunctate, these more or less yellowish-hyaline; punctures on tergum 6 somewhat coarser, deep, distinct and more widely separated but not sparse; pubescence extremely short and obscure, entirely white where visible; basal width of pygidial plate about equal to length, quite strongly narrowed apically and with a deep median apical incision, lateral margins carinate, surface rather smooth but with scattered, fine punctures; sternum 8 as in *modesta* (fig. 101); genital armature much as in *modesta* (fig. 101) but gonocoxites (fig. 99) with robust and rather elongate basal lobes.

DISTRIBUTION—Florida, Georgia and South Carolina, March to September.

FLOWER RECORDS—*Bidens*, *Ceanothus*, *Melilotus* and *Polygonum*.

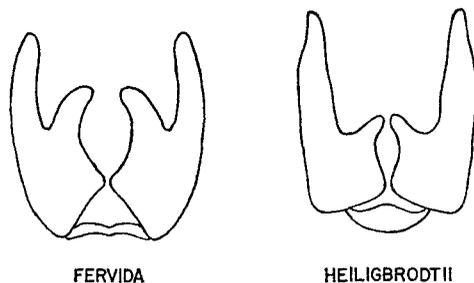


Figure 99

Gonocoxites of genital armature in males of *Nomada fervida* and *N. heiligbrodtii*.

Nomada (Micronomada) heiligbrodtii
Cresson
(Fig. 99)

Nomada heiligbrodtii Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 75. ♀.

Nomada (Micronomada) tiftonensis Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 610. ♂. New synonymy.

Nomada (Micronomada) modesta rivertonensis Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 22, p. 610. ♀. New synonymy.

Nomada heiligbrodtii Cockerell, 1919. U. S. Natl. Mus. Proc. 55, p. 180. ♂.

FEMALE—Length 7-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks very narrow, less than half width of eye; shorter side of basal segment of flagellum fully equal to segment 2, median segments about as broad as long; mandibles simple; wings rather deeply infuscated, with the usual three submarginal cells, 2nd very broad anteriorly, 3rd somewhat narrowed anteriorly, veins piceous, stigma somewhat more ferruginous, basal vein interstitial with transverse median vein; tegulae shining, with only a small area on inner margin with fine and rather obscure punctures; posterior margin of scutellum with a very narrow, slight, median depression; front coxal spines rather short but slender and distinct, usually obscured by pubescence; apex of hind tibiae with a row of five or six, rather short but well developed, yellowish setae; face including clypeus black except for a pair of extensive, lateral, yellow maculations reaching from upper half of clypeus to slightly above level of antennae; mandibles yellow basally and a small yellow spot behind each eye above, labrum dull testaceous, antennal scape more ferruginous, flagellum brownish below, more piceous above; pronotal collar, tubercles, tegulae, scutellum except mid-line and anterior margin, metanotum, and a large, transverse, yellow maculation on mesopleura, bright yellow; legs reddish-testaceous basally, with yellow basal and apical areas on tibiae, these more or less connected; abdominal terga 1-5 with transverse, subapical, yellow bands, these somewhat narrowed medially, or narrowly interrupted on 3, more extensive on 2, sterna entirely black; punctures coarse, close and deep below ocelli, becoming rather sparse below antennae, very fine, irregular and sparse on the shining clypeus, somewhat finer but deep, distinct and rather close on cheeks, well separated between eyes and ocelli above, quite close and finer across vertex; scutum coarsely rugoso-punctate, punctures somewhat more distinct near center posteriorly, punctures of scutellum equally coarse and deep but quite

distinct, those on pleura below rather well separated, becoming densely crowded above maculation and below wing bases; propodeum dull, finely and rather closely and irregularly punctate laterally, posterior face somewhat more coarsely, deeply and irregularly punctate, triangle impunctate, rather smooth but dull; punctures of basal abdominal tergum extremely minute basally, becoming more distinct between maculation and apical rim, 2-5 with close, deep, distinct and rather fine punctures, uniformly distributed in general, becoming more minute to the narrowly impunctate, apical rims; pseudopygidium transverse, forming a rather short, truncate, apical margin of tergum 5, densely covered with pale yellowish, suberect hairs; pubescence extremely sparse, short and thin, hardly evident, entirely pale where visible.

MALE—Length 7-9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks about half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments slightly broader than long; mandibles slender and simple; wings rather deeply infuscated, with the usual three submarginal cells, veins testaceous to piceous, stigma somewhat more ferruginous, second submarginal cell quite broad anteriorly, anterior width of 3rd about half that of 2nd, transverse median vein slightly basad of basal vein; tegulae shining, with only a very few sparse, obscure punctures; posterior margin of scutellum very slightly impressed medially; front coxal spines well developed but largely obscured by pubescence; hind femora unmodified; lower half of face, including labrum and mandibles, entirely yellow, reaching narrowly nearly to top of eye on each side, cheek with a small yellow spot near top of eye, and antennal scape yellow anteriorly; flagellum brownish-testaceous beneath, considerably darker above; pronotal collar, tubercles, tegulae, scutellum except mid-line, median part of metanotum and a broad, extensive, transverse yellow maculation on pleura, bright yellow; legs more testaceous basally, more or less infused with black on hind femora, tibiae more or less yellow at base and apex, these maculae usually connected, and tarsi and spurs yellow; abdominal terga 1-5 with transverse, subapical, yellow bands, this rather narrow on 1, very broad and expansive on 2, interrupted on 3, tergum 6 with a more obscure, subapical band which is interrupted medially; sternal plates entirely black; punctures of face deep and distinct, rather coarse, somewhat separated between antennae and ocelli, becoming rather sparse between ocelli and eyes, and quite sparse on lower half of face, much finer and quite close on cheeks and vertex; scutum very coarsely rugoso-punctate,

punctures becoming more distinct and slightly separated on scutellum, slightly separated but very coarse and deep on pleura below, becoming somewhat closer but still distinct above; propodeum rather dull, punctures fine, shallow and irregular on lateral faces, scattered and irregular on posterior face, triangle impunctate, rather smooth but dull; basal abdominal tergum shining, the more basal punctures minute and obscure, becoming more distinct but still very fine on the maculated band and area between this and the rim; discs of terga 2-6 with fine, close, deep and distinct punctures, these reaching nearly to the very narrow, impunctate, apical rims, punctures somewhat more coarse and distinct on the more apical terga; pubescence very short, thin and obscure, entirely pale where evident; basal width of pygidial plate somewhat less than median length, slightly narrowed apically, with a rather shallow, triangular, median emargination, carinate laterally, surface very finely and shallowly punctate; sternum 8 as in *modesta* (fig. 101); genital armature much as in *modesta* (fig. 101) but gonocoxites (fig. 99) with short and rather slender basal lobes, and the gonostyli very short.

DISTRIBUTION—Michigan to the New England states, south to Florida, June to October, with early records during April and May in Florida.

FLOWER RECORDS—*Bidens*, *Chrysopsis*, *Haplopappus*, and *Solidago*.

Nomada (Micronomada) modesta Cresson

(Figs. 100 & 101)

Nomada modesta Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 286. ♀ ♂.

Nomada (Micronomada) modesta var. *vegana* Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 5, p. 610. ♀.

Nomada (Micronomada) vegana var. *nitescens* Cockerell, 1905. Colo. Agr. Expt. Sta. Bul. 94, p. 76. ♀.

FEMALE—Length 8.5-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks about half width of eyes; shorter side of segment 1 of flagellum fully equal to segment 2, median segments about as long as broad; mandibles slender and simple; wings rather deeply infuscated, with the usual three submarginal cells, 2nd submarginal very broad anteriorly, 3rd strongly narrowed, veins piceous, stigma more testaceous, basal vein interstitial with transverse median vein; tegulae shining between numerous, rather fine and well separated punctures; posterior mar-

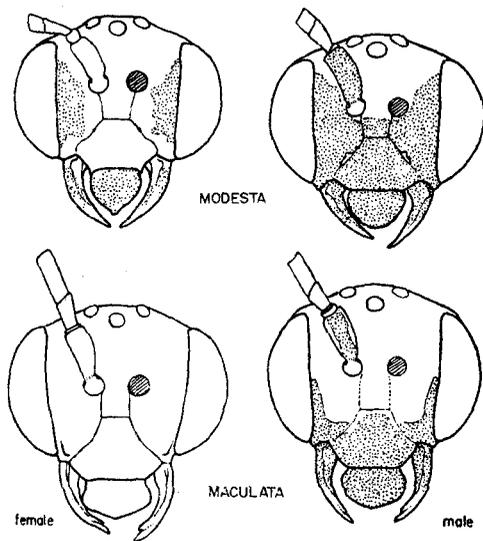


Figure 100
Facial views of head of males and females of
Nomada maculata and *N. modesta*.

gin of scutellum shallowly depressed medially; front coxal spines well developed, somewhat obscured by pubescence; apex of hind tibiae very densely fringed with short, silvery tomentum, without elongate hairs or setae; face black except for a pair of extensive, lateral, triangular yellow maculations, reaching from slightly below upper margin of clypeus, terminating narrowly on eye margin considerably above antennae (fig. 100); scape of antennae yellow anteriorly, labrum somewhat reddened, and mandibles basally more or less reddish-testaceous, a very small yellow maculation behind each eye above; pronotal collar, tubercles, tegulae, two large lateral maculations on scutellum, median portion of metanotum, a pair of rather small maculations on pleura which are more or less connected, and a spot on each side of posterior face of propodeum, bright yellow; scutellum black medially and along basal margin; abdominal terga 1-5 with transverse, subapical, yellow bands which are more or less strongly constricted medially, more or less interrupted on 3-5, much broadened at each side; abdominal sternae entirely black; punctures coarse, deep and close on face above and vertex, becoming somewhat finer but close on cheeks below, finer and quite sparse on lateral areas of face below, somewhat closer on supraclypeal area, finer and irregular on shining clypeus; scutum quite coarsely and closely rugoso-punctate, punctures somewhat more distinct across median area of disc, finer and densely crowded on black areas of scutellum, more coarse and distinct on each side, coarse and deep but slightly

separated on pleura below, becoming quite densely crowded above; lateral faces of propodeum rather dull, shallowly and rather finely and irregularly punctate, posterior face quite closely and shallowly punctate, triangle entirely impunctate, rather smooth but quite densely tessellate; basal abdominal tergum shining, minutely but quite closely punctate toward base, punctures toward apical margin deeper, more distinct and quite close; discs of terga 2-5 deeply, distinctly, rather finely and closely punctate, punctures becoming somewhat more sparse and minute toward the narrowly impunctate apical rims; pseudopygidium transverse, forming the truncate apical margin of tergum 5, rather extensive, deeply covered with pale yellowish tomentum; pubescence extremely short, thin and obscure, hardly evident, entirely pale where visible.

MALE—Length 7.5-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly more than half width of eyes; shorter side of segment 1 of flagellum slightly longer than segment 2, median segments considerably broader than long; mandibles slender and simple; wings rather lightly infuscated basally, becoming quite deeply so apically, with the usual three submarginal cells, 2nd very broad anteriorly, 3rd much narrowed, veins testaceous to piceous, stigma more testaceous, basal vein interstitial with transverse median; tegulae shining, with only a very few, minute, scattered punctures; posterior margin of scutellum quite deeply impressed medially; front coxal spines elongate and slender, somewhat obscured by pubescence; hind femora unmodified; face, including labrum and mandibles except tips, almost entirely yellow below level of antennae, only upper half of supraclypeal area black, and with some black in lateral clypeal sutures, the yellow face marks ending triangularly on eye margin near top of eyes (fig. 100); scape of antennae bright yellow anteriorly, and cheek narrowly yellow on posterior margin of eye above; pronotal collar, tubercles, tegulae, scutellum except in mid-line, adjacent area of metanotum, a maculation on each side of posterior face of propodeum, and a large transverse maculation on pleura, bright yellow; legs testaceous basally, tibiae yellow in part, and basitarsi bright yellow, the more apical tarsal segments more testaceous, spurs pale yellow; abdominal terga 1-6 with transverse, subapical, bright yellow bands which are more or less narrowed medially, sometimes narrowly interrupted, quite broad laterally; abdominal sternae entirely black; punctures coarse, deep, distinct and somewhat separated over most of face, somewhat more sparse on each side below antennae, somewhat finer and closer but still distinctly separated

on clypeus, much finer and quite close on cheeks; scutum coarsely rugoso-punctate, with only a few shining interspaces evident near central portion of disc, the maculated areas of scutellum coarsely and distinctly punctate, blackened mid-line and anterior margin densely and finely rugose; pleura with coarse, deep, distinct and slightly separated punctures in large part, these becoming considerably closer above adjacent to tubercles; lateral faces of propodeum rather dull, very finely, shallowly and rather irregularly punctate, punctures of posterior face somewhat deeper and more distinct but quite close, triangle impunctate but dull and tessellate; tergum 1 shining and very minutely punctate basally, punctures becoming more distinct in the yellow transverse band and beyond; terga 2-6 with deep, distinct, close and rather fine, uniformly distributed punctures, these becoming somewhat sparser and finer to the narrow impunctate rims; pubescence extremely short, thin and obscure, hardly evident in general, entirely pale where visible; pygidial plate somewhat broader at base than the median length, quite strongly narrowed apically, apex deeply incised, lateral margins carinate, surface rather dull, quite closely but shallowly punctate; sternum 8 with a median, apical projection which is slightly narrowed apically, setose toward the tip, the

apical setae elongate; gonocoxites of genital armature (fig. 101) not setose beneath, base with a broad, subtruncate lobe, gonostyli tufted apically.

DISTRIBUTION—New York to Alabama, June to September.

FLOWER RECORDS — *Cephalanthus*, *Cucurbita*, *Helenium*, *Rhus* and *Solidago*.

Nomada (Micronomada) texana
Cresson

Nomada texana Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 271. ♀ ♂.

Cephen texanus Robertson, 1903. Canad. Ent. 35, p. 176. ♀ ♂.

Cephen texanus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks very narrow, less than half width of eyes; shorter side of basal segment of flagellum fully as long as segment 2, median segments about as long as broad; mandibles slender and simple; wings subhyaline basally, becoming rather deeply infuscated at apex and in region of marginal cell, 2nd submarginal very broad anteriorly, 3rd much narrower, veins piceous, stigma more testaceous, basal vein interstitial with transverse median; tegulae shining between minute and quite sparse punctures; posterior margin of scutellum slightly grooved medially; front coxal spines slender and elongate, rather densely pubescent; apex of hind tibiae with a row of short, yellowish, apically dilated setae; head including clypeus, largely black, face with broad, extensive, yellow maculations filling space between antennae, supraclypeal area and eye, extending from clypeus nearly to top of eye, and a narrow yellow band bordering margin of eye on cheeks above; mandibles yellow at base, becoming more testaceous medially, fuscous at tip, labrum entirely testaceous; scape, pedicel and base of flagellum testaceous, the more apical flagellar segments more brownish; pronotal collar, tubercles, tegulae, scutellum in large part, adjacent median area of metanotum, and a rather broad, transverse stripe on pleura, bright yellow; scutellum with a black median line and anterior margin narrowly black; legs testaceous in large part, spurs pale yellow, and hind tibiae with a small yellow apical maculation; abdominal terga 1-5 with entire, transverse, subapical, yellow bands, those on 2 and 3 much narrowed medially but very broad laterally, band on 4 less restricted medially, and that on 5 quite deeply constricted; abdominal sterna 1 and 2 entirely

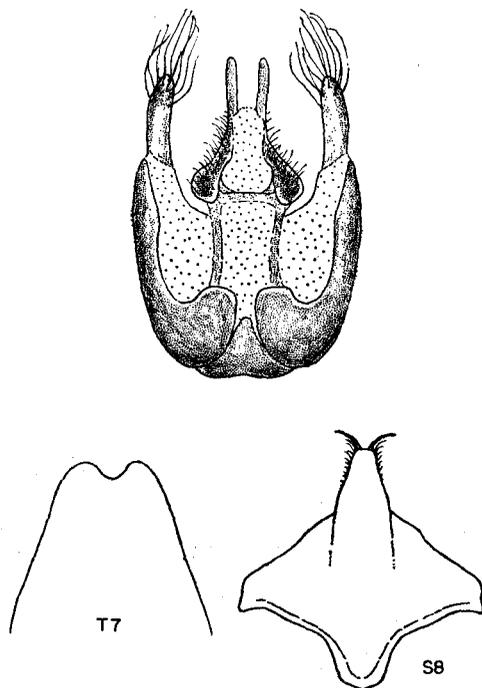


Figure 101
Tergum 7, sternum 8 and genital armature in male of *Nomada modesta*.

dark, 3 and 4 with conspicuous, transverse, yellow bands; punctures of face above coarse, close, deep and distinct, becoming more sparse laterally and below, quite close but somewhat finer on supraclypeal area, very irregular and scattered on the shining clypeus, rather fine and close on vertex and on cheeks above, becoming coarser and deeper on cheeks below; scutum and scutellum coarsely rugoso-punctate, punctures very coarse and slightly separated on pleura below, becoming somewhat finer and crowded above, finer but deep and distinct on metapleura; lateral faces of propodeum densely rugose in part, but with a shining, punctate space below, the punctures rather sparse, posterior face quite deeply, closely and distinctly punctate, triangle impunctate, somewhat shining; basal addominal tergum shining, punctures toward base exceedingly minute and rather close, becoming somewhat deeper, more distinct and more widely separated in the yellow band, minute and scattered toward the rim; terga 2-5 very uniformly, closely, deeply and finely punctate, punctures becoming somewhat finer toward the narrowly impunctate rims; pseudopygidium rather extensive, median length about half the breadth, narrowly truncate apically, covered with short, dense, yellowish tomentum; pubescence extremely short, thin and obscure, entirely pale where visible.

MALE—Length 7-10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks about half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments slightly broader than long; mandibles slender and simple; wings subhyaline at base, becoming quite deeply infuscated apically, with the usual three submarginal cells, 2nd broad anteriorly, 3rd quite strongly narrowed, veins piceous, stigma more testaceous, basal vein interstitial with transverse median; tegulae shining between minute, sparse punctures; posterior margin of scutellum slightly grooved medially; front coxal spines slender and elongate, rather densely pubescent; hind femora unmodified; lower half of face, including labrum and basal half of mandibles, largely yellow, upper half of supraclypeal area black, the lateral yellow maculae terminating acutely at upper end of eye, cheeks with a narrow yellow maculation bordering eye above; antennal scape bright yellow anteriorly, the flagellum brownish-testaceous below, becoming more piceous above; pronotal collar, tubercles, tegulae, scutellum except anterior margin and mid-line, adjacent median area of metanotum, and a transverse band on pleura bright yellow; legs largely testaceous, spurs pale yellow, mid and hind tibiae with yellow apical maculations, and hind basitarsi yellow in part;

punctures of face above coarse, deep and distinct, only slightly separated, becoming somewhat less coarse and more widely separated below, irregular and variable as to size on clypeus, somewhat finer and close on vertex and cheeks above, becoming slightly coarser below; scutum and scutellum quite coarsely rugoso-punctate, punctures of pleura below very coarse, deep and slightly separated, becoming quite densely crowded above; propodeum laterally dull, with variable, very fine and shallow punctures, posterior face with somewhat closer and deeper punctures, triangle entirely impunctate, somewhat shining; basal abdominal tergum shining, punctures minute and quite close toward base, becoming somewhat more coarse and sparse on the transverse yellow band; terga 2-6 with uniformly close, deep and rather coarse punctures throughout, these becoming somewhat finer toward the narrowly impunctate rims, these somewhat reddened on the more apical terga; pubescence very short, thin and obscure, entirely white where visible; basal width of pygidial plate about equal to median length, slightly narrowed apically, apex slightly incised or emarginate, margins carinate, surface minutely and closely punctate basally, punctures becoming obscure apically; sternum 8 as in *modesta* (fig. 101); gonocoxites of genital armature similar to those of *heiligbrodtii* (fig. 99), the gonostyli very short.

DISTRIBUTION—Michigan to Massachusetts, south to Texas and Alabama, July to September.

FLOWER RECORDS—*Helianthus*, *Mari-
laundium* and *Verbesina*. This species has been recorded by Robertson (1929) on *Cephalanthus*, *Eryngium*, *Pycnanthemum* and *Verbena*.

*Nomada (Micronomada)
wisconsinensis* Graenicher

Nomada wisconsinensis Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1, p. 239.

FEMALE—Length 7-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly less than half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments very slightly longer than broad; mandibles slender and simple; wings lightly infuscated, somewhat more deeply so apically, with the usual three submarginal cells, 2nd submarginal very broad anteriorly, anterior width of the 3rd about half that of 2nd, veins brownish-testaceous, stigma testaceous, basal vein interstitial with transverse median; tegulae shining between sparse and minute punctures;

posterior margin of scutellum quite deeply grooved medially; front coxal spines slender and elongate, quite densely pubescent; apex of hind tibiae densely covered by a transverse patch of very short, reddish setae; head largely black, clypeus somewhat tinged with testaceous, labrum quite strongly so, mandibles yellow at base, face with rather restricted, lateral, yellow maculae reaching from upper angle of clypeus nearly to top of eye, cheeks with a very faint yellowish spot near upper end of eye; scape, pedicel and base of flagellum yellowish-testaceous, flagellum more brownish below, piceous above; pronotal collar, tubercles, tegulae, scutellum in large part, adjacent median area of metanotum, and a posterior median spot on pleura, bright yellow; the depressed median line of scutellum dark reddish, anterior margin narrowly black; legs largely testaceous, spurs pale yellow, hind tibiae with a rather indefinite, apical, yellow maculation; abdominal terga 1-5 with transverse yellow bands, that on tergum 1 very narrow, broad laterally on 2 but quite strongly narrowed medially, narrow and widely interrupted medially on 3, entire on 4 and 5; abdominal sterna entirely black; punctures very coarse, deep and distinct over entire face, close above antennae and on supraclypeal area, somewhat more widely separated laterally, somewhat finer and slightly separated on clypeus, close and quite coarse over most of vertex and cheeks; scutum and scutellum coarsely rugoso-punctate, pleural punctures very coarse and deep, slightly separated below, becoming quite densely crowded and somewhat finer above; propodeum laterally dull, densely and very finely rugoso-punctate, almost tessellate; posterior face with quite coarse, deep, distinct and close punctures, triangle dull and impunctate; basal abdominal tergum shining, minutely and obscurely punctate toward base, punctures becoming more distinct and sparse just beyond the transverse band, but margin becoming impunctate; terga 2-5 quite uniformly closely, deeply, distinctly and rather coarsely punctate, rims becoming narrowly impunctate, these somewhat broader and more reddish on the more apical terga; pseudopygidium quite broad, transverse, median length about one third the breadth, densely covered with short, yellowish, subappressed hairs or tomentum; pubescence very fine, thin and obscure, entirely pale where at all visible.

MALE—Length 8-9.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks about half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments about as broad as long; mandibles slender and simple; wings subhyaline basally, becoming quite deeply infuscated apically, with the usual three

submarginal cells, anterior margin of 2nd about twice as broad as 3rd, veins testaceous to piceous, stigma testaceous, basal vein interstitial with transverse median; tegulae shining between quite sparse and minute punctures; posterior margin of scutellum quite deeply grooved medially; front coxal spines slender and elongate, densely pubescent; hind femora unmodified; lower part of face largely yellow, but supraclypeal area usually entirely black, and clypeal sutures lined with black, lateral maculations ending narrowly near top of eye, and cheeks with a narrow yellow maculation on eye margin above; mandibles yellow basally, labrum more testaceous, scape yellowish anteriorly, flagellum brownish-testaceous beneath, more piceous above; pronotal collar, tubercles, tegulae, scutellum in large part, adjacent median area of metanotum, a large posterior spot on pleura, and a smaller more anterior spot, bright yellow; scutellum reddened in the median groove, anterior margin black; legs largely testaceous, tibiae more or less yellowish apically, spurs pale yellow; abdominal terga 1-5 with entire, transverse, subapical, yellow bands, that on 1 very narrow, very broad on 2, but somewhat narrowed medially, strongly narrowed medially on 3 and 4, becoming broad laterally, and less narrowed on 5, tergum 6 with a pair of lateral, yellow maculations which are not connected; abdominal sterna entirely black; punctures of face coarse, deep and distinct, rather close in general, somewhat variable as to size on clypeus, deep, distinct and close over most of cheeks and vertex; scutum and scutellum very coarsely rugoso-punctate, the punctures on pleura below somewhat separated, very coarse and deep, becoming closely crowded and somewhat less coarse above; propodeum laterally dull, densely and very finely rugose, posterior face more distinctly but still very closely punctate, triangle impunctate, rather dull; basal abdominal terga shining, the more basal punctures very minute and indistinct, becoming somewhat more coarse, sparse and distinct in region of transverse yellow band, and narrowly impunctate along rim; terga 2-6 with quite uniformly deep, distinct, close and rather coarse punctures, rims becoming narrowly impunctate, these somewhat reddish on the more apical terga; pubescence extremely short, sparse and obscure, hardly evident, entirely whitish where visible; pygidial plate strongly narrowed apically, tip deeply emarginate, basal width about equal to median length, lateral margins distinctly carinate, surface rather dull, with numerous shallow and vague punctures basally, these becoming inevident apically; sternum 8 as in *modesta* (fig. 101); gonocoxites of genital armature similar to those in *heiligbrodtii* (fig. 99), the gonostyli very short.

DISTRIBUTION—Wisconsin and Michigan, June and July.

Nomada (Holonomada) affabilis
affabilis Cresson

(Fig. 102)

Nomada affabilis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 74. ♂.

Nomada affabilis Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 123. ♀ ♂.

Holonomada affabilis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9.5-12 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin not carinate; basal segment of flagellum fully equal to segment 2 in length, median segments considerably longer than broad; mandibles robust, entirely simple; wings lightly infuscated, somewhat more deeply so apically and in marginal cell, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd veins and stigma testaceous, basal vein much basad of transverse median; tegulae uniformly finely and closely punctate; scutellum posteriorly deeply grooved medially; front coxae not spined; apex of hind tibiae with a row of short testaceous bristles; face, including labrum and mandibles, largely yellow; vertex, posterior half of cheeks, and median portion of face above antennae and around ocelli, black, with a small yellow maculation just below anterior ocellus, the eyes completely surrounded with yellow, becoming somewhat ferruginous along upper inner margin, scape yellow anteriorly, flagellum brownish beneath toward base, becoming brownish-piceous apically, blackish above; pronotal collar, tubercles, tegulae, scutellum and axillae, metanotum, mesopleura in large part, lateral margins and a pair of submedian narrow lines on scutum, and posterior face of propodeum in large part, bright yellow, otherwise the scutum, propodeal triangle, metapleura and adjacent half of lateral faces of propodeum, and ventral surface of mesothorax, black; lower margin of mesopleural maculation ferruginous; femora brownish-ferruginous in large part, becoming yellow at apex, the tibiae brownish-ferruginous, with basal and apical yellow maculations, basitarsi more yellowish, the more apical tarsal segments becoming more reddish, spurs pale yellow; abdominal terga 1-5 with broad, entire, bright yellow bands, these occupying most of the discs of 2-5, only the apical impressed areas dark or ferruginous, band on basal tergum submedian, with basal and apical areas piceous; abdominal sterna yellow in large

part, apical margins becoming more or less ferruginous; face above antennae and vertex quite coarsely rugoso-punctate, cheeks somewhat more finely so, punctures becoming more distinct but still close on face below antennae laterally, supraclypeal area and clypeus very minutely, shallowly and obscurely punctate; scutum, scutellum and mesopleura quite coarsely rugoso-punctate; metapleura somewhat more shallowly rugose and lateral faces of propodeum much more finely and shallowly rugose, posterior face shallowly rugose in maculated area, the triangle impunctate, rather irregularly rugoso-striate toward upper margin; abdominal terga very minutely and closely punctate throughout, apical margins becoming very narrowly impunctate; pseudopygidium transverse, forming the rather broad, apical margin of tergum 5, median length about one-third the breadth, densely covered with short silvery tomentum; pubescence very short, thin and sparse, somewhat yellowish over most of head and on thorax laterally, very obscure on dorsum of thorax, hardly evident on abdomen except toward apex beneath, sternum 5 with much elongate yellowish pubescence at each side apically.

MALE—Length 10-12 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks nearly as broad as eyes, not definitely carinate posteriorly; antennal scape slightly swollen, apex deeply excavated and largely covering the pedicel, basal segment of flagellum fully equal to segment 2 in length, median segments only slightly longer than broad; mandibles robust, entirely simple; wings subhyaline basally, becoming lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd only slightly broader than 3rd anteriorly, veins and stigma testaceous, basal vein much basad of transverse median; tegulae shining between close, fine, deep and distinct punctures; posterior margin of scutellum quite deeply grooved medially; front coxae not spinose; hind femora not modified; face below antennae entirely yellow, lateral maculations ending narrowly on eye margins slightly above antennae; face above, vertex and cheeks largely black, a small yellow maculation at top of each eye and posterior margin bordered with yellow nearly to top; antennal scape bright yellow anteriorly, flagellum more brownish-testaceous below, piceous above; pronotal collar, tubercles, tegulae, scutellum, axillae, median area of metanotum just below scutellum, a pair of large propodeal maculations, and a transverse band on pleura above, all bright yellow; thorax otherwise black, the coxae and front and mid trochanters yellow in part, femora mostly testaceous, tibiae testaceous becoming yellow basally and apically,

and tarsi testaceous in large part, spurs pale yellow; abdominal terga 1-6 with broad, entire, transverse, yellow bands, these slightly narrowed medially on 1 and 2, somewhat less so on 3 and 4, uniform in width on 5 and 6, basal and apical areas black to piceous; abdominal sterna largely yellow, becoming ferruginous apically, the pygidium ferruginous; cheeks, vertex and upper part of face quite coarsely rugoso-punctate, becoming more finely so below level of antennae, clypeus becoming very finely and closely punctate toward the narrow, impunctate, apical margin, malar space and adjacent lower end of face on each side shining and nearly impunctate; scutum and mesopleura densely and coarsely rugoso-punctate, scutellum with more distinct, coarse and deep punctures, metapleura rather shallowly and closely punctate, lateral faces of propodeum somewhat smoother, surface irregularly and rather finely subrugose, posterior face shallowly rugoso-punctate in maculated areas, triangle entirely black, smooth and impunctate, but rather densely tessellate and dull, becoming somewhat striate above; abdominal terga quite uniformly, minutely and very closely punctate throughout, punctures becoming minute and sparse toward the extreme base, somewhat coarser and more distinct toward apical margins of the more apical terga; pubescence short, entirely pale, erect, rather copious over head and thorax but not hiding surface except to some degree beneath, hardly evident on abdomen dorsally, but sternal plates more or less densely fringed with elongate yellowish hairs; sternum 6 quite densely covered with elongate, erect, somewhat recurved hairs over apical third; basal width of pygidial plate (fig. 102) about equal to median length, slightly narrowed and broadly rounded apically, not emarginate, margins carinate, surface very deeply, closely and rather finely punctate; sternum 8 with a slender, elongate, apical process which is conspicuously fringed apically and at base; gonocoxites of genital armature (fig. 102) broad at base, inner margin lobate medially, gonostyli much shorter than penis valves, compressed, densely tufted, with a basal protuberance beneath which is densely tufted.

DISTRIBUTION—Illinois to Massachusetts, south to Florida, March to June.

FLOWER RECORDS—*Brassica*, *Oenothera*, *Rubus* and *Viola*. Robertson (1929) records this species on the following: *Apocynum*, *Aruncus*, *Brauneria*, *Camassia*, *Cercis*, *Claytonia*, *Cornus*, *Diospyros*, *Gillenia*, *Houstonia*, *Hydrophyllum*, *Krigia*, *Malva*, *Melilotus*, *Pentstemon*, *Polemonium*, *Taenidia*, *Trifolium*, *Verbena* and *Zizia*.

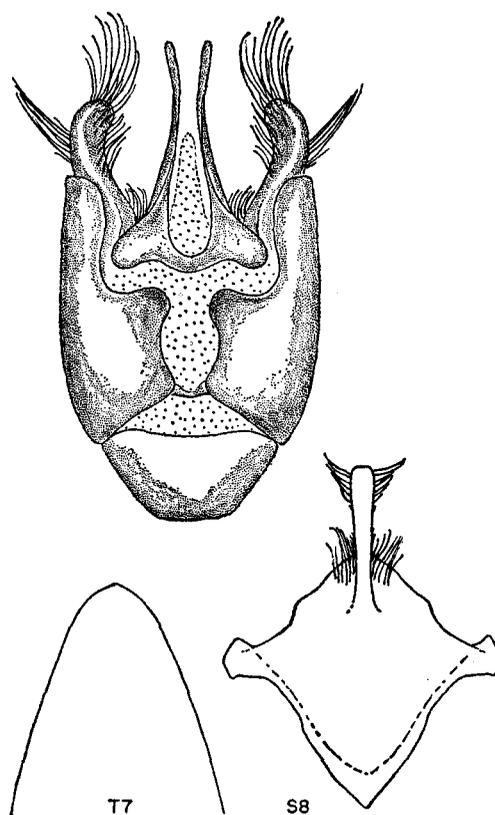


Figure 102
Tergum 7, sternum 8 and genital armature in male of *Nomada affabilis*.

This subspecific designation of *affabilis* results from the recognition of another form, *dallasensis* Cockerell, in Texas.

***Nomada (Holonomada) superba superba* Cresson**

Nomada superba Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 281. ♂.

Nomada superba Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 340. ♀ ♂.

Holonomada superba Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9-12 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks nearly equal to eyes in width, posterior margin subcarinate; basal segment of flagellum fully equal to eyes in width, posterior margin subcarinate; basal segment of flagellum fully equal to segment 2, median segments only slightly longer than broad; mandibles robust, simple; wings lightly

infuscated, somewhat more deeply so apically, with the usual three submarginal cells, 2nd and 3rd subequal and rather narrow anteriorly, veins piceous, basal vein considerably basad of transverse median; tegulae shining between very fine punctures, these rather close anteriorly and along inner margin, becoming quite sparse on the outer and posterior margins; posterior margin of scutellum rather deeply depressed medially; front coxae not spined; apex of hind tibiae with a row of short and rather fine yellowish setae; face largely yellow below level of antennae, upper half of supraclypeal area black, lateral yellow areas ending narrowly at upper end of eye, upper part of face, vertex and most of cheeks black, cheeks with a narrow yellow band along posterior margin of eye nearly to top; antennal scape yellow anteriorly, flagellum brownish-testaceous beneath, somewhat more piceous above; pronotal collar, tubercles, tegulae, scutellum except anterior margin, a small median spot on metanotum, and a small anterior maculation on pleura, bright yellow, the pleural maculations becoming ferruginous above; femora largely testaceous, tibiae, tarsi and spurs yellow; abdominal terga 1-5 with broad, transverse, entire, yellow bands, those on 2 and 3 slightly narrowed medially, basal and apical areas piceous or dull reddish; abdominal sterna largely red, becoming somewhat yellowish in part; face above antennae, vertex and cheeks coarsely and deeply rugoso-punctate, the lateral punctures below somewhat more distinct and separated, becoming quite sparse on malar space, clypeus and supraclypeal area with very minute, densely crowded punctures; scutum and mesopleura densely and rather coarsely rugoso-punctate, scutellum with coarse, deep and more distinct punctures, metapleura somewhat more finely rugose, the lateral and posterior faces of propodeum quite coarsely and regularly rugose, triangle impunctate but densely tessellate, becoming irregularly striate along upper margin; abdominal terga minutely and very closely punctate throughout, but the more basal punctures of basal tergum becoming hardly visible, the more apical punctures on the more apical terga becoming somewhat coarser and more definitely separated, apical rims narrowly impunctate; pseudopygidium transverse, forming the truncate apical margin of tergum 5, median length somewhat more than one-third the breadth, densely covered with short silvery tomentum; pubescence very short and thin, rather copious over head and thorax, entirely pale, hardly visible on abdomen dorsally, the sterna more evidently pubescent, sternum 5 with a dense tuft of elongate hairs on each side of mid-line apically.

MALE—Length 11-12 mm.; lateral ocelli

considerably nearer margin of vertex than to each other; cheeks fully equal to eyes in width, not noticeably carinate posteriorly; antennal scape slightly swollen, apex deeply excavated and largely enclosing the pedicel, basal segment of flagellum fully equal to segment 2, median segments about as broad as long; mandibles robust and simple; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, veins testaceous to brownish, 2nd and 3rd submarginal cells subequal and rather narrow anteriorly, basal vein usually somewhat basad of transverse median; tegulae shining, punctures minute and rather indistinct, close along inner margin, becoming rather sparse laterally and posteriorly; posterior margin of scutellum slightly impressed medially; front coxae not spined; hind femora not modified; face entirely yellow below level of antennae, scape bright yellow, upper part of face, vertex and cheeks entirely black; pronotal collar, tubercles, tegulae, a pair of small maculations on scutellum, and a very small yellow spot on pleura anteriorly, bright yellow; thorax otherwise entirely black, with femora largely testaceous, tibiae and tarsi bright yellow, spurs pale yellow; abdominal terga 1-6 with broad, entire, bright yellow bands, these slightly narrowed on 2 and 3, basal and apical areas blackish, to some degree red apically on the more apical terga; abdominal sterna more or less reddish, with transverse, sub-basal, yellow areas, sternum 6 almost entirely yellow; punctures of face above antennae, on vertex and on cheeks coarse, deep and close, somewhat more distinct on face laterally and below, impunctate on malar space and adjacent area, supraclypeal area and clypeus with minute, densely crowded and obscure punctures; scutum, scutellum and mesopleura densely rugoso-punctate, somewhat more finely so on each side of scutum, metapleura more shallowly rugoso-punctate, propodeum quite coarsely rugose or reticulate, triangle impunctate but dull and densely tessellate, becoming irregularly rugose or striate along upper margin; abdominal terga with minute and very close punctures throughout, these becoming hardly visible on tergum 1 basally, becoming somewhat coarser and more widely separated apically on the more apical terga; pubescence entirely pale, rather copious and erect over most of head and thorax, hardly evident on abdomen dorsally, but with considerable fine, elongate, suberect pubescence ventrally, sternum 6 largely covered with rather elongate and erect, white pubescence; basal width of pygidial plate about equal to median length, quite strongly narrowed apically, apex narrowly rounded, not at all emarginate, margins carinate, surface quite closely and rather finely punctate, punctures becoming obscure api-

cally; sternum 8 and genital armature much as in *affabilis* (fig. 102).

DISTRIBUTION—Kansas and Minnesota, east to Ohio and Georgia, April to July.

FLOWER RECORDS—Robertson (1929) has recorded *superba* on the following plant genera: *Brauneria*, *Camassia*, *Cardamine*, *Comandra*, *Coreopsis*, *Cornus*, *Erigeron*, *Fragaria*, *Geranium*, *Heracleum*, *Houstonia*, *Krigia*, *Lithospermum*, *Melilotus*, *Nepeta*, *Nothoscordum*, *Oxalis*, *Phlox*, *Prunus*, *Ranunculus*, *Rubus*, *Salix*, *Senecio*, *Sisyrinchium*, *Stachys*, *Stellaria*, *Trifolium* and *Zizia*.

Another form of this species, *malvastri* Swenk, from Nebraska makes this subspecific designation of *superba* necessary.

Nomada (Centrias) erigeronis
Robertson

(Figs. 103 & 104)

Nomada erigeronis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 341. ♀.

Centrias erigeronis Robertson, 1903. Canad. Ent. 35, p. 176. ♀ ♂.

Centrias erigerontis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks more than half width of eyes, hind margin strongly carinate; longer side of basal segment of flagellum equal to segment 2, median segments about as broad as long; mandibles slender and simple; wings lightly infuscated basally, becoming rather deeply infuscated apically, with the usual three submarginal cells, 2nd submarginal about as broad anteriorly as posteriorly, 3rd strongly narrowed, veins piceous, stigma more testaceous, basal vein interstitial with transverse median; tegulae deeply, closely and quite coarsely punctate; pronotal collar sharply carinate; posterior margin of scutellum quite deeply grooved medially; front coxal spines slender and elongate, quite densely pubescent; apex of hind tibiae with 5 or 6 elongate, yellowish bristles; lower half of face, including labrum and mandibles, and antennae basally, reddish-testaceous, lateral face marks produced narrowly along inner margin of eye nearly to vertex, and orbital margin of cheeks narrowly yellowish, the narrow malar space and area between clypeus laterally and lower end of eye bright yellow; median area of face above, vertex and cheeks, black; antennal flagellum beyond segment 1 brownish beneath, somewhat darker above; pronotal collar, the

small axillae on each side of scutellum, and small spots on metanotum, bright yellow; tubercles, tegulae and legs in large part, more testaceous, spurs pale yellow; scutellum bright ferruginous, pleura suffused with ferruginous anteriorly and to some degree above and posteriorly, and scutum narrowly rimmed with dull ferruginous on each side; abdominal terga with bright yellow maculae, those on basal tergum small, submedian and rather widely interrupted medially; tergum 2 with a broad, extensive maculation on each side occupying most of disc, but deeply constricted, almost interrupted medially; tergum 3 with a narrower, transverse band which is broadly interrupted medially, 4 with a rather narrow, entire, subapical band; and tergum 5 with a rather extensive, median, apical, more whitish area and a small spot on each side, abdominal sterna entirely black; punctures of face above antennae and on vertex coarse, close and deep, becoming somewhat finer and very close on cheeks below and on face laterally, the clypeus quite closely, deeply, distinctly and rather finely punctate; scutum and scutellum very coarsely and deeply rugoso-punctate, the pleura below somewhat more deeply and distinctly but very closely punctate becoming somewhat finer but still very close and deep above; propodeum laterally somewhat shining, but with fine, scattered and irregular, shallow punctures, posterior face much more closely punctate and dull, triangle impunctate but rather dull and tessellate; the more basal abdominal terga with deep, distinct, close, rather coarse and uniform punctures, those on 1 becoming more minute and sparse toward base; punctures on the more apical terga somewhat finer and closer but still distinct and deep; pseudopygidium transverse, very short and rather narrow, forming the narrow apical rim of tergum 5, densely covered with very fine, silvery, subappressed tomentum; pubescence extremely short, thin and obscure, entirely whitish where visible.

MALE—Length 10-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks very nearly as broad as eyes, posterior margin carinate; antennal scape much swollen, apex deeply excavated and completely hiding pedicel, basal segment of flagellum about half length of segment 2, the more apical segments much shorter, only slightly longer than broad, segment 3 with a minute but distinct spine beneath, apical segment somewhat more elongate and acuminate; mandibles slender and simple apically; wings subhyaline at base, becoming rather deeply infuscated apically, with the usual three submarginal cells, the 2nd nearly as broad anteriorly as posteriorly, 3rd much narrower, veins piceous, stigma somewhat more testa-

ceous, basal vein interstitial with transverse median; tegulae coarsely, closely and deeply punctate throughout; pronotal collar sharply carinate; posterior margin of scutellum rather shallowly grooved medially; front coxal spines rather short, obscured by quite dense pubescence; lower surface of hind femora rather strongly carinate along the posterior margin; apex of hind tibiae with four rather fine and obscure, elongate, yellowish bristles; entire face below antennae, including labrum and basal half of mandibles, bright yellow; face above antennae, vertex and cheeks, entirely black, the lateral facial maculae ending obliquely on eye margin near top of eye; antennal scape and segment 1 of flagellum yellow, flagellum otherwise reddish-testaceous below, more piceous above; pronotal collar, tubercles, tegulae, axillae, metanotum except in center, and rather large anterior maculations of pleura, bright yellow; scutellum bright ferruginous, legs largely reddish-testaceous, but front legs chiefly yellow anteriorly, and mid and hind legs with yellow maculations on trochanters, femora and tibiae, spurs pale yellow; abdominal terga with transverse bright yellow maculations, that on tergum 1 subapical, and rather widely interrupted medially, that on 2 broad laterally, deeply constricted medially, with only a narrow connecting band; bands entire on 3-5 but somewhat narrowed near mid-line, very small and median on 6; punctures of face above antennae, on vertex and on cheeks above, very coarse, deep and close, becoming somewhat finer but very close and deep on cheeks below, very fine over most of face below antennae and on clypeus; scutum and scutellum coarsely and deeply rugosopunctate, punctures very coarse and close over entire pleura, becoming almost rugose above; propodeum laterally with rather fine, shallow and irregular punctures, becoming close posteriorly, very close on posterior face, the triangle impunctate but densely tessellate, becoming almost striate along upper margin; punctures of abdominal terga deep, distinct, quite coarse and uniformly close, only the narrow apical rims impunctate, but tergum 1 becoming more minutely and sparsely punctate toward base; abdominal sterna very coarsely, deeply and closely punctate, becoming more finely so on the more apical sterna, apical margins of 4 and 5 somewhat incurved and broadly depressed, covered with dense, fine and elongate, plumose pubescence, hiding the surface, and sternum 6 with a dense fringe of elongate, more erect, pale hairs; pubescence very short, thin, suberect, but rather inconspicuous, entirely pale; basal width of pygidial plate nearly equal to median length, strongly narrowed apically, apex narrowly rounded, tip only very faintly incised if at all, margin carinate, surface closely, quite coarse-

ly, and deeply punctate; sternum 8 (fig. 104) broadly produced apically, this part subtriangular, fringed with robust, ventrally projecting setae; gonocoxites of genital armature (fig. 103) not lobate at base, the gonostyli not produced and setose at base beneath, rather slender, tufted apically and along the inner margin.

DISTRIBUTION—Kansas and Nebraska to Massachusetts, in May.

FLOWER RECORDS—Recorded by Robertson (1929) on *Coreopsis* and *Erigeron*.

Nomada (Nomadula) articulata
Smith

?*Nomada americana* Kirby, 1837. Fauna Bor.-Amer., p. 269. ♀.

Nomada articulata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 248. ♂.

Nomada incerta Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 309. ♀. New synonymy.

Nomada (Centrias) americana dacotana Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 592. ♂.

Nomada americana Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 310.

Nomada (Nomada) bilobata Swenk, 1913. Nebr. Univ. Studies 12, p. 25. ♀. New synonymy

Centrias americanus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8.5 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks slightly more than half width of eyes, hind margin strongly carinate; longer side of basal segment of flagellum equal to segment 2, median segments very slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming quite strongly infuscated on apical margin and in marginal cell, with the usual three submarginal cells, 2nd usually not much broader anteriorly than 3rd, veins piceous, stigma somewhat more testaceous, basal vein interstitial or nearly with transverse median; tegulae deeply, distinctly, rather coarsely and closely punctate; posterior margin of scutellum very slightly impressed medially; front coxal spines well developed but quite densely pubescent and obscure; apex of hind tibiae with a row of 4 or 5 very short bristles which do not project beyond the finer whitish pubescence beneath; head and thorax chiefly red, flagellum somewhat more brownish beneath, piceous above, head with some black above antennae, around ocelli and on posterior margin of cheeks, prothorax laterally and beneath, and

front coxae in part, black; pleura below, metapleura, mid coxae and propodeum, in large part black, and scutum with a rather faint median longitudinal black line; legs testaceous to ferruginous, spurs pale yellow; abdomen chiefly red, impressed apical margins of the more apical terga becoming yellowish-hyaline; punctures of face above antennae and on vertex and cheeks close, deep, distinct and quite coarse, becoming very fine and close on supraclypeal area and clypeus, relatively coarse and slightly separated on each side of face below antennae; scutum very coarsely rugoso-punctate, scutellum somewhat more finely so, pleura below coarsely and very closely punctate, but with some narrow, shining interspaces evident, becoming quite densely rugoso-punctate above; lateral faces of propodeum finely rugose in part but with some smooth, somewhat shining spaces, posterior face quite densely and finely rugoso-punctate, triangle impunctate but dull, upper margin obscurely striate on each side; abdominal terga quite deeply, rather finely and closely punctate, more finely so on basal tergum which becomes more minutely and sparsely punctate toward base, apical rims of the terga narrowly impunctate; tergum 5 quite finely and closely punctate across basal margin, becoming somewhat more coarsely and sparsely punctate toward apex; pseudopygidium transverse, very short, forming the rather narrow apex of tergum 5, densely covered with suberect, very fine, silvery tomentum; pubescence very short and thin, erect in large part, entirely white or pale yellow where evident.

MALE—Length 8.5-9.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks nearly subequal to eyes in width, not noticeably carinate posteriorly; antennal scape strongly swollen, apex deeply excavated and completely hiding pedicel, longer side of basal segment of flagellum shorter than segment 2, the more apical segments shorter, not much longer than broad, segment 3 with a minute but distinct ventral spine, apical segment somewhat elongated and acuminate; mandibles slender and simple; wings subhyaline basally, becoming lightly infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd usually not much broader anteriorly than 3rd, veins piceous, stigma somewhat more reddish, basal vein slightly basad of transverse median, or in some specimens interstitial with it; tegulae closely, deeply and rather coarsely punctate throughout; posterior margin of scutellum very slightly impressed medially; front coxal spines well developed, but quite densely pubescent and obscure; lower margin of hind femora flattened or concave, with distinct anterior and posterior subcarinate margins; en-

tire face below antennae, except for tips of mandibles and scape anteriorly, bright yellow; face above, vertex and cheeks black; antennal flagellum yellowish-testaceous beneath, piceous to black above; pronotal collar narrowly yellow along the carinate margin, tubercles testaceous, tegulae more reddish testaceous, pleura usually with a small, anterior, yellow maculation and metanotum with a pair of sublateral yellow spots, the scutellum red and scutum with red infusions; front and mid legs largely testaceous, front tibiae yellow apically, hind legs more ferruginous, spurs pale yellow; punctures of face above antennae, on vertex and cheeks coarse, close, deep, and distinct, becoming somewhat finer on cheeks below, very fine, shallow and obscure on maculated areas below antennae; scutum and scutellum densely and rather coarsely rugoso-punctate, scutellum somewhat more finely so, pleura quite coarsely rugoso-punctate in general, lower surface somewhat obscured with whitish tomentum; lateral faces of propodeum rather dull, with very shallow but quite close punctures, posterior face finely and closely punctate beneath, with rather copious pale pubescence, triangle impunctate, becoming rather finely striate along upper margin; abdominal terga with conspicuous yellow maculations, widely interrupted on 1 and 2, the resulting lateral marks on 1 transverse and rather narrow, those on 2 broad laterally, becoming strongly narrowed toward mid-line, those on 3-6 entire, strongly narrowed medially on 3, basal area of 2 and 3 ferruginous, and tergum 1 ferruginous medially and in vicinity of maculation, terga otherwise blackish, tip of abdomen more ferruginous; punctures of abdominal terga deep, distinct, very close and rather coarse in general, finer on tergum 1 basally, only the very narrow apical rims impunctate, that on 5 somewhat broader and more ferruginous in color; abdominal sterna largely ferruginous, apical margins rather broadly yellowish-hyaline, punctures deep, distinct and rather close; pubescence entirely pale, short, quite copious in general, more whitish laterally and beneath, more yellowish above, hardly evident on abdomen dorsally, but rather dense beneath, especially on the more apical sterna, forming a quite dense subapical fringe of elongate yellowish hairs on 5, sternum 6 with rather dense tufts of elongate yellowish hairs at each side; pygidial plate about as broad at base as median length, strongly narrowed apically, tip very slightly incised, surface quite closely and rather deeply punctate, the punctures becoming minute and obscure apically; sternum 8 and genital armature similar to those in *rubicunda* (figs. 103 & 104).

DISTRIBUTION—North Dakota to the

New England States, south to Louisiana and Florida, April to August.

FLOWER RECORDS—*Apocynum*, *Eri-geron*, *Hypochaeris*, *Melilotus*, *Ranunculus* and *Senecio*. This species has been recorded by Robertson on the following additional genera: *Amorpha*, *Aruncus*, *Camassia*, *Ceanothus*, *Chrysanthemum*, *Coreopsis*, *Crataegus*, *Dianthera*, *Geranium*, *Houstonia*, *Krigia*, *Malva*, *Nepta*, *Nothoscordum*, *Oxalis*, *Potentilla*, *Rubus*, *Rudbeckia*, *Taenidia*, *Trifolium* and *Zizia*.

The name *americana* is not used for this species because of the uncertainty with respect to its identity. The type has not been located, and without that specimen it is not possible to relate it confidently to any of the apparently allied species.

Nomada (Nomadula) australis
new species

FEMALE—Length 7-8 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks about two-thirds width of eye, posterior margin carinate; longer side of basal segment of flagellum equal in length to segment 2, segment 3 much shorter, not much longer than broad; mandibles slender and simple; wings hyaline basally, becoming quite deeply infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma piceous, basal vein interstitial with transverse median; tegulae deeply, distinctly and rather closely punctate, somewhat more sparsely so on outer and posterior margins; posterior margin of scutellum distinctly depressed medially; front coxal spines slender and elongate, quite densely pubescent; apex of hind tibiae with a row of four or five elongate, robust, piceous setae; general body color red, scape and basal segment of flagellum more reddish-testaceous, and a small amount of black around ocelli, head otherwise entirely red; lateral faces of propodeum black in large part, with a small reddish maculation posteriorly, and posterior face black below the triangle; scutum with an indistinct, median black line, the tubercles and tegulae somewhat tinged with yellow, thorax otherwise entirely deep red; front and mid legs somewhat more testaceous, hind legs more reddish, spurs pale yellow; abdomen entirely red, without maculations, apical margins of 2-4 becoming somewhat yellowish-hyaline; punctures deep, distinct, close and rather coarse over most of face, vertex and cheeks, only the supraclypeal area and clypeus very minutely and closely punctate; thorax rugoso-punctate in large

part, coarsely so on pleura and scutum, very finely so on scutellum, lateral faces of propodeum somewhat smoother but dull, shallowly and rather finely rugose, posterior face more coarsely rugose below, the triangle smooth and impunctate but dull; basal abdominal tergum minutely and rather closely punctate apically, becoming more minutely, obscurely and more sparsely punctate basally; terga 2-5 with deep, distinct, rather fine and close punctures basally, these somewhat coarser and more widely separated but not sparse toward apical margins, only the narrow apical rims impunctate; pseudopygidium transverse, very narrow, forming the truncate apical margin of tergum 5, densely covered with short, more or less erect, silvery tomentum; sternum 5 with lateral tufts of robust elongate hairs on each side of midline apically; pubescence in general extremely short, thin and sparse, somewhat more evident on face, cheeks, thorax laterally and beneath, entirely whitish where visible.

MALE—Length 7-9 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks about two-thirds width of eye, posterior margin rounded, not carinate; antennal scape strongly swollen, apex deeply excavated and completely enclosing pedicel, basal segment of flagellum much shorter than segment 2, about equal to segment 3 which has a minute, short but distinct spine beneath, following segments more or less spinose or nodulose beneath; mandibles slender and simple apically; wings hyaline basally, becoming rather deeply infuscated apically, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, veins and stigma piceous, basal vein interstitial or nearly with transverse median; tegulae closely, deeply, distinctly and quite uniformly punctate; posterior margin of scutellum quite deeply impressed medially; front coxal spines slender and elongate, rather densely pubescent; lower surface of hind femora flattened and more or less concave, posterior margin subcarinate; clypeus, labrum, mandibles except tips, lateral face marks, lower half of supraclypeal area, and scape anteriorly, bright yellow, head otherwise entirely black, lateral face marks ending narrowly on eye margin at level of antennae; antennal flagellum more testaceous basally, becoming somewhat reddish apically; tubercles, tegulae, front and mid legs largely reddish-testaceous, hind legs more reddish, spurs pale yellow; pronotal collar with a pair of inconspicuous yellow maculations, thorax otherwise black; abdomen black with reddish infusions and conspicuous yellow maculations, those on basal tergum small, submedian and lateral, widely separated; tergum 2 with a pair of large, cuneiform, lateral maculations

which are widely separated medially, the disc black, apical impressed areas becoming somewhat reddened; tergum 3 with a pair of more elongate, subtriangular lateral maculations which are rather widely separated medially, disc black, apical impressed rim more reddish; terga 4-6 with entire, transverse bands which are more or less submedian in position, apical rims distinctly reddish-hyaline; abdominal sterna blackish basally, apical rims broadly yellowish-hyaline; face above antennae and vertex coarsely, closely and deeply punctate, cheeks much more finely so, becoming rather finely rugose beneath, the lower maculated areas of face more sparsely and finely punctate, clypeus very minutely and densely so; thorax densely rugoso-punctate, coarsely so on mesopleura and scutum, finely so on scutellum, lateral faces of propodeum dull, shallowly and closely rugose or reticulate, posterior face becoming somewhat more coarsely so, triangle impunctate but densely tessellate; basal abdominal tergum finely, deeply, distinctly and rather closely punctate apically, punctures becoming very minute and indistinct on the shining base; punctures of terga 2-6 rather fine, close, deep and distinct basally, becoming somewhat coarser and more widely separated but not sparse apically, only the very narrow, apical margins impunctate, these somewhat broader on the more apical terga; basal width of pygidial plate about equal to median length, strongly narrowed apically and deeply, triangularly emarginate, lateral margins carinate, surface deeply, distinctly and rather coarsely punctate basally, becoming very closely and more finely so apically; sternum 5 with a dense, subapical fringe of elongate pale hairs; sternum 6 with a dense tuft of more erect, elongate hairs on each side of apex, and with a broader median fringe of somewhat shorter erect hairs; sternum 8 and genital armature similar to *rubicunda* (figs. 103 & 104); pubescence short, entirely pale, rather copious on head and thorax, hiding surface only beneath, extremely short over most of abdomen but somewhat more dense on sternal plates.

TYPES—Holotype: Female, Highlands Hammock State Park, Fla., April 5, 1959 (Mitchell, on *Bidens*). Allotype: Male, topotypical. [both author's coll.]. Paratypes: 3 ♀♀, 1 ♂, topotypical. FLORIDA: 2 ♀♀, Gainesville, April 13, 1924 (G. B. Merrill); 1 ♀, Lake Co., April 11, 1960 (H. V. Weems, Jr.); 1 ♂, Lake Co., April 6, 1956 (R. A. Morse, on *Erigeron quercifolius*). GEORGIA: 1 ♀, Fort Gordon, Richmond Co., April 26, 1959 (R. R. Snelling). SOUTH CAROLINA: 3 ♀♀, Dewees Is., April 29 (J. Bequaert). NORTH CAROLINA: 2

♂♂, Sampson Co., April 13, 1954; 2 ♂♂, Ivanhoe, April 5, 1945 (on *Ilex*); 1 ♀, Pettigrew State Park, May 27, 1959 (on *Erigeron*); 1 ♀, Raleigh, May 2, 1948 (on *Senecio*); 1 ♀, Faison, April 20, 1955 (on *Fragaria*) (all Mitchell); 1 ♀, Raleigh, May 8, 1923 (C. S. Brimley); 1 ♀, Raleigh, May 17, 1951 (R. L. Sullivan); 1 ♂, Duplin Co., April 21, 1955 (D. A. Becker). NEW YORK: 1 ♂, Oliverea, June 18, 1934, (H. Dietrich). INDIANA: 1 ♂, Tippecanoe Co., May 22, 1956 (Montgomery, on *Gypsophila oldhamiana*).

Paratypes are in collections of the Florida Plant Board, the Museum of Comparative Zoology, Cornell University, Purdue University, the North Carolina Department of Agriculture, R. R. Snelling and the author.

This species is very close to *articulata* but seems to be distinct, even though the ranges of the two overlap. In the female the elongate, apical bristles of the hind tibiae will separate this species from *articulata*, but in the male the differences are primarily of color.

***Nomada (Nomadula) rubicunda*
Olivier**

(Figs. 103 & 104)

Nomada rubicunda Olivier, 1811. *Encycl. Meth.*, v. 8, p. 365.

Nomada torrida Smith, 1854. *Cat. Hym. Brit. Mus.*, v. 2, p. 250.

FEMALE—Length 8.5-9.5 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks somewhat more than half width of eyes, posterior margin conspicuously carinate; longer side of basal segment of flagellum about equal to segment 2, median segments slightly longer than broad; mandibles slender and simple; wings subhyaline basally, becoming quite deeply infuscated apically and in marginal cell, but with a quite distinct hyaline area just beyond the discoidal and 3rd submarginal cells, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins piceous, basal vein interstitial or nearly with transverse median; tegulae uniformly deeply and finely punctate throughout, punctures crowded; posterior margin of scutellum quite deeply grooved; front coxal spines well developed, quite densely pubescent; apex of hind tibiae with a single, slightly oblique, robust, brownish and rather elongate seta; head, thorax and abdomen largely red, the scape, pedicel and basal seg-

ment of flagellum more testaceous, following segments of flagellum more brownish beneath, black above; clypeus somewhat more reddish-testaceous; front and middle legs reddish-testaceous, spurs pale yellow, hind legs more ferruginous; pronotal collar somewhat more yellowish, scutellum and axillae yellowish in large part, metapleura and adjacent margin of propodeum black, and middle and hind coxae largely black posteriorly, more or less ferruginous anteriorly; abdominal tergum 3 with a pair of small, widely separated, yellow maculations, 4 and 5 with transverse, subapical ivory bands, that on 4 rather narrow, much broader on 5, discs of these terga black, the more basal terga entirely ferruginous and the sterna entirely ferruginous; punctures coarse, deep and close on face above antennae, on vertex, cheeks, and across face between antennae and clypeal margin, clypeus very finely and closely punctate; scutum and scutellum very coarsely rugoso-punctate, pleura below more distinctly punctate, becoming coarsely rugose laterally and above; lateral faces of propodeum dull, with shallow, vague but coarse, close punctures, posterior face obscurely punctate, triangle impunctate but rather dull, becoming rather finely and irregularly striate along upper margin; basal abdominal tergum finely and closely punctate across apical half, punctures becoming more minute and somewhat more sparse toward base; terga 2-4 deeply, distinctly, rather uniformly and closely punctate throughout, only the very narrow apical rims impunctate; tergum 5 with finer and quite densely crowded punctures throughout; pseudopygidium transverse, extremely short, evident only as an apical fringe of short, dense, pale yellowish hairs; pubescence extremely short, thin and obscure, entirely whitish where evident, sternum 5 with dense, lateral tufts of long, densely plumose, fuscous hairs.

MALE—Length 7-9.5 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks only slightly narrower than eyes, posterior margin carinate; antennal scape considerably swollen, apex deeply excavated and completely hiding pedicel, basal segment of flagellum much shorter than segment 2, even on longer side, median segments about as broad as long, segment 3 much shorter than 2, with a distinct but short and fine ventral spine; mandibles slender and simple; wings hyaline basally, becoming rather densely infuscated along outer margin and in marginal cell, but with a hyaline area just beyond the discoidal and submarginal cells, with the usual three submarginals, 2nd very much broader than 3rd anteriorly, veins piceous in general, stigma somewhat more testaceous, basal vein interstitial or nearly with trans-

verse median; tegulae uniformly deeply, closely and distinctly punctate throughout; posterior margin of scutellum rather deeply grooved or impressed medially; front coxal spines rather short, subtriangular, quite densely pubescent; hind femora unmodified; clypeus, adjacent lateral areas of face, labrum, mandibles except tips, a rather large spot on supraclypeal area, and antennal scape, bright yellow, head otherwise black; pronotal collar, tubercles, tegulae, scutellum and axillae, two spots on metanotum, and an anterior spot on mesopleura, bright yellow, thorax otherwise black; legs reddish-testaceous, spurs pale yellow, basal half of hind femora infuscated; abdominal terga with conspicuous yellow maculations, that on basal tergum interrupted medially, the resulting lateral spots with a deep emargination on apical margin, intervening area somewhat ferruginous; tergum 2 with extensive yellow maculae on each side, these very narrowly united medially, basal area of disc between them black, apical area somewhat reddened; terga 3-6 with transverse, submedian, yellow bands that are of rather uniform width, apical portion of 5 and 6 beyond the bands more ferruginous; abdominal sterna largely dark, but 3 and 4 with rather small and obscure, sublateral maculations; punctures coarse, deep and close on face above antennae, vertex and cheeks, and rather coarse and deep between antennae and clypeus, punctures of clypeus extremely minute and close, lateral areas shining, with sparse, irregular, scattered punctures; scutum, scutellum and mesopleura coarsely and densely rugoso-punctate, lateral faces of propodeum somewhat smoother but with fine, shallow and rather coarse, vague punctures, posterior face quite closely and shallowly punctate and dull, triangle impunctate, tessellate, becoming irregularly striate along upper margin; basal abdominal tergum quite closely and finely punctate apically, punctures becoming very minute and indistinct toward base; terga 2-5 with deep, distinct quite fine but close and uniform punctures throughout, only the very narrow, apical rims impunctate; pubescence very short, entirely pale but evident, whitish below, somewhat more yellowish above, hardly evident on abdomen basally, but the more apical sterna quite densely long pubescent toward apical margin, sternum 6 with a conspicuous, apical fringe of erect, more or less curved, yellowish hairs; basal width of pygidial plate about equal to median length, strongly narrowed to the somewhat deeply incised apex, lateral margins carinate, surface quite closely and deeply punctate toward base, becoming very finely to minutely punctate toward tip; sternum 8 (fig. 104) broadly produced apically, rounded, the apex fringed with robust, ventrally pro-

jecting setae; gonocoxites of genital armature (fig. 103) not lobate at base, slightly angulate on inner margin medially, gonostyli slender and elongate, simple, tufted apically.

DISTRIBUTION — Michigan to New York, south to Texas and Florida, March to June.

FLOWER RECORDS — *Crataegus*, *Fragaria*, *Melilotus*, and *Rubus*.

Nomada (Nomadula) seneciophila
new species

FEMALE—Length 7-8 mm.; lateral ocelli considerably nearer margin of vertex than to each other; longer side of basal segment of flagellum equal to segment 2, but this only slightly longer than broad, median segments slightly shorter; mandibles slender and simple; wings hyaline basally, becoming somewhat infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly; veins piceous to black, stigma somewhat more brownish-testaceous, basal vein interstitial with transverse median; tegulae closely, deeply, distinctly and rather uniformly punctate throughout; posterior margin of scutellum quite deeply grooved medially; front coxal spines rather short and triangular, quite densely pubescent; apex of hind tibiae with a row of three or four elongate, robust, fuscous bristles; body color red in large part, scape and basal segment of flagellum anteriorly more testaceous, area around ocelli and posterior margin of cheeks black; tubercles and tegulae somewhat more testaceous; legs reddish-testaceous, spurs pale yellow; scutum with a narrow, median, black line and metapleura and propodeum entirely black, thorax otherwise deep red; abdominal terga red but with small yellow maculations, those on tergum 2 small, widely separated, submedian if evident on 3, tergum 4 with a transverse, yellow band near midline, 5 with a pair of spots, sterna largely red; punctures coarse, deep, distinct and very close on face above, on vertex and on cheeks, slightly separated, deep and rather coarse on face below antennae, the clypeus and supraclipeal area with very fine, densely crowded punctures; scutum, scutellum and mesopleura densely and coarsely rugoso-punctate; propodeum dull, shallowly but very fine and closely rugoso-punctate, the triangle impunctate but dull and tessellate; basal abdominal tergum very finely and rather closely punctate toward apical margin, punctures becoming more minute and inconspicuous basally; terga 2-5 very finely, closely, deeply and distinctly punctate, only the very narrow apical rims impunctate, these becoming yellow-

ish-hyaline on the more apical terga; pseudopygidium transverse, very short, forming the rather narrowly truncate apical margin of tergum 5, densely covered with short, suberect, pale yellowish pubescence; sternum 5 with a dense apical tuft of elongate, plumose hairs on each side apically; pubescence in general very short and thin, entirely pale, rather conspicuous on face, cheeks, over most of thorax, and on apical segments of abdomen.

MALE—Length 8 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin subcarinate; antennal scape slightly swollen, apex deeply excavated and completely enclosing pedicel, basal segment of flagellum very short, segment 2 somewhat longer but not much longer than broad, 3 nearly equal to 2, with a distinct but short and very slender spine beneath, median segments about as long as broad; mandibles slender and simple; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd about equal in width anteriorly, veins testaceous to piceous, basal vein interstitial with transverse median; tegulae uniformly very finely, closely and rather deeply punctate; posterior margin of scutellum slightly impressed medially; front coxal spines very short, subtriangular, quite densely pubescent; ventral surface of hind femora considerably flattened but not concave; clypeus, adjacent lateral areas of face, labrum, and basal half of mandibles, bright yellow, lateral maculae continuing narrowly up eye margin to level of antennae; scape and basal part of flagellum bright yellow anteriorly, the more apical antennal segments more testaceous beneath, somewhat more reddish above; head otherwise black; tubercles and tegulae bright yellow, legs largely testaceous, spurs pale yellow, and pleura with a very small, anterior, yellow spot, thorax otherwise black; basal abdominal tergum piceous toward base, more testaceous apically, with a pair of widely separated, very narrow, lateral, yellow maculations; tergum 2 with a conspicuous, transverse, yellow band which is quite broad laterally, strongly narrowed and subinterrupted medially, basal area of disc blackish, apical portion more testaceous-hyaline; terga 3-6 with transverse yellow bands that are submedian in position, discs dark basally, testaceous-hyaline apically, bands with lateral interruptions on 4 and 5, that on 6 rather short, sometimes with small lateral spots at extreme sides; abdominal sterna piceous or blackish basally, more testaceous-hyaline apically; punctures coarse, deep, distinct and close on face above antennae and on vertex, those on cheeks very much finer and very close, deep and distinct on each side below antennae, but

minute and very close on supraclypeal area and clypeus, the lateral yellow areas somewhat more sparsely and obscurely punctate; scutum, scutellum and pleura densely and rather coarsely rugoso-punctate, somewhat more finely so on scutellum; lateral faces of propodeum somewhat smoother, but with shallow, obscure, close punctures or reticulations, posterior face quite coarsely, closely and shallowly punctate, triangle impunctate but rather dull; punctures of basal abdominal tergum minute and rather close, barely visible; terga 2-6 with deep, distinct, close and rather fine punctures, only the narrow apical rims becoming impunctate, the more apical terga with somewhat coarser and more widely spaced punctures; pygidial plate about as broad at base as median length, strongly narrowed apically, tip subtruncate or with a very slight median incision, lateral margins carinate, surface deeply and distinctly punctate toward base, the punctures becoming minute and obscure apically; sterna 3-5 with rather thin, subapical fringes of elongate pale hairs, that on 5 quite dense, 6 with dense tufts of elongate, yellowish hairs on each side that are directed toward the base, and with a submedian tuft

of shorter hairs; pubescence otherwise very short, thin but rather copious over most of head and thorax, very minute and indistinct on abdomen dorsally; sternum 8 and genital armature as in *rubicunda* (figs. 103 & 104).

TYPES—Holotype: Female, Wake Co., N. C., May 7, 1960. Allotype: Male, topotypical (both Mitchell, on *Senecio*) [author's coll.]. Paratypes: NORTH CAROLINA: 2 ♂♂, Raleigh, early May, 1921; 1 ♂, Raleigh, April 26, 1922 (on *Rubus*); 2 ♂♂, Raleigh, May 1, 1922 (on *Senecio*); 1 ♂, Raleigh, May 2, 1948 (on *Senecio*); 1 ♂, Raleigh, May 15, 1961; 1 ♂, Blue Ridge Pkwy., Wilkes Co., June 2, 1950 (all Mitchell); 1 ♂, Durham, May 11, 1952. (R. D. Cuyler); 2 ♂♂, Mt. Graybeard, May 23 (N. Banks); 5 ♀♀, Raleigh, April 24-May 30, 1941 & 42. FLORIDA: 1 ♀, Florida Caverns St. Pk., Jackson Co., April 13, 1960 (H. V. Weems, Jr., on *Senecio*).

Paratypes are in collections of the Florida Plant Board, the North Carolina Department of Agriculture, the Museum of Comparative Zoology, and the author.

Table 11—Distribution of species of *Nomada* (*Gnathias*, *Micronomada*, *Holonomada*, *Centrias* and *Nomadula*) by states.

Nomada (Gnathias)	New England					North Central					Mid Atlantic						South-eastern										
	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
<i>bella</i>	X	X	X	X	X	X	X											X									X
<i>cuneata</i>		X		X	X	X	X					X	X	X				X	X			X					
<i>hydrophylli</i>								X							X												
<i>lepida</i>	X	X		X	X	X	X	X	X		X	X		X				X	X	X		X	X				X
<i>louisianae</i>											X							X	X			X					
<i>maculata</i>	X			X	X	X	X				X							X	X								
<i>ovata</i>	X	X		X	X	X	X	X	X		X	X	X	X	X			X	X	X	X	X	X				
<i>perplexa</i>				X	X	X	X	X	X		X	X		X				X	X	X	X	X					
<i>subnigrocincta</i>												X															
<i>volatilis</i>			X	X			X		X		X			X				X	X								
(<i>Micronomada</i>)																											
<i>fervida</i>																							X			X	X
<i>heiligbrodtii</i>				X	X	X												X				X		X	X	X	
<i>modesta</i>											X	X										X			X		
<i>texana</i>				X	X	X												X				X			X		
<i>wisconsinensis</i>						X	X																				
(<i>Holonomada</i>)																											
<i>affabilis</i>				X			X	X										X	X	X	X				X	X	
<i>superba</i>							X	X	X																X		
(<i>Centrias</i>)																											
<i>erigeronis</i>			X				X																				
(<i>Nomadula</i>)																											
<i>articulata</i>			X	X	X	X	X	X	X	X	X	X	X	X				X	X	X		X				X	X
<i>australis</i>								X			X											X	X		X	X	
<i>rubicunda</i>						X					X											X	X		X	X	
<i>seneciophila</i>																						X				X	

Nomada (*Callinomada*) *aquilarum*
Cockerell

Nomada aquilarum Cockerell, 1903. Ann. Mag. Nat. Hist. (7) 12, p. 208. ♂.

Nomada cockerelli Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1, p. 240.

Nomada (*Holonomada*) *dacotensis* Swenk, 1913. Nebr. Univ., Studies 12, p. 88. ♀.

FEMALE—Length 8-9 mm.; lateral ocelli

subequally distant from margin of vertex and each other; cheeks about as broad as eyes, posterior margin carinate; shorter side of basal segment of flagellum equal to segment 2 in length, median segments fully as broad as long; mandibles slender and simple apically; wings subhyaline basally, becoming faintly infuscated apically, but with a definitely hyaline area just beyond the discoidal and submarginal cells, with the usual three submarginal cells, 2nd somewhat broader anterior-

ly than 3rd, veins testaceous to piceous, stigma somewhat more reddish, basal vein interstitial with transverse median; tegulae shining, very sparsely punctate except along inner margin; posterior margin of scutellum very slightly grooved medially; front coxae with short, acute, triangular tubercles that are obscured by the pubescence; apex of hind tibiae with a row of 5 or 6 very short setae; face with a pair of much abbreviated, ivory maculations adjacent to eyes below, head otherwise black; antennal scape reddish, flagellum more reddish-testaceous beneath, piceous above, tubercles and posterior band on scutellum ivory, outer half of tegulae and a narrow median band on pronotal collar maculated in some specimens, thorax otherwise black; femora and trochanters largely piceous, front femora and tibiae yellowish maculated apically, otherwise black, hind tarsi largely piceous, mid and front tarsi more reddish-testaceous, spurs pale yellow; basal abdominal tergum entirely black, terga 2-6 with conspicuous, ivory maculae, interrupted medially on 2-4, very broad laterally and triangularly pointed medially on 2 and 3, entire on 5 but narrowed laterally; abdominal sterna largely black, but 3 and 4 often with narrow, subapical, ivory bands that are more or less widely interrupted medially; punctures of face, vertex and cheeks deep, distinct and quite close, somewhat coarser on vertex and upper half of face, rather fine and very close on cheeks below and on lower half of face; scutum, scutellum and mesopleura rather coarsely and densely rugoso-punctate, punctures somewhat more distinct on pleura below and on scutellum, propodeum posteriorly with rather fine, close punctures just below the impunctate triangle, this and the lateral surfaces dull and densely tessellate; basal abdominal tergum with minute, rather close punctures just before the impressed apical margin, these becoming minute and inevident toward the shining base; discs of terga 2-6 with deep, distinct, minute and rather close punctures, apical margins rather narrowly impunctate; pseudopygidium of the usual form; pubescence extremely short and thin, hardly visible, apparently entirely pale.

MALE—Length 8 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks fully as broad as eyes, posterior margin not carinate; antennal scape not much swollen, apex rather deeply excavated and partially enclosing pedicel, basal segment of flagellum slightly longer than segment 2, median segments fully as broad as long; mandibles slender and simple apically; wings subhyaline basally, becoming faintly infuscated apically, but with a definite hyaline area just beyond the discoidal and submarginal cells, with the usual three submarginal cells,

2nd somewhat broader anteriorly than 3rd, veins testaceous to piceous, stigma somewhat more reddish, basal vein interstitial with transverse median; tegulae shining, very sparsely punctate except along inner margin; posterior margin of scutellum slightly grooved medially; front coxae with short but rather robust, triangular spines that are obscured by the pubescence; hind femora unmodified; clypeus and labrum in large part, mandibles at base, and a pair of much abbreviated, lateral maculae, pale yellowish-white or ivory, upper third of clypeus black, head otherwise black; antennal scape yellowish-testaceous anteriorly, flagellum more reddish-testaceous beneath, piceous above; tubercles, outer half of tegulae, a narrow median band on pronotal collar, and a pair of spots on scutellum, ivory; thorax otherwise entirely black; femora and trochanters largely piceous, front femora more yellowish anteriorly, tibiae yellowish at base and apex on outer surface, these narrowly connected, surface otherwise piceous to testaceous, hind tarsi largely piceous, mid and front tarsi more reddish-testaceous, spurs pale yellow; basal abdominal tergum entirely black, terga 2-6 with conspicuous, ivory maculae, interrupted medially on 1-3, very broad laterally and triangularly pointed medially on 2 and 3, entire and of rather uniform width on 5 and 6, on which the apical margins are reddish-hyaline; abdominal sterna largely black, yellowish-hyaline apically, sterna 3-5 with narrow, subapical, ivory bands that are more or less widely interrupted medially; punctures of face, vertex and cheeks deep, distinct and quite close, somewhat coarser and more widely separated on vertex, rather fine and very close on cheeks below and on lower half of face, supraclypeal area rather coarsely rugoso-striate, punctures of maculated area of clypeus more vague and irregular; scutum, scutellum and mesopleura rather coarsely and densely rugoso-punctate, punctures somewhat more distinct on pleura below and on scutellum, propodeum posteriorly with rather fine, shallow, but close punctures just below the impunctate triangle, this and the lateral surfaces dull and densely tessellate; basal abdominal tergum with minute, rather close punctures just before the impressed apical margin, these becoming minute and inevident toward the shining base; discs of terga 2-6 with deep, distinct, rather close and fine punctures, apical margins rather narrowly impunctate and more or less yellowish-hyaline, the punctures slightly coarser on the more apical terga; pubescence extremely short and thin but rather copious over head and thorax, more whitish below, more yellowish above, very fine and inconspicuous on abdomen; median length of pygidial plate about equal to

basal width, rather strongly narrowed to the narrowly rounded apex, margins carinate, surface rather shallowly rugoso-punctate; sternum 8 and genital armature similar to *placida* (figs. 103 & 104).

DISTRIBUTION—Chiefly western, but found in Wisconsin, in July.

FLOWER RECORDS—This species has been recorded on *Erigeron*, *Grindelia*, *Lactuca*, *Melilotus* and *Solidago*.

***Nomada (Callinomada) placida*
Cresson**

(Figs. 103 & 104)

Nomada placida Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 291. ♀ ♂.

Holonomada placida Robertson, 1903. Canad. Ent. 35, p. 177. ♀ ♂.

Holonomada placida Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Nomada (Callinomada) placida Rodeck, 1945. Ent. News 56, p. 181.

FEMALE—Length 7-8 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly more than half width of eyes, posterior margin subcarinate; shorter side of basal segment of flagellum equal to segment 2, median segments about as broad as long; mandibles slender and simple apically; wings lightly infuscated, not much darker apically, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins testaceous to piceous, stigma somewhat more ferruginous, basal vein interstitial with transverse median; tegulae shining, punctures minute, sparse and obscure; posterior margin of scutellum very slightly impressed medially; front coxae not spinose; apex of hind tibiae with a row of four rather short but robust, dark bristles; clypeus, lateral face marks, labrum and mandibles except tips, yellow, to some degree tinged with ferruginous, face marks ending narrowly on margin near top of eye, and cheeks very narrowly yellow adjacent to eye margin below; head otherwise black, antennal scape testaceous, flagellum more brownish-testaceous below, becoming piceous above; pronotal collar, tubercles, tegulae, scutellum, adjacent median area of metanotum, and a rather large anterior maculation on mesopleura, bright yellow; thorax otherwise black, legs reddish-testaceous basally, tibiae yellow in large part, with reddish infusions, tarsi yellow at base, becoming somewhat reddened on apical segments, spurs pale yellow; basal abdominal tergum entirely dark, terga 2-5 with transverse, median, yellow

bands, those on 2 and 3 broad laterally, more or less deeply constricted medially, slightly interrupted on 3, those on 4 and 5 of more uniform width; abdominal sterna largely dark, but 3 and 4 to some degree yellow banded; punctures over entire head quite uniformly, deeply, closely, distinctly and rather coarsely punctate, only the clypeus becoming somewhat more finely and closely punctate medially; scutum densely and rather coarsely rugoso-punctate; punctures of scutellum and of mesopleura below somewhat coarser and more distinct, becoming crowded on pleura above; propodeum dull, densely and finely rugose posteriorly and to some degree on each side, becoming somewhat smoother toward mid coxae, triangle impunctate but densely tessellate and dull, becoming obscurely and finely striate along upper margin; abdominal terga deeply, finely, distinctly and very closely punctate throughout, only the very narrow apical rims impunctate, this somewhat broader on tergum 4 where it is yellowish-hyaline; pseudopygidium transverse, very short, forming the rather narrow, truncate, apical margin of tergum 5, densely covered with suberect, whitish tomentum; pubescence extremely short, thin and obscure, hardly visible, entirely pale where evident, sternum 5 with an apical tuft of elongate, somewhat curved, brownish hairs on each side of mid-line.

MALE—Length 7 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat more than half width of eyes, posterior margin subcarinate; antennal scape only slightly swollen, apex deeply excavated and partially enclosing pedicel, shorter side of basal segment of flagellum fully equal to segment 2, median segments fully as broad as long; mandibles slender and simple apically; wings hyaline basally becoming faintly infuscated apically, with the usual three submarginal cells, 2nd only slightly broader than 3rd anteriorly, veins testaceous to piceous, stigma somewhat more reddish, basal vein interstitial with transverse median; tegulae shining, punctures rather fine but deep and distinct, rather sparse except anteriorly; posterior margin of scutellum only faintly impressed; front coxae not spinose; hind femora unmodified; clypeus, labrum, mandibles except tips, the narrow malar space and lateral margins adjacent to clypeus, yellowish; head otherwise black, antennal scape more testaceous anteriorly, flagellum reddish-testaceous beneath, becoming piceous above; punctures rather uniformly deep, distinct, close and rather coarse over entire head, becoming somewhat finer below antennae and over median area of clypeus; scutum densely rugoso-punctate, rather finely so laterally, scutellum and mesopleura more coarsely and distinctly

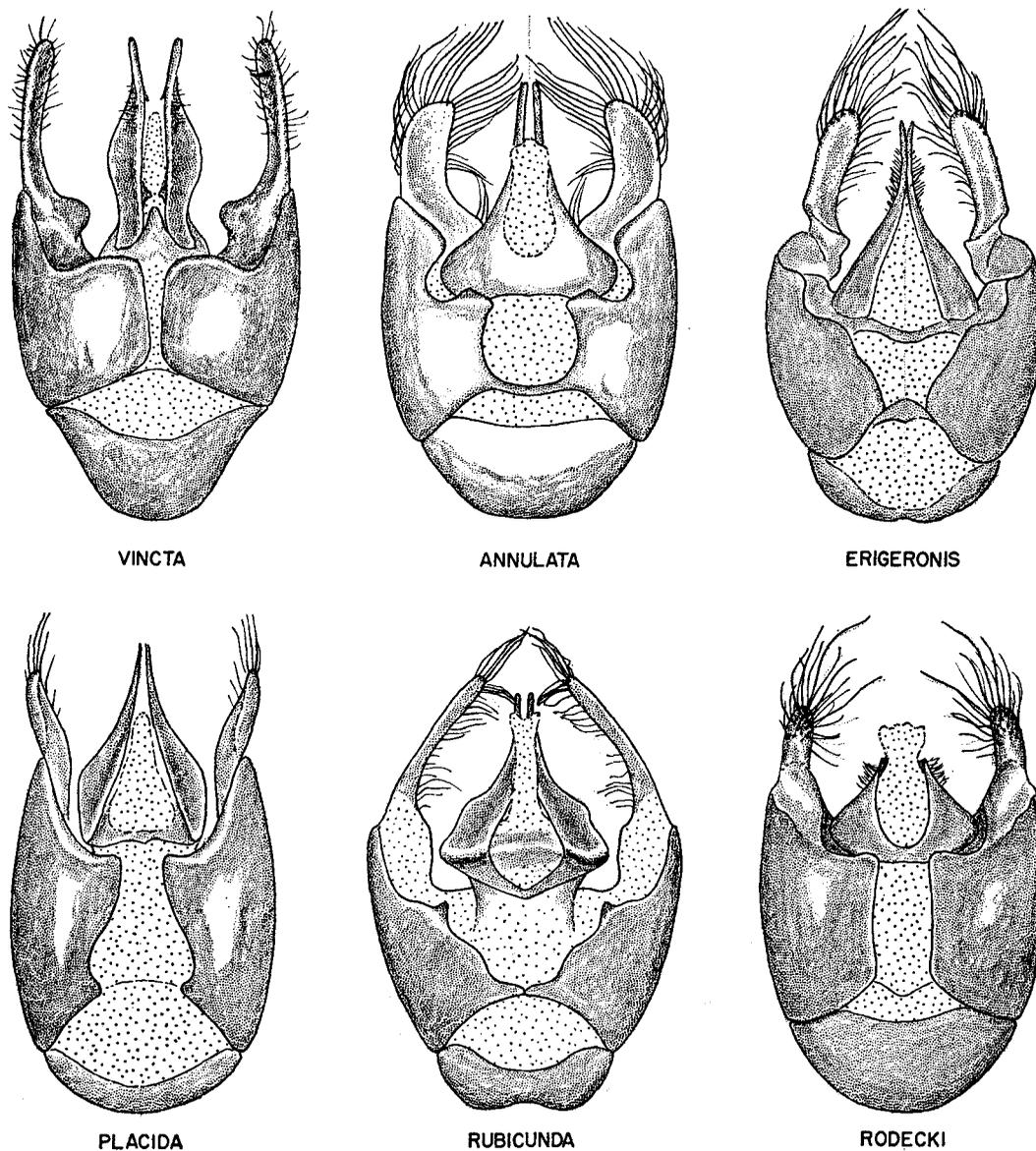


Figure 103—Dorsal views of genital armature in males of species of *Nomada*.

punctate, the punctures becoming crowded on pleura above; propodeum somewhat more finely but very densely rugoso-punctate, lateral faces becoming somewhat shining toward mid coxae, triangle impunctate but dull and densely tessellate, obscurely short-striate along upper margin; abdominal terga quite uniformly, deeply, very closely and rather finely punctate throughout, only the very narrow apical rims impunctate, and punctures somewhat coarser and more distinctly separated on the more apical terga; pubescence extremely short, thin

and obscure, entirely pale where visible; median length of pygidial plate subequal to basal width, slightly narrowed to the abruptly truncate tip, margins carinate, surface rather coarsely but shallowly rugoso-punctate; abdominal sterna deeply, closely and rather finely punctate, depressed rims rather broad, yellowish-hyaline; sternum 6 rather broadly rounded; apical process of sternum 8 (fig. 104) broadly rounded, fringed with robust, ventrally directed setae; gonocoxites of genital armature (fig. 103) broad at base, not

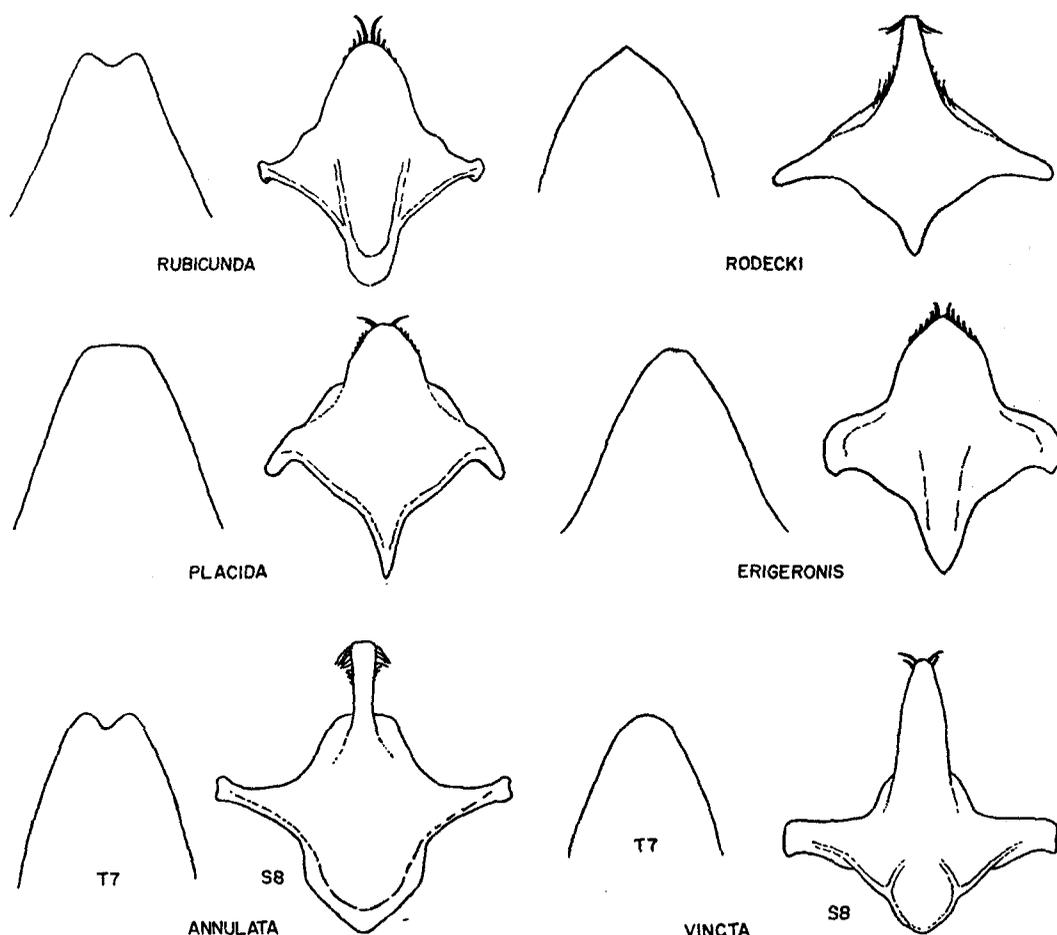


Figure 104—Tergum 7 and sternum 8 in males of species of *Nomada*.

lobate, gonostyli slender and quite short, sparsely tufted apically, neither produced nor tufted at base beneath.

DISTRIBUTION — Nebraska to New York, south to North Carolina, August to October.

FLOWER RECORDS — *Aster*. Robertson (1929) records *placida* also on *Boltonia* and *Solidago*.

Nomada (Callinomada) rodecki
new species
(Figs. 103 & 104)

MALE—Length 9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks only slightly narrower than eyes, hind margin quite strongly carinate; antennal scape quite slender, not much

broader than flagellum, apex rather deeply excavated but not completely enclosing pedicel, shorter side of basal segment of flagellum nearly as long as segment 2, median segments only very slightly longer than broad; mandibles rather robust, simple; wings hyaline basally, becoming rather deeply infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd very short anteriorly, much narrower than 3rd, veins testaceous to piceous, basal vein interstitial with transverse median; tegulae shining between quite coarse, close and deep punctures; posterior margin of scutellum only slightly impressed medially; front coxae not spinose; hind femora unmodified; labrum, clypeus except narrow upper margin, mandibles except tips, a very small spot on supraclypeal area, and small lateral maculations, bright yellow, the lateral maculations not reaching level of antennae and interrupted by a dark-

ened area near lower end of eye; face, vertex and cheeks otherwise black; antennal scape largely yellow, flagellum more brownish-testaceous below, more piceous above; pronotal collar, tubercles, tegulae, scutellum except anterior and posterior margins, and two large lateral maculations on posterior face of propodeum, bright yellow; thorax otherwise black; tibiae and tarsi bright yellow, front femora yellow beneath and toward apex, mid and hind femora more narrowly yellow at apex, otherwise legs piceous to testaceous basally, spurs pale yellow; basal abdominal tergum mostly piceous, but with a vague, more or less yellowish median band; terga 2-4 with transverse, basal, yellow bands that are broad laterally, much narrowed or interrupted medially, discs piceous apically; terga 5 and 6 with submedian, transverse, yellow bands that are more or less interrupted medially; abdominal sterna 1 and 2 largely dark, 3-5 with transverse, yellow, basal bands; punctures very coarse, close and deep over most of head, becoming somewhat finer, shallower and closer on clypeus, supraclypeal area rather densely and finely rugose; punctures of scutellum deep and contiguous, rather irregular as to size, somewhat finer laterally, very coarse over median area; scutellum somewhat more finely and very closely punctate; mesopleura very coarsely and deeply punctate, with some very narrow, shining interspaces evident, but contiguous in general; lateral faces of propodeum somewhat shining, with very fine, scattered, irregular rugosities above and posteriorly, posterior face more shining, punctures coarse, close and deep laterally, median area and triangle impunctate; basal abdominal tergum minutely and rather closely punctate apically, punctures becoming increasingly minute toward base; terga 2-5 with deeper, more distinct but still fine and close punctures, these becoming somewhat more minute toward the narrowly impunctate apical rims on 2 and 3, but becoming somewhat coarser and distinct on 4 and 5, very close and fine but deep and distinct over entire disc of 6; pubescence extremely short, thin and obscure, entirely pale where visible, somewhat more evident on face, cheeks below, venter of thorax and on the more apical abdominal segments; basal width of pygidial plate somewhat greater than median length, obtusely angulate at apex, margins carinate, surface very densely and finely rugoso-punctate; sternum 6 rather broadly rounded apically; sternum 8 (fig. 104) with a slender, apical process, obscurely fringed except at apex; gonocoxites of genital armature (fig. 103) broad at base, not lobate, gonostyli very short, conspicuously tufted, not produced at base beneath, penis valves strongly flexed, the apices directed ventrally (thus hidden from view in figure).

TYPE—Holotype: Male, Southern Pines, N. C., May 12, 1950 (T. B. Mitchell).

Nomada (Phor) integerrima
Dalla Torre

Nomada integra Robertson, 1893. Amer. Ent. Soc. Trans. 20, p. 276. ♀ ♂. Preocc.

Nomada integerrima Dalla Torre, 1896. Cat. Hym. v. 10, p. 353. N. name.

Phor integer Robertson, 1903. Canad. Ent. 35, pp. 174, 175, 177. ♀ ♂.

Phor integer Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin subcarinate; shorter side of basal segment of flagellum fully equal to segment 2 which is only very slightly longer than broad, median segments fully as broad as long; mandibles slender and simple; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd nearly equal in breadth anteriorly, veins testaceous to piceous, basal vein interstitial with or slightly basad of transverse median vein; tegulae shining between fine but quite deep, distinct and rather sparse punctures; posterior margin of scutellum quite deeply grooved medially; front coxae with short, triangular spines; apex of hind tibiae with a row of 5 or 6 elongate, piceous bristles; head and thorax preponderantly red, with black maculations, tubercles and tegulae somewhat more testaceous, legs reddish-testaceous, spurs pale yellow; face black around and between bases of antennae and ocelli, and along posterior margin of cheeks; prothorax laterally, mesothorax beneath, metapleura and adjacent area of propodeum, and a median band on scutum and posterior face of propodeum, black; abdomen red in general, basal tergum entirely so, terga 2 and 3 with widely separated, lateral, yellow maculations, 4 with a pair of transverse, submedian bands that are slightly separated medially, and 5 with a rectangular, subapical, yellow blotch; punctures coarse, close and deep on face above antennae and on vertex, somewhat finer on cheeks, very fine and close on supraclypeal area and clypeus, becoming somewhat more sparse and distinct on lateral areas of face below; scutum, scutellum and pleura coarsely rugoso-punctate, the scutum somewhat more finely and densely so anteriorly; metapleura and propodeum in large part somewhat more finely and shallowly rugoso-punctate, triangle impunctate, becoming rather coarsely rugoso-striate along upper margin; basal abdominal

tergum shining, punctures exceedingly minute, hardly visible; terga 2-5 very finely but more distinctly punctate, punctures rather close and uniformly distributed, becoming somewhat more sparse and minute toward apical margins of each tergum, but only the narrow apical rims impunctate, these more or less yellowish-hyaline; punctures of tergum 5 somewhat more distinct and very close basally, becoming coarser apically; pseudopygidium transverse, very short, forming the rather narrow, truncate, apical margin of tergum 5, densely covered with pale yellowish, suberect tomentum; pubescence short, rather thin, entirely pale, rather copious on head and thorax, becoming somewhat yellowish above, hardly evident on abdominal terga, but becoming more evident apically, sternum 5 with lateral tufts of elongate, curved, fuscous hairs on each side of mid-line apically.

MALE—Length 5.5-8 mm.; space between lateral ocelli and margin of vertex about half that separating the ocelli; cheeks only slightly narrower than eyes, posterior margin subcarinate; antennal scape considerably swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum very short, no longer anteriorly than the apical breadth, segment 2 slightly longer, median segments about as broad as long; mandibles slender and simple; wings largely hyaline, becoming slightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd only slightly broader than 3rd anteriorly, veins testaceous, basal vein interstitial with or slightly basad of transverse median; tegulae somewhat shining between rather deep, distinct and close punctures; posterior margin of scutellum rather deeply grooved medially; front coxae with very short, triangular, posterior spines or tubercles; hind femora slender and simple; clypeus except upper margin, narrow lateral face marks, labrum and mandibles, bright yellow, the face marks extended very narrowly along margin of eye to level of antennae, head otherwise black; antennal scape narrowly yellowish-testaceous anteriorly, flagellum more reddish-testaceous beneath, somewhat darker above; thorax largely or entirely black, tubercles more or less yellowish-testaceous, tegulae yellowish-hyaline, front and mid legs testaceous, hind femora piceous but the tibiae and tarsi testaceous, spurs pale yellow; basal abdominal tergum largely piceous, but the slightly impressed, apical margin more ferruginous; terga 2 and 3 with widely separated, lateral, yellow maculae, 4 with very inconspicuous or vague maculations or none, 5 with a pair of small, sublateral maculations that are slightly separated medially, and 6 with a more median, entire maculation; abdominal sterna largely testaceous, margins

more or less yellowish-hyaline; punctures coarse, deep and very close on face above antennae and on vertex, somewhat finer and very close on cheeks, very fine and close on face and clypeus below; scutum, scutellum and mesopleura quite coarsely and densely rugosopunctate, the metapleura and propodeum somewhat more shallowly but rather coarsely rugose, triangle impunctate but rather dull, upper margin becoming quite densely rugosostriate; basal abdominal tergum shining, punctures extremely minute, hardly visible but rather close; discs of terga 2-6 with very fine, slightly separated but rather uniform punctures, apical impressed areas becoming more minutely and sparsely punctate, rims very narrowly impunctate, these areas becoming yellowish-hyaline; pubescence entirely pale, rather copious over head and thorax, dense and subappressed on face below antennae, more elongate and erect above, quite dense and elongate on thorax laterally and beneath, very short and obscure on abdomen, the more apical sternal plates without conspicuous fringes, sternum 7 rather densely covered toward apex with rather short but erect whitish hairs; pygidial plate somewhat longer than basal width, rather strongly narrowed apically to the narrowly truncate apex, margins carinate, surface quite closely and rather coarsely rugosopunctate; sternum 8 and genital armature much as in the *maculata* (fig. 98), but gonostyli more slender and less robust, narrowly rounded at tip.

DISTRIBUTION—Minnesota to Quebec and the New England states, south to Louisiana and North Carolina, March to August.

FLOWER RECORDS—*Rubus* and *Salix*. Recorded by Robertson (1929) also on *Antennaria*, *Claytonia*, *Dentaria*, *Heracleum* and *Prunus*.

Nomada (?*Phor*) *proxima* Cresson

Nomada proxima Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 294. ♂.

Nomada (Phor) proxima Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey Bul. 22 (3), p. 726.

MALE—Length 9 mm.; lateral ocelli slightly nearer margin of vertex than to eyes; cheeks subequal to eyes in width; longer side of basal segment of flagellum slightly shorter than segment 2, median segments only slightly longer than broad; mandibles simple; wings hyaline, faintly clouded along outer margin, veins brownish-testaceous; 3rd submarginal cell slightly narrower than 2nd anteriorly,

basal vein distinctly basad of transverse median; tegulae testaceous, shining, rather closely punctate; scutellum rounded, not at all grooved; front coxae not spinose; hind femora unmodified; labrum, mandibles except tips, lower half of clypeus, and narrow lateral face marks, yellow; scape entirely black, flagellum brownish beneath, black above; head otherwise black; thorax entirely black, with only the tubercles yellowish; terga 2-6 with transverse yellow maculations, that on 2 narrowed and interrupted medially, subinterrupted on 3 and 4, entire on 5 and 6, discs otherwise blackish; sterna also with rather narrow, transverse, yellow bands on 2-5; pygidium narrowed and truncate apically, margins carinate, surface closely punctured; head and thorax quite coarsely rugoso-punctate, propodeal triangle smooth below, but rugose across upper half; abdominal terga finely and closely punctured but punctures not crowded; pubescence of head and thorax quite copious and erect, yellowish, very fine and subappressed on abdomen.

TYPE LOCALITY—Maine.

This species is based on a single male specimen which was described nearly 100 year ago. No specimens assignable to it have appeared in any of the collections made, or received for study, and apparently it remains to be rediscovered, along with the unknown female. Robertson placed it with *integerrima* (*integra*) in the genus *Phor*, but there is no evidence that he ever collected any specimens, and possibly he had not seen the type. Thus its inclusion in *Phor* seems hardly justified, and the determination of its place in this scheme of classification must await its rediscovery.

Nomada (Pachynomada) vincta *vincta* Say

(Figs. 103 & 104)

Nomada vincta Say, 1837. Boston Jour. Nat. Hist. 1, p. 401. ♀.

Holonomada vincta Robertson, 1903. Canad. Ent. 35, p. 177. ♀ ♂.

Holonomada vincta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9.5-12 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin not carinate; shorter side of basal segment of flagellum fully equal to segment 2 in length, median segments slightly longer than broad; mandibles simple, rather robust; wings lightly infuscated, slightly dark-

er apically, with the usual three submarginal cells, 2nd somewhat narrower than 3rd anteriorly, veins and stigma testaceous, basal vein interstitial with transverse median; tegulae shining between rather deep and distinct but fine and evenly distributed punctures; posterior margin of scutellum very slightly impressed medially; front coxae not spinose; apex of hind tibiae with a row of 3-6 rather short but robust, testaceous bristles; clypeus and supraclypeal area yellowish-testaceous, the labrum, basal half of mandibles, and broad, lateral, facial maculae, bright yellow, the lateral maculae terminating rather narrowly at top of eye, and cheeks very narrowly rimmed with yellow along eye margin; otherwise upper portion of face, vertex and cheeks black; antennal scape, pedicel and basal segment of flagellum testaceous, flagellum otherwise more piceous; pronotal collar, tubercles, tegulae, scutellum in large part, adjacent median area of metanotum, a pair of broad maculae on propodeum, a large anterior maculation on mesopleura, and front, mid and hind coxae in large part, bright yellow; thorax otherwise black, scutellum rimmed with black both anteriorly and posteriorly, and with a median black line; trochanters piceous, femora testaceous, more or less piceous along lower margin, tibiae and tarsi bright yellow, spurs pale yellow; abdominal terga 1-5 with transverse, entire, submedian, yellow bands, these somewhat narrowed medially on 1-3, very broad on 5, covering most of the disc; abdominal sterna piceous, 2-4 with more or less complete, submedian yellow bands; punctures over entire head quite close, deep and distinct, somewhat finer on cheeks and vertex, more distinctly separated on face laterally and below; scutum densely and rather uniformly rugoso-punctate, scutellum and pleura below somewhat more coarsely and distinctly punctate, becoming more closely crowded on pleura above; propodeum rather closely and finely punctate, lateral faces below becoming smooth and somewhat shining, triangle impunctate, dull and densely tessellate, becoming somewhat striate along upper margin; abdominal terga very finely and closely but deeply and distinctly punctate throughout, the punctures becoming invident at base of tergum 1, somewhat more coarse and sparse on tergum 5, only the very narrow apical rims of each impunctate; pseudopygidium transverse, very short, forming the truncate apical margin of tergum 5, covered with very dense, pale, suberect tomentum; pubescence extremely short, thin and obscure, hardly evident, entirely pale where visible; sternum 5 apically with a conspicuous tuft of elongate, yellowish hairs on each side.

MALE—Length 9-11 mm.; lateral ocelli

slightly nearer margin of vertex than to each other; cheeks slightly more than half width of eyes, posterior margin rounded; antennal scape bulbous, length only slightly exceeding the maximum breadth, apex only slightly excavated, fully exposing pedicel, shorter side of basal segment of flagellum slightly longer than segment 2, following segments fully as broad as long; mandibles robust, entirely simple; wings subhyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma testaceous, basal vein interstitial with transverse median; tegulae shining between deep, distinct and rather close punctures throughout; posterior margin of scutellum narrowly and slightly grooved medially; anterior coxae not spinose; hind femora unmodified; apex of hind tibiae with a row of 5 or 6 rather short but robust, testaceous bristles; labrum, basal half of mandibles, entire face below antennae, and a narrow band completely encircling eyes, bright yellow, a small yellow spot just below anterior ocellus; otherwise upper part of face, vertex and cheeks black; scape yellow anteriorly, becoming testaceous posteriorly, flagellum largely testaceous, more or less piceous above toward apex; pronotal collar, tubercles, tegulae, scutellum, adjacent median area of metanotum, two large maculations on propodeum, a large anterior maculation on mesopleura, and all coxae, bright yellow; scutum narrowly ferruginous on each side, thorax otherwise black; trochanters and femora in general testaceous, the femora more or less yellowish anteriorly, tibiae and tarsi yellow, hind tibiae more or less testaceous over apical two thirds, spurs pale yellow; abdominal terga 1-6 with entire, transverse, broad, submedian, yellow bands, these slightly narrowed medially on 1-3, quite uniformly wide on 4 and 5, more restricted on 6; sterna 2-4 with more or less conspicuous, basal, yellow bands that are considerably narrowed at mid-line, 5 with a small, submedian, yellow maculation; sterna otherwise yellow-hyaline apically, more or less darkened between these areas and the maculations; punctures quite close, deep and distinct over entire head, somewhat finer on cheeks, somewhat more sparse on each side of clypeus below, those on clypeus medially rather coarse, very close and irregular; scutum densely and rather finely rugoso-punctate; pleura below very coarsely and distinctly punctate, punctures becoming slightly closer above; propodeum rather closely and deeply punctate, lower margin laterally becoming shining and impunctate, the triangle impunctate but dull and tessellate, becoming very finely and irregularly rugoso-striate along upper margin; abdominal terga deeply and distinctly but very finely and

closely punctate throughout, punctures becoming inevident at base of tergum 1, somewhat coarser and more widely separated on the more apical terga, only the very narrow apical rims impunctate; pubescence extremely short, thin and inconspicuous, pale yellowish where visible; basal width of pygidial plate (fig. 104) about equal to median length, strongly narrowed apically to the narrowly rounded apex, margins carinate, surface very finely and shallowly punctate; sternum 6 quite broadly rounded, rather deeply and closely punctate, at least toward base; sternum 8 (fig. 104) with an elongate, slender, apical process, with a few robust setae at tip; gonocoxites of genital armature (fig. 103) broad at base but not lobate, gonostyli slender and elongate, thinly short pubescent, somewhat produced on inner side at base but not tufted.

DISTRIBUTION—Kansas and Nebraska, east to North Carolina, July to September.

FLOWER RECORDS—*Bidens*. Recorded by Robertson (1929) on *Aster* and *Helianthus*.

Recognition of another form of this species, *heterochroa* Cockerell, from Colorado makes the subspecific designation of this typical form of *vineta* necessary.

Nomada (Heminomada) annulata Smith

(Figs. 103 & 104)

Nomada annulata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 248. ♀. (♂ misdet)

Nomada annulata Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 311.

FEMALE—Length 8-9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes, posterior margin subcarinate above; shorter side of basal segment of flagellum fully equal to segment 2, median segments slightly longer than broad; mandibles unusually robust, quite strongly flattened, outer margins strongly bowed, almost angular, inner margin relatively straight; wings subhyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd quite broad anteriorly, 3rd very strongly narrowed, veins testaceous, basal vein slightly basad of transverse median, almost interstitial; tegulae shining between deep, distinct, rather coarse punctures which are close anteriorly, slightly more sparse posteriorly; posterior margin of scutellum only very faintly impressed medially, if at all; front coxae not spinose; apex of hind tibiae with a pair of short but robust, reddish bristles; clypeus, supraclypeal area,

lateral facial maculae extending completely around eyes, and a small spot below anterior ocellus, bright yellow; labrum somewhat more yellowish-testaceous, mandibles and antennal scape testaceous, flagellum more brownish-testaceous; pronotal collar, tubercles, tegulae, scutellum, adjacent median area of metanotum narrowly, lateral margins of scutum and adjacent axillae, and usually a pair of narrow, submedian lines, an anterior and a dorsal maculation on mesopleura, and a pair of broad maculations on propodeum, bright yellow; mesopleura above largely ferruginous posterior to and beneath the yellow maculae; coxae with small yellow maculae, but otherwise testaceous, trochanters and femora testaceous in large part, tibiae largely yellow, hind pair somewhat testaceous apically; front and middle basitarsi yellowish, the more apical tarsal segments and hind tarsi entirely, more testaceous, spurs pale yellowish; abdominal terga 1-5 with entire, broad, transverse, yellow bands, that on tergum 1 submedian and rather narrow, those on 2 and 3 sub-basal, sometimes interrupted medially by a broad ferruginous area on 2, those on 4 and 5 sub-apical; impressed apical margins more ferruginous on 4 and 5, piceous on 1-3, and base of 1 piceous; sterna 2-5 with more or less extensive, transverse, basal, yellow areas, apical margins rather broadly and obscurely brownish-hyaline; punctures close, deep and distinct over most of head, coarsely so above antennae and at sides of face below, more finely so on cheeks and vertex, the supraclypeal area and clypeus laterally with coarse and deep punctures, these becoming very fine and rather obscure on clypeus medially; scutum quite coarsely and densely rugoso-punctate, scutellum with rather sparse, coarse and deep punctures, pleura very coarsely, deeply and quite closely punctate below, but with some shining interspaces evident, becoming densely crowded above; propodeum rather finely rugoso-punctate, triangle irregularly striate, rather coarsely so along upper margin; discs of abdominal terga with rather deep, distinct, fine and slightly separated punctures, apical rims becoming narrowly impunctate, punctures extremely minute on tergum 1 but still quite close basally, those on 4 and 5 relatively coarse and well separated toward the apical impressed margins which are more or less reddish; pseudopygidium transverse, median length almost half the breadth, forming the apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence extremely short and thin but rather copious over head and thorax, yellowish above, somewhat more whitish below, barely evident on abdomen dorsally, more elongate and very thin on sternal plates, sternum 5 with apical

tufts of elongate, yellowish hairs on each side of mid-line, these converging medially.

MALE—Length 6.5-9.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks more than half width of eyes, posterior margin carinate above; antennal scape strongly swollen, apex rather deeply excavated, partially enclosing pedicel, shorter side of basal segment of flagellum fully equal to segment 2, median segments very slightly longer than broad; mandibles robust, somewhat flattened, outer margins slightly angulate, inner margin nearly straight; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd, veins yellowish, basal vein very slightly basad of transverse median; tegulae shining between fine but quite deep and distinct, rather close punctures, these becoming more sparse posteriorly; posterior margin of scutellum very slightly grooved medially; front coxae not spinose; hind femora slender and simple; face below antennae yellow except for some blackened areas just below each antennal fossa, the lateral facial maculae extending very narrowly to top of eye; cheeks below narrowly yellow along eye margin; antennal scape yellow anteriorly, black posteriorly, flagellum brownish-testaceous; pronotal collar in part, tubercles, tegulae, transverse maculations on scutellum, and a rather small anterior maculation on mesopleura, bright yellow, thorax otherwise black; legs chiefly bright yellow, but femora more or less testaceous to piceous on posterior face, and hind coxae black; spurs pale yellow; abdominal terga 1-6 with entire, transverse, yellow bands, that on 1 submedian and rather narrow, that on 2 sub-basal, very broad laterally, slightly narrowed medially, those on 3 and 4 sub-basal, more nearly apical on 5 and 6, apical margins more or less yellowish-hyaline on the more apical terga; abdominal sterna 2-6 largely bright yellow, apical margins broadly yellowish-hyaline; punctures very coarse, deep and close on face above antennae, becoming somewhat finer but still very close on vertex laterally and on cheeks, much finer and very close below antennae, very fine and distinct on clypeus; entire thorax densely rugoso-punctate, the pleura very coarsely so below, punctures of scutellum somewhat more distinct, propodeal triangle impunctate but rather finely and irregularly substriate; abdominal terga very finely and rather closely punctate, tergum 1 very minutely so, becoming impunctate toward base; punctures of the more apical terga becoming somewhat more coarse and distinctly separated, apical rims very narrowly impunctate; pubescence pale yellowish, short and thin but rather copious over head and thorax, hardly evident

on abdomen dorsally, more elongate but very thin and sparse on abdominal sterna; sternum 6 quite densely fringed on each side with elongate yellowish hairs, the apical pubescence erect and quite dense; basal width of pygidial plate about equal to median length, quite strongly narrowed apically to the narrowly but deeply incised tip, margins carinate, surface very finely and closely punctate; sternum 6 triangular; sternum 8 and gonocoxites of genital armature as shown (figs. 103 & 104).

DISTRIBUTION—North Carolina, April and May.

FLOWER RECORDS—*Claytonia*, *Rubus* and *Senecio*.

HOST—*Andrena macra* Mitchell.

Nomada (?*Heminomada*) *autumnalis*
new species

MALE—Length 8 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin subcarinate; antennal scape quite strongly swollen, apex deeply excavated, partially enclosing pedicel, longer side of basal segment of flagellum equal to segment 2, median segments very slightly longer than broad; mandibles slender and simple apically; wings hyaline, only the rather narrow apical margin and marginal cell lightly infuscated, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma testaceous, basal vein much basad of transverse median; tegulae shining between rather fine punctures, these close over anterior half, becoming sparse posteriorly; posterior margin of scutellum quite deeply depressed medially; front coxae not spinose; hind femora slender and simple; lower half of face largely yellow, but broadly black laterad of bases of antennae and reaching the supraclypeal area, the lateral facial maculations extending very narrowly to top of eye, and cheeks very narrowly yellow along posterior orbits nearly to top; vertex, cheeks and upper part of face black; antennal scape bright yellow anteriorly, piceous posteriorly, flagellum more reddish-testaceous; thorax largely black, with only the tubercles and a small anterior maculation on mesopleura, yellow; coxae black in large part, becoming yellowish apically, trochanters more testaceous; front and mid femora testaceous posteriorly, yellowish anteriorly, the tibiae largely yellow with some testaceous infusions, and tarsi entirely yellow; hind femora piceous posteriorly, more testaceous anteriorly, apex yellow, hind tibiae yellow at base, otherwise more testaceous, and tarsi testaceous; spurs pale yellow; abdominal terga 2 and 3 with broad,

transverse, submedian, yellow bands that are somewhat narrowed medially, 4-6 with more apical, yellow bands separated from apical rims only by the impressed apical margin; tergum 1 with a pair of transverse, more lateral maculations that are slightly separated medially by a testaceous zone, 1-3 piceous basally and apically, 4-6 becoming more brownish or testaceous apically; discs of abdominal sterna 2-6 largely yellow, the impressed apical areas more testaceous, becoming yellowish-hyaline along the rims; sternum 1 with a very small, median, yellow spot; vertex and face above antennae quite coarsely rugose, cheeks becoming somewhat more finely rugoso-punctate, lower part of face more distinctly but finely punctate, the supraclypeal area and clypeus with minute, close and very vague punctures; scutum and scutellum densely rugose, mesopleura somewhat more coarsely rugoso-punctate; propodeum posteriorly more shallowly rugoso-punctate, lateral faces becoming rather smooth below and along margin of metapleura; punctures of abdominal terga 2-6 very fine and close, becoming somewhat more distinctly separated apically, especially on the more apical terga, very minute medially on basal tergum, becoming impunctate laterally and basally; pubescence entirely pale, quite copious over head and thorax but not hiding surface, very fine, short and obscure on abdominal terga, but the more apical hairs becoming more elongate; sternal plates with more elongate, sparse, fine hairs, these becoming rather dense on apex of sternum 6; median length of pygidial plate about equal to basal width, somewhat narrowed apically, apex rather deeply incised, margins strongly carinate, surface rather closely and shallowly punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed apically, subtriangular; sternum 8 with a slender apical process; gonocoxites of genital armature much as in *denticulata* (fig. 107).

TYPE—Holotype: Male, Oakland Co., Mich. Sept. 23, 1923. (A. W. Andrews) [author's coll.].

Nomada (*Heminomada*) *bethunei*
Cockerell
(Fig. 105)

Nomada bethunei Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 607. ♂.

MALE—Length 9-10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks considerably narrower than eyes, posterior margin strongly carinate; antennal scape quite strongly swollen, apex deeply excavated and completely enclosing pedicel,

basal segment of flagellum very short, the shorter side less than half length of segment 2, median segments somewhat longer than broad; mandibles rather robust, simple; wings hyaline basally, becoming lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein considerably basad of transverse median; tegulae shining between very close, deep and distinct punctures; posterior margin of scutellum deeply grooved; front coxae not spinose; hind femora slender and unmodified; face below antennae largely yellow, with only a small amount of red below each antenna and between the yellow supra-clypeal area and lateral face marks, these ending rather abruptly at level of antennae; face otherwise chiefly ferruginous, with a small amount of black just above supra-clypeal area and between ocelli; posterior margin of cheeks rather narrowly black; antennal scape bright yellow anteriorly, more ferruginous on inner and posterior sides, flagellum brownish-testaceous; thorax red in large part, the pronotal collar narrowly, tubercles, an anterior maculation on mesopleura, and a small lateral maculation on each side of posterior face of propodeum, yellow; tegulae more testaceous; metapleura and lateral faces of propodeum black, and a small amount of black medially on venter of thorax; legs largely reddish-testaceous, the front coxae, trochanters, femora and tibiae quite definitely yellow anteriorly, a small amount of yellow on mid coxae beneath and hind coxae laterally; spurs pale yellow; basal abdominal tergum largely dark, with a transverse, more or less ferruginous, submedian band which becomes yellowish laterally, the basal and apical margins fuscous; terga 2-6 with broad, transverse, entire, yellow bands, these more basal, very broad laterally and somewhat narrowed medially on 2-4, subapical on 5 and 6; discs of abdominal sterna 3-6 with considerable yellow, the broadly impunctate and depressed apical margins testaceous-hyaline; punctures of face coarse, close, deep and distinct, those on vertex somewhat more crowded, becoming rather fine but densely crowded on cheeks below, supra-clypeal area and clypeus very finely and obscurely punctate, very sparsely so on each side of clypeus just above mandibles; scutum, mesopleura and scutellum coarsely and deeply rugoso-punctate, the propodeum posteriorly somewhat more finely and more shallowly rugose, lateral faces more or less rugoso-striate below, more coarsely rugose above; discs of abdominal terga minutely and quite closely punctate, basal tergum becoming impunctate laterally and basally, punctures on the following terga becoming somewhat more widely sep-

arated on the apically impressed areas, somewhat coarsely so on the more apical terga, only the very narrow rims entirely impunctate; pubescence very short and thin, entirely pale, whitish, quite copious on head and thorax below, becoming somewhat shorter and more yellowish above, very short and inconspicuous on abdomen dorsally, very sparse and thin on the sterna; sternum 6 densely clothed toward apex with rather elongate, erect, pale pubescence; median length of pygidial plate subequal to basal width, rather strongly narrowed apically, the tip deeply incised, margins carinate, surface rather coarsely but shallowly punctate; exposed sternal plates unmodified; sternum 6 quite strongly narrowed apically; sternum 8 much as in *annulata* (fig. 104); gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION — Michigan and Ohio, May to July.

Nomada (Heminomada) bishoppi
Cockerell new combination

(Fig. 105)

Nomada (Xanthidium) luteola bishoppi Cockerell, 1911. U. S. Natl. Mus. Proc. 39, p. 655. ♀.

Nomada (Heminomada) luteoloides bishoppi Swenk, 1915. Univ. Nebr. Stud. 15, p. 169.

FEMALE—Length 9.5-12 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks nearly as broad as eyes, posterior margin strongly carinate; longer side of basal segment of flagellum about equal to segment 2, median segments somewhat longer than broad; mandibles rather robust, simple apically; wings hyaline basally, becoming somewhat yellowish apically, with the usual three submarginal cells, 2nd not much longer than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct and rather coarse punctures which are close anteriorly, somewhat sparse posteriorly; posterior margin of scutellum quite deeply grooved, upper surface smooth and shining between coarse, deep, distinct and rather sparse punctures; front coxae not spinose; apex of hind tibiae with a pair of short, triangular, robust processes which form a quite deep emarginate area; cheeks anteriorly and lower half of face below antennae entirely yellow, eyes thus nearly surrounded by yellow; cheeks posteriorly, space between ocelli, and limited areas above antennae, black; vertex and face just below ocelli ferruginous; antennal scape more testaceous, flagellum brownish-testaceous; pronotal collar, tubercles,

tegulae in large part, scutellum, axillae, lateral margins and a pair of narrow submedian lines on scutum, posterior face of propodeum except mid-line, and an extensive transverse area on mesopleura, bright yellow; scutum medially, anterior margin of scutellum, a median stripe and lateral faces of propodeum, and metapleura, black; scutum largely ferruginous between median and lateral yellow lines, mesopleura above with a small yellow maculation just below wing bases, and venter of thorax dark ferruginous with blackish infusions; coxae, trochanters and femora largely ferruginous, but narrowly yellow apically, tibiae yellow at base and apex, these maculations to some degree connected on front and mid legs, tarsi more testaceous, spurs pale yellow; abdominal terga 1-5 with broad, entire, yellow bands, these occupying nearly the entire disc of 2-5, that on 1 submedian and subinterrupted medially; abdominal sterna 2-5 yellow in large part, only the broad, depressed, subhyaline, apical margins more reddish, basal sternum with yellowish infusions medially, otherwise red; punctures coarse, close and deep over most of face and vertex, finer on cheeks, supraclypeal area and clypeus, very sparse between clypeus laterally and lower margin of eyes; scutum coarsely rugoso-punctate medially, becoming much more finely so laterally, posterior median area more distinctly punctate; upper face of scutellum very coarsely and rather sparsely punctate, surface shining; mesopleura rather densely and finely rugoso-punctate below, becoming more distinctly and coarsely punctate above, the punctures quite sparse anteriorly; propodeum posteriorly quite finely and obscurely rugose, lateral faces somewhat smoother below, rather coarsely rugose above, triangle rather smooth below, becoming quite coarsely striate along upper margin; discs of abdominal terga very finely and closely but quite distinctly punctate throughout, only basal tergum becoming impunctate laterally and basally, apical margins of terga becoming narrowly impunctate, pseudopygidium transverse, very short, forming a rather broad, truncate, apical margin on tergum 5, densely covered with suberect, silvery tomentum, the more apical punctures of terga 4 and 5 becoming quite sparse; pubescence very short, thin and obscure, entirely pale, somewhat yellowish above, hardly evident on abdomen dorsally, sterna with sparse elongate hairs overlying in part the broad depressed apical margins; sternum 5 apically with a dense tuft of elongate, curved, brownish hairs which converge medially.

MALE—Length 8.5-11.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks considerably narrower than eyes, posterior margin subcarinate; antennal

scape strongly swollen, apex deeply excavated, nearly or quite enclosing pedicel, longer side of basal segment of flagellum fully equal to segment 2, the more apical segments slightly longer than broad; mandibles quite slender and simple apically; wings subhyaline basally, becoming faintly infuscated or yellowish apically, with the usual three submarginal cells, 2nd not much broader than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct, close and rather coarse punctures; posterior margin of scutellum rather deeply grooved medially; front coxae not spinose; hind femora slender and simple; face below antennae largely yellowish, but with some invasion of black on each side of supraclypeal area below antennae, the lateral maculae extending narrowly to top of eyes and posterior margin of eye narrowly bordered with yellow nearly to the top; remainder of face, vertex and cheeks black; scape bright yellow anteriorly, flagellum more testaceous beneath, somewhat darker brown above; pronotal collar, tubercles, tegulae, a pair of small maculations on scutellum and on propodeum posteriorly, and a rather small anterior maculation on mesopleura, bright yellow; thorax otherwise black; front coxae largely yellow, mid and hind pair yellow in part, front legs entirely yellow except for posterior faces of femora and tibiae which are reddish to piceous in part, mid and hind legs more testaceous, the mid femora and tibiae yellow anteriorly and to some degree at base and apex posteriorly, hind femora yellow apically, tibiae yellow at base and apex anteriorly, posterior surfaces of these two segments piceous; all tarsi yellowish to testaceous, spurs pale yellow; abdominal terga 1-6 with broad, entire, yellow bands, tergum 1 piceous to black basally, apical depressed areas of all terga somewhat reddish, becoming narrowly yellowish-hyaline along rims; abdominal sterna yellow in large part, basal sternum with a yellow central blotch, otherwise more reddish; face above antennae quite coarsely rugoso-punctate, becoming somewhat more finely so on vertex and cheeks, the yellow lower part of face rather shallowly and vaguely finely rugose on each side, supraclypeal area and clypeus more distinctly but very finely punctate, lateral areas of face between clypeus and lower end of eye shining and largely impunctate; scutum, scutellum and pleura quite densely rugose, only the maculated areas of scutellum with distinctly separated, coarse punctures; propodeum more finely and obscurely rugose, becoming somewhat smooth and shining on each side below, triangle dull and densely tessellate below, becoming irregularly and rather finely striate

along upper margin; discs of abdominal terga very finely, closely, deeply and distinctly punctate, punctures becoming somewhat more coarse and sparse on terga 4-6 apically; basal tergum becoming impunctate laterally and basally; pubescence pale yellowish, short but quite dense, erect and conspicuous on head and thorax, very fine and obscure on abdomen dorsally, more elongate and sparse on sternal plates, sternum 6 with quite dense, more erect pubescence apically; median length of pygidial plate about equal to basal width, quite strongly narrowed apically, apex slightly incised medially, margins carinate, surface rather closely and finely punctate; exposed sternal plates unmodified; sternum 6 subtriangular, apex rather narrowly rounded; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION—Minnesota to Maine, south to Mississippi and Florida, March to June.

FLOWER RECORDS—*Aronia*, *Brassica*, *Claytonia*, *Crataegus*, *Rubus*, *Senecio* and *Viburnum*.

Nomada (Heminomada) capitalis
new species

FEMALE—Length 8 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks nearly as broad as eyes, posterior margin strongly carinate; longer side of basal segment of flagellum fully equal to segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming rather lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd only slightly broader than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae somewhat shining between deep, distinct punctures, these quite close anteriorly, becoming rather sparse posteriorly; posterior margin of scutellum slightly impressed medially; front coxae not spinose; apex of hind tibiae quite deeply emarginate between a pair of robust, triangular tubercles; face below level of antennae largely yellow, but supraclypeal area and clypeus sometimes more testaceous or ferruginous, lateral face marks ending narrowly near top of eye; face above vertex, and cheeks in part, ferruginous, a limited area above each antenna and another between ocelli, black; cheeks narrowly black posteriorly, yellow along margin of eye, intermediate area above more or less ferruginous; antennal scape yellowish-testaceous anteriorly, flagellum somewhat more brownish-testaceous; pronotal col-

lar, tubercles, tegulae in part, scutellum above, restricted median area on metanotum beneath, two large posterior maculations of propodeum, and a limited anterior area of mesopleura, bright yellow; tegulae yellow, becoming more testaceous posteriorly; scutum with a median black line and some blackish infusions on each side anteriorly; metapleura, adjacent lateral faces of propodeum, and a median area of posterior face, black; otherwise scutum and mesopleura more ferruginous; legs testaceous in large part but front coxae somewhat yellowish apically, and apex of femora narrowly yellowish, tibiae yellow at base and apex, tarsi more testaceous, spurs pale yellow; abdominal terga 1-5 with broad, entire, yellow bands, that on 1 submedian, subinterrupted medially, those on 2-4 median, that on 5 covering most of apical half of disc, the broad, apical, impressed margins somewhat reddish, basal tergum more piceous; discs of abdominal sterna 3-5 largely yellow, apical margins broadly testaceous-hyaline, sternum 1 with a limited median yellow area, and 2 with small, yellow areas on each side; head in large part coarsely, deeply, and very closely punctate, almost rugose above antennae, somewhat more finely and definitely rugose on cheeks below, each side of face below antennae quite distinctly and rather sparsely punctate, supraclypeal area and clypeus medially, more finely and closely punctate, becoming more sparsely and coarsely so laterally; scutum densely rugoso-punctate, rather finely so at each side, mesopleura very coarsely rugoso-punctate, scutellum shining between coarse, deep and well separated punctures; propodeum rather finely and shallowly rugose posteriorly, lateral faces becoming somewhat smoother, disc rather smooth but dull below, becoming irregularly rugoso-striate along upper margins; discs of abdominal terga very finely, closely and quite regularly punctate, punctures becoming slightly more sparse apically, rather coarse toward apex on 4 and 5, basal tergum becoming nearly impunctate laterally and basally; pseudopygidium transverse, very narrow, forming a rather narrow, truncate, apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence extremely short, thin and sparse, somewhat more elongate and copious on head below and on thorax beneath, largely pale yellow where evident, hardly visible on abdomen dorsally, the sterna with sparse but more elongate, pale yellowish hairs; sternum 5 apically with sublateral tufts of elongate curved hairs which converge medially.

TYPES — Holotype: Female, Raleigh, N. C., April 5, 1935 (H. F. Schoof) [author's coll.]. Paratypes: 1 ♀, Univ. Tenn. Farm, Knoxville, Tenn., May 5, 1951 (A. C.

Cole); 1 ♀, Livingston Co., Mich., May 28, 1944 (R. R. Dreisbach); 1 ♀, Antrim, N. H., June 11, 1932 (C. A. Frost).

Paratypes are in collections of the University of Tennessee, R. R. Dreisbach and Museum of Comparative Zoology.

Nomada (Heminomada) colorata
new species

FEMALE—Length 10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes, posterior margin subcarinate; longer side of basal segment of flagellum equal to segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming very faintly infuscated apically, with the usual three submarginal cells, 2nd very much broader than 3rd anteriorly, 3rd very short, veins testaceous to piceous, basal vein slightly basad of transverse median; tegulae somewhat shining between deep, distinct, rather fine punctures, these close anteriorly, becoming quite sparse posteriorly; posterior margin of scutellum quite deeply grooved medially; front coxae not spinose; apex of hind tibiae with a pair of very short but rather robust, triangular tubercles delimiting a median emarginate area; face largely yellow below level of antennae, but with a limited black area laterad of supraclypeal area just beneath antennae, lateral maculae extending rather broadly to top of eyes, and cheeks rather broadly yellow anteriorly nearly to top of eyes, these two marginal maculated areas not quite meeting; otherwise face above antennae, entire vertex and posterior half of cheeks, black; antennal scape yellowish-testaceous anteriorly, flagellum more reddish-testaceous beneath, piceous above; pronotal collar, tubercles, tegulae, scutellum in large part, median adjacent area of metanotum, a pair of large maculae on each side of propodeum posteriorly, and a large anterior maculation on pleura, bright yellow; pleura posteriorly and below more ferruginous, black above but with a rounded yellow spot beneath tegulae which is yellowish-ferruginous; scutum, metapleura, lateral faces of propodeum, propodeal triangle and median area below, entirely black; front coxae yellowish in part, trochanters testaceous, femora testaceous, becoming yellow apically, tibiae and tarsi yellow, somewhat infused with testaceous posteriorly; middle and hind legs largely testaceous basally, femora tipped with yellow, trochanters yellow in large part anteriorly, more or less testaceous posteriorly, mid tarsi yellow, hind tarsi testaceous, spurs pale yellow; abdominal terga 1-5 with broad, transverse yellow bands, these sub-

median on 1-4, somewhat interrupted medially on tergum 1 which is piceous at base and apex, tergum 2 piceous at base, the broad apical margins of 2-4 more ferruginous, somewhat more piceous on 4, tergum 5 almost entirely yellowish; sterna 2-5 largely yellow, only the broad apical margins becoming somewhat more testaceous-hyaline, basal sternum with a very small, median, yellow blotch; head coarsely and closely punctate in general, punctures becoming somewhat finer and closer on cheeks below, coarse and well separated on each side of face below, very fine and close on supraclypeal area and on clypeus medially, becoming rather sparse at extreme sides; scutum densely rugoso-punctate, rather finely so on each side, the mesopleura quite coarsely rugoso-punctate, scutellum shining between coarse, deep and sparse punctures, propodeum rather finely rugose, becoming somewhat smoother on lateral faces below; discs of abdominal terga deeply and distinctly but very finely and closely punctate throughout, basal tergum becoming minutely punctate laterally and basally, the punctures hardly evident, and punctures becoming somewhat more coarse and sparse apically on tergum 5; pseudopygidium transverse, quite short, forming a rather short, truncate, apical margin of tergum 5, densely covered with suberect silvery tomentum; pubescence short, rather copious on head and thorax, largely pale yellow, hardly evident on abdomen dorsally, the sterna with more elongate and sparse pale hairs, sternum 5 with a pair of apical tufts of elongate, curved, yellowish hairs on each side of midline that tend to converge medially.

TYPES—Holotype: Female, Sanilac Co., Mich., Aug. 7, 1926 [author's coll]. Paratypes: 1 ♀, Ann Arbor, Washtenaw Co., Mich., May 1, 1937 (D. L. Cantrall) [Hubbell]; 1 ♀, Ithaca, N. Y., May 4, 1937 (W. B. St. John) [Snelling].

Nomada (Heminomada) dentariae
(Robertson)

(Fig. 105)

Xanthidium dentariae Robertson, 1903. Canad. Ent. 35, p. 178. ♂.

Xanthidium dentariae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat narrower than eyes, posterior margin becoming carinate above; longer side of basal segment of flagellum slightly shorter than segment 2; mandibles rather robust, simple apically; wings

subhyaline basally, becoming lightly infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct and rather close punctures; posterior margin of scutellum deeply grooved medially; front coxae not spinose; apex of hind tibiae with one or two rather slender and elongate, yellowish bristles; head chiefly yellow, with a limited black area just above antennae, ocelli enclosed in an ovoid, blackened area, and posterior half of cheeks black; antennal scape yellow anteriorly, more reddish-testaceous posteriorly, flagellum more brownish-testaceous thorax largely red or yellow (possible discoloration due to cyanide); prothorax laterally, a limited area on mesopleura below, metapleura, adjacent lateral faces of propodeum, posterior face of propodeum medially, mid and hind coxae in large part, and a median line on scutum, black; tubercles and tegulae pale yellowish; femora largely testaceous, but all coxae more yellowish beneath, trochanters, tibiae and tarsi largely yellow, the spurs pale yellow; abdominal terga 1-5 with rather broad, transverse, submedian, yellow or ferruginous bands, these occupying most of discs of 2-4; apical impressed areas broad and piceous, reddish on the more apical terga; abdominal sterna 2-5 largely yellow basally, the broadly impressed, apical margins more reddish, basal sternum with a median yellow blotch; punctures coarse, close, deep and distinct over most of head, becoming slightly finer on cheeks below, very fine and close on supraclypeal area and clypeus; scutum, scutellum, mesopleura and propodeum coarsely and quite densely rugoso-punctate, rather shallowly on propodeum, becoming quite finely so on lateral faces below; discs of abdominal terga 2-4 very finely, closely and quite distinctly punctate basally, punctures becoming more minute and somewhat more widely separated toward apical margins, very minute and rather close on basal tergum medially, becoming impunctate laterally and basally; tergum 5 finely and closely punctate basally, more coarsely and sparsely so apically; pseudopygidium transverse, very short, forming the quite broad, apical margin of tergum 5, densely covered with erect, pale yellowish or whitish tomentum; pubescence very short and thin but fairly copious on head and thorax, whitish below, more yellowish above, barely visible over most of abdomen, with some longer sparse hairs on the sternal plates; apex of sternum 5 with dense lateral tufts of elongate, curved, more or less fuscous hairs which converge medially.

MALE—Length 9.5 mm.; lateral ocelli sub-

equally distant from margin of vertex and each other; cheeks slightly narrower than eyes, posterior margin rounded; antennal scape much swollen, apex deeply excavated and entirely enclosing the pedicel, basal flagellar segment very short, the longer side much shorter than segment 2 which is fully twice as long as broad, median segments somewhat less elongate; mandibles quite robust, simple apically; wings hyaline basally, becoming faintly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins testaceous to brownish, basal vein much basad of transverse median; tegulae shining between deep, distinct and quite close punctures; posterior margin of scutellum very slightly impressed medially; front coxae not spinose; hind femora slender and simple; clypeus, a small spot on supraclypeal area, narrow lateral facial maculae terminating at level of antennae on margin of eye, labrum, mandibles except tips, and lower end of cheeks on eye margin, bright yellow, head otherwise black; antennal scape bright yellow anteriorly, piceous posteriorly, flagellum brownish-testaceous; pronotal collar, tubercles, tegulae, two large maculations on scutellum, and a rather large anterior maculation on mesopleura, bright yellow, thorax otherwise black; front and hind coxae black in large part, legs otherwise largely testaceous, but hind femora more piceous beneath, all tibiae more or less yellow at base and apex, and tarsal segments yellow basally, becoming somewhat reddened apically, spurs pale yellow; abdominal terga 1-6 with broad, basal, yellow bands, that on tergum 1 more median and narrowly interrupted medially, occupying most of discs on 2-6, apical impressed areas more reddish; abdominal sterna 2-6 more or less broadly yellowish across discs, the broad, apical, impressed areas more ferruginous-hyaline, basal sternum with a median yellow blotch, and sternum 6 largely yellow; punctures coarse, deep, distinct and close over most of face and cheeks, coarse just below antennae, very fine, obscure and rather close on maculated areas above and on clypeus, very sparse on lower anterior orbits; scutum, scutellum and mesopleura quite densely and rather coarsely rugoso-punctate, propodeum more shallowly rugoso-punctate posteriorly, becoming much more finely so laterally and more or less shining along lower anterior margin, triangle rather smooth and impunctate below, becoming quite coarsely and irregularly rugoso-striate along upper margin; pubescence short and thin but quite copious over most of head and thorax, whitish below, somewhat tinged with yellow above, barely visible on abdominal terga, the sterna with some more elongate, sparse hairs, only tergum 6 rather densely

pubescent apically; basal width of pygidial plate about equal to median length, strongly narrowed apically, tip deeply incised, margins carinate, surface covered with fine, slightly separated punctures; abdominal sterna but little modified, sternum 6 triangularly acute apically, tip quite densely covered with erect, fine, yellowish hairs; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION—Illinois to New York, south to the Great Smokies National Park (Tennessee or North Carolina), April and May.

FLOWER RECORDS—Robertson (1929) records *dentariae* on *Dentaria*, *Erythronium*, *Mertensia* and *Salix*.

The description above of the female of this species is based on a specimen collected with a male in the Great Smokies National Park and received from R. R. Dreisbach.

Nomada (Heminomada) electa

Cresson

(Fig. 105)

Nomada electa Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 290. ♀ ♂.

Nomada (Xanthidium?) mimula Cockerell, 1908. Ent. Soc. Wash. Proc. 10, p. 66. ♀. New synonymy

FEMALE—Length 9.5 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, posterior margin strongly carinate; longer side of basal segment of flagellum considerably shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple apically; wings yellowish-hyaline, rather deeply so apically, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein much basad of transverse median; tegulae unusually broad and expansive, somewhat shining between deep, distinct, rather coarse and slightly separated punctures; posterior margin of scutellum faintly impressed medially; front coxae not spinose; apex of hind tibiae with a row of very short but rather robust reddish bristles; clypeus, labrum, mandibles except tips, and broad lateral facial maculae, bright yellow; supraclypeal area, face above antennae, vertex, and cheeks, black; cheeks narrowly yellow along eye margin below, and a small yellow spot on eye margin above; facial maculae quite abruptly truncate on eye margin just above antennae; antennal scape yellow anteriorly, more piceous posteriorly, flagellum brownish-testaceous basally,

become more piceous apically; pronotal collar, tubercles, adjacent anterior angle of scutum, scutellum except anterior margin, and adjacent median area of metanotum, bright yellow; mesopleura with a transverse yellow band which is margined above and below with ferruginous; coxae more or less black, trochanters and femora brownish-testaceous, tibiae yellow at least at base and apex, more or less testaceous medially, tarsi largely testaceous, tibial spurs pale yellow; abdominal terga 1-5 with conspicuous, transverse, yellow bands, that on tergum 1 submedian, slightly interrupted medially and rather sinuous; bands on terga 2-4 very broad laterally, becoming much narrowed medially, and subinterrupted on 2 and 3, that on 4 of more uniform width although subinterrupted at each extreme side, and that on 5 apical, very broad medially, subinterrupted on each side; abdominal sterna 3 and 4 with more or less transverse yellow bands, sterna otherwise quite dark; punctures of face above, vertex and cheeks coarse, close and deep, becoming rugose in part, lateral punctures below antennae fine and rather close, fine and densely crowded on supraclypeal area, and somewhat more distinct but fine and quite close on clypeus; scutum and mesopleura coarsely and very densely rugoso-punctate, pleural punctures rather coarse but distinct, to some degree separated; propodeum posteriorly very finely and closely rugoso-punctate below, triangle dull and tessellate but rather smooth below, becoming very irregularly rugoso-punctate along upper margin, lateral faces above spiracle more coarsely rugose, somewhat smoother below; discs of abdominal terga 2-5 very fine, close, deep and distinct across base, becoming somewhat more coarse and distinct apically, basal tergum quite distinctly punctate apically, but becoming impunctate laterally and basally, the more apical terga with somewhat deeper, more distinct and coarse punctures before apical rims; pseudopygidium short and transverse, forming the narrow apical margin of tergum 5, densely covered with suberect, silvery or yellowish tomentum; pubescence extremely short, thin and obscure, entirely pale where visible, apex of sternum 5 with a pair of tufts of elongate hairs which converge medially.

MALE—Length 8.5-9.5 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin carinate; antennal scape slightly swollen, apex deeply excavated and largely enclosing pedicel, basal segment of flagellum much shorter than segment 2, the shorter side not much greater than apical width, median segments somewhat longer than broad; mandibles slender and simple apically; wings yellowish-hyaline, somewhat more deep-

ly so apically, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein much basad of transverse median; tegulae unusually broad and expansive, shining between deep, distinct, quite coarse and rather close punctures; posterior margin of scutellum slightly impressed medially; front coxae not spinose; hind femora slender and simple; clypeus, labrum, basal half of mandibles, narrow lateral facial maculae, and cheeks below adjacent to eye, bright yellow; head otherwise black, the facial maculae ending rather narrowly on eye margin at level of antennae; antennal scape yellow anteriorly, flagellum more brownish-testaceous; pronotal collar narrowly, tubercles, tegulae, usually a pair of maculae on scutellum, and a small anterior maculation on mesopleura, bright yellow, thorax otherwise black; front and hind coxae black, legs otherwise chiefly testaceous but front tibiae yellow anteriorly, mid and hind tibiae yellow at base and apex, narrowly connected on hind pair by a yellow line; spurs pale yellow; abdominal terga 1-6 with conspicuous, yellow maculations, submedian, rather narrow, and interrupted medially on tergum 1, more widely interrupted on 2 and 3, submedian, broad laterally, acuminate toward mid-line, transverse and entire on 4-6, considerably separated from margin on 4, subinterrupted on each side on 4 and 5; abdominal sterna with small lateral maculations on 3, a median maculation on 4, and small yellow spots at extreme sides of sterna 2-5; punctures coarse, close, deep and distinct on face above antennae, on vertex and on cheeks, quite coarse on each side of face below antennae, somewhat finer and closer on supraclypeal area and clypeus; scutum, scutellum and mesopleura coarsely rugoso-punctate throughout; propodeum somewhat more finely rugose posteriorly, triangle densely tessellate and dull, becoming irregularly rugoso-striate along upper margin; punctures becoming somewhat more sparse toward mid coxae laterally, somewhat coarser above spiracle; discs of abdominal terga 2-5 deeply, distinctly, finely and closely punctate across base, those on tergum 1 deep, distinct and close, becoming minute and obscure basally and laterally; apical margins of terga very narrowly impunctate, punctures of the more apical terga becoming somewhat more coarse and sparse apically; pubescence very short, sparse and obscure, hardly evident above, rather copious on head and thorax below, sternum 6 with rather elongate, erect, yellowish hairs medially; pygidial plate considerably longer than basal width, strongly narrowed apically, tip subtruncate or obscurely incised, margins carinate, surface quite closely and finely punctate; sternum 6 narrowly rounded apically; sternum

8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION — Massachusetts and Connecticut, August to October. This is recorded from Illinois.

Nomada (Heminomada) electella
Cockerell

Nomada electella Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 612. ♀.

FEMALE—Length 7.5 mm.; lateral ocelli slightly nearer margin of vertex than each other; cheeks considerably more than half width of eyes, posterior margin strongly carinate; basal segment of flagellum very short, not much longer than broad, and less than half length of segment 2, median segments considerably longer than broad; mandibles slender and simple; wings subhyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd approximately equal anteriorly, veins testaceous, basal vein considerably basad of transverse median; tegulae shining between fine and rather close punctures, outer and posterior margins impunctate; posterior margin of scutellum quite deeply grooved medially; front coxae with triangular denticles posteriorly, but hardly spined; apex of hind tibiae with three or four testaceous bristles, the outermost elongate; clypeus, labrum and mandibles except tips, testaceous, a spot on supraclypeal area and the narrow malar space anteriorly, yellow, head otherwise black; antennal scape and basal segment of flagellum more testaceous, flagellum otherwise more reddish-testaceous; pronotal collar, tubercles, scutellum except anterior margin, and a rather vague, transverse stripe on mesopleura, yellow; tegulae yellowish-testaceous; thorax otherwise black; legs largely testaceous, more or less tinged with yellowish on tibiae, spurs pale yellow; basal abdominal tergum largely reddish, tinged with yellow on each side of median area, terga 2-5 with conspicuous yellow maculae, otherwise more reddish, maculations of 2 occupying most of disc laterally, rather widely separated medially, those on 3 somewhat narrowed and more widely separated; tergum 4 with a subapical transverse band which is narrowly interrupted medially and subinterrupted on each side, and 5 yellow along apical margin, more broadly so near mid-line; punctures of face above antennae, on vertex and on cheeks very coarse, deep and close, those below antennae much finer and more shallow, especially on clypeus; scutum and mesopleura very coarsely and deeply rugoso-punctate, punctures becoming somewhat crowded on pleura above, those on scutellum deep and distinct, crowded only in part; posterior

face of propodeum below coarsely rugoso-punctate, lateral faces becoming rather smooth but dull toward the metapleura, triangle very coarsely rugoso-striate along upper margin, becoming more finely so below; basal abdominal tergum almost impunctate, the exceedingly minute, well separated punctures hardly visible; discs of 2-4 with minute and rather close punctures, the rather broad, impressed apical margins entirely impunctate; tergum 5 more deeply, distinctly, closely and coarsely punctate, especially toward apical margin; pseudopygidium transverse, very short, forming the rather narrow, apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence extremely short, thin and obscure, somewhat more evident on thorax below and on posterior face of propodeum laterally, entirely pale where evident; sternum 5 with a pair of sublateral tufts of long, somewhat curved, yellowish hairs on each side of mid-line.

DISTRIBUTION—Rhode Island to Georgia, June and July.

FLOWER RECORD—*Ceanothus*.

Nomada (Heminomada) festiva
Cresson

Nomada festiva Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 289. ♀.

FEMALE—Length 9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat more than half width of eyes, posterior margin strongly carinate; shorter side of basal segment of flagellum very slightly shorter than segment 2, median segments slightly longer than broad; mandibles rather robust, simple; wings subhyaline basally, becoming lightly infuscated apically and in marginal cells, with the usual three submarginal cells, 2nd and 3rd rather narrow but about equal anteriorly, veins testaceous to brownish, basal vein slightly basad of transverse median; tegulae shining between deep, distinct, rather fine and close punctures; posterior margin of scutellum deeply depressed medially; front coxae not spinose; apex of hind tibiae with no evident setae or bristles, only finely short pubescent; clypeus supraclypeal area below, lateral face marks, labrum, and base of mandibles, bright yellow, face marks ending abruptly at level of antennae, and lateral clypeal sutures infused with black; face, vertex and cheeks otherwise black; antennal scape bright yellow anteriorly, pedicel and basal segment of flagellum more testaceous, the following segments more piceous; pron-

tal collar, tubercles, tegulae, scutellum in large part, a pair of large maculae on posterior face of propodeum, and a small transverse submedian mark on mesopleura, bright yellow, thorax otherwise black; front and mid coxae dark, the hind coxae with some yellow beneath, blackish above, femora testaceous in general, with some piceous basally, the tibiae and front and mid tarsi bright yellow, hind tarsi more testaceous basally, becoming yellow apically, spurs pale yellow; abdominal terga 1-5 with conspicuous, bright yellow maculations, that on tergum 1 a transverse, submedian and rather narrow band, tergum 2 with extensive yellow areas laterally, this somewhat narrowed medially, and narrowly interrupted at mid-line, the disc blackish apically; tergum 3 with a pair of rather widely separated, yellow maculations, and tergum 4 with more extensive lateral maculations which do not quite meet at mid-line, tergum 5 largely yellow, but with a narrow, median, dark area; abdominal sterna 1-4 more or less yellow basally, apical impressed rims largely reddish-hyaline; face above antennae, vertex and cheeks very coarsely, closely and deeply but distinctly punctate, punctures below antennae quite deep on each side, but supraclypeal area and clypeus very finely and closely punctate; scutum, scutellum and mesopleura very coarsely, closely and deeply punctate, becoming rugose on scutum laterally and on pleura above, contiguous on maculated area of scutellum, propodeum somewhat more finely but closely punctate posteriorly, punctures becoming very fine and irregular laterally, surface more or less shining and minutely punctate toward mid coxae, triangle impunctate but dull and tessellate; discs of abdominal terga 2-5 very finely, closely, deeply and distinctly punctate, much more minute across apical half of basal tergum, becoming more minute and obscure laterally and basally, punctures of the more apical terga becoming somewhat more coarse, deep and distinct toward apical margins, only the very narrow apical rims impunctate; pseudopygidium transverse, very narrow, forming the rather narrow apical margin of tergum 5, densely covered with suberect, pale yellowish tomentum; pubescence extremely short, thin, sparse and obscure, hardly evident, entirely pale where visible; sternum 5 apically with a dense tuft of elongate, more or less curved, yellowish hairs that converge toward mid-line.

DISTRIBUTION — Massachusetts and New Jersey. No seasonal records have been found.

Nomada (Heminomada) fragariae
new species

(Fig. 105)

MALE — Length 9-10 mm., lateral ocelli very slightly nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin strongly carinate; antennal scape strongly swollen, apex deeply excavated, completely enclosing pedicel, longer side of basal segment of flagellum slightly shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma testaceous, basal vein interstitial with transverse median; tegulae shining, punctures fine and close along inner margin, becoming sparse along outer margin; posterior margin of scutellum quite deeply impressed medially; front coxae not spinose; hind femora slender and unmodified; face chiefly yellow below level of antennae, but lateral clypeal sutures black; face above antennae, vertex and cheeks in large part black, cheeks below narrowly yellow along margin of eye, and a very small yellow spot at top of eye; antennal scape bright yellow anteriorly, piceous posteriorly, flagellum brownish-testaceous; pronotal collar, tubercles, tegulae, scutellum except anterior margin, a pair of small spots on each side of propodeal triangle, a pair of larger maculations on posterior face below, and a transverse maculation along mesopleura, bright yellow, scutum narrowly margined with yellow on each extreme side; thorax otherwise black; front and mid coxae largely yellow, hind coxae dark basally, more or less yellow apically, legs otherwise largely testaceous, the femora narrowly yellow at apex, and hind tibiae tipped with yellow, spurs pale yellow; abdominal terga 1-6 with transverse, bright yellow bands, that on tergum 1 submedian, rather narrow, more or less interrupted medially; bands on terga 2 and 3 submedian, very broad laterally, slightly constricted medially, those on 4-6 more nearly apical in position, the more basal terga piceous basally and apically, becoming more ferruginous on the more apical terga; discs of abdominal sterna largely yellow, the broad, impressed, subhyaline margins more ferruginous, basal sternum yellow only along mid-line; vertex and upper half of face coarsely rugoso-punctate, cheeks becoming more finely so below, lower part of face closely but more distinctly punctate laterally, supraclypeal area and clypeus very finely and rather obscurely punctate; scutum densely rugose, scutellum slightly more coarsely and distinctly but very closely punctate, mesopleura very coarsely ru-

gose or reticulate; propodeum rather coarsely rugose posteriorly and laterally, but lateral faces becoming relatively smooth and shining below, triangle rather smooth but densely tessellate below, becoming rather coarsely and irregularly rugoso-striate medially and along upper margin; discs of abdominal terga very finely, closely and deeply punctate, punctures becoming somewhat finer apically, apical rims narrowly impunctate; tergum 1 becoming impunctate laterally and basally, the more apical punctures on terga 4-6 becoming somewhat more coarse and distinct; pubescence very short and thin, pale yellowish above, more whitish below, rather copious over head and thorax, very thin and obscure on abdomen dorsally, hairs on sternal plates somewhat more elongate but very sparse, becoming rather dense, erect and quite short on sternum 6 apically; median length of pygidial plate slightly greater than basal width, only slightly narrowed apically, apex quite broadly emarginate, margins strongly carinate, surface quite closely and rather coarsely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

TYPES—Holotype: Male, Faison, N. C., April 20, 1955 (Mitchell, on *Fragaria*) [author's coll.]. Paratypes: 1 ♂, Ft. Lee, Va., May 16, 1959 (R. R. Snelling); 1 ♂, Alachua Co., Fla., Feb. 23, 1957 (H. V. Weems, Jr., on *Prunus angustifolia*).

Paratypes are in collections of R. R. Snelling and the Florida Plant Board.

Nomada (Heminomada) graenicheri
Cockerell

Nomada (Xanthidium) Graenicheri Cockerell, 1905. *Canad. Ent.* 37, p. 189. ♀.

Nomada graenicheri Graenicher, 1911. *Pub. Mus. City Milwaukee*, Bul. 1, p. 238. ♀ ♂.

No specimens of *graenicheri* have been found in any of the collections received for study. The following descriptive note was made from the type at the U. S. National Museum:

FEMALE—Length 10 mm.; mandibles simple; coxae not spined; punctures in general fine and close, densely crowded on face above antennae, more distinct but close below and on clypeus, some shining spaces on cheeks below; scutum densely and rather finely rugoso-punctate, crowded on pleura above, becoming slightly separated and coarser below; scutellum deeply grooved; propodeum dull, a few punc-

tures on each side of triangle; abdominal terga densely and minutely punctate, only the very narrow apical rims being impunctate on terga 2-4, tergum 1 with a subapical black band which is more distinctly and sparsely punctate; color black except for yellow areas as follows; a pair of apical spots on each side of clypeus, lateral areas between clypeus and eyes, extending more narrowly along orbits to top of eyes, a very narrow line along upper half of posterior orbits, collar, tubercles, tegulae, transverse band on pleura below, a pair of large spots on scutellum and a band on metanotum, complete but narrow transverse bands on abdominal terga 1-5, and on sterna 2 and 3, a median blotch on 4; all coxae yellow in part, the femora dark below, yellowish to ferruginous above, front and mid tibiae and tarsi largely ferruginous, hind tibiae largely yellow, darkened on inner and outer surfaces apically, the basitarsus piceous, apical joints more reddish.

DISTRIBUTION—Wisconsin.

Nomada (Heminomada) imbricata
Smith

Nomada imbricata Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 246. ♀.

Nomada (Holonomada) imbricata(?) Packard, 1897. N. Y. Ent. Soc. Jour. 5, p. 83-87. larva and pupa.

Nomada (Holonomada) imbricata Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey Bul. 22 (3), p. 727. ♀.

FEMALE—Length 9-10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat narrower than eyes, posterior margin carinate; shorter side of basal segment of flagellum only slightly shorter than segment 2, median segments only slightly longer than broad; mandibles rather slender and simple apically; wings hyaline basally, becoming faintly yellowish apically, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae somewhat shining between quite deep and distinct, rather fine punctures, these close anteriorly, becoming rather sparse posteriorly; posterior margin of scutellum rather deeply depressed medially; front coxae not spinose; posterior apical angle of hind tibiae with a pair of short, triangular, acute tubercles; face chiefly yellowish-ferruginous, more yellowish below antennae, somewhat more reddish above; antennal scape

testaceous, flagellum brownish-testaceous; thorax in large part ferruginous, pronotal collar, tubercles, and a pair of small maculations on scutellum, yellow, and propodeum with a pair of small and rather indefinite yellow areas on each side; tegulae testaceous; prothorax black laterally; propodeum largely ferruginous, with a small yellow spot on each side of posterior face, a broad black band on each lateral face, and a restricted blackened area just below metanotum medially; legs testaceous in large part, front and mid tibiae more or less tinged with yellow, spurs pale yellow; abdominal terga reddish, with yellow maculations, basal tergum largely reddish, with faint, obscure, yellow areas on each side, the apical, impressed area more piceous; tergum 2 with broad, lateral, yellow maculations, ferruginous medially and apically; terga 3-5 with transverse, subapical bands that are of rather uniform width, that on 5 subapical, broad medially, narrowly constricted at each side; discs of sterna 3 and 4 more or less yellow medially, apical margins broadly impunctate, reddish-hyaline; punctures coarse, close, deep and distinct on face above antennae and on vertex, somewhat finer on cheeks, rather coarse on each side of face below antennae, very fine and close on supra-clypeal area and clypeus; scutum and mesopleura densely and quite coarsely rugosopunctate, scutellum with very coarse, deep and distinct punctures; propodeum shallowly rugose posteriorly, becoming somewhat smoother but dull on the lateral surfaces, triangle impunctate but densely tessellate, becoming irregularly striate above; basal abdominal tergum very minutely and obscurely punctate across median area apically, becoming practically impunctate laterally and basally; discs of terga 2-5 very finely and closely punctate basally, punctures becoming obscure laterally, the apical impressed areas largely impunctate, with the more apical punctures on discs of 4 and 5 somewhat more sparse and distinct; pseudopygidium transverse, very short, forming the rather narrow apical margin of tergum 5, densely covered with suberect, pale yellowish tomentum; pubescence very thin, short, obscure, somewhat more copious on head and thorax below, but visible above, rather dense on propodeum, abdomen largely bare but with somewhat more elongate hairs apically; apex of sternum 5 with a pair of tufts of elongate, curved, yellowish hairs that converge medially.

DISTRIBUTION—New York and the New England states, to Nova Scotia, May and June.

Nomada (Heminomada) luteola

Olivier

(Fig. 105)

Nomada luteola Olivier, 1811. *Encycl. Meth.*, 8, p. 365.

Xanthidium luteolum Robertson, 1929. *Flowers and Insects*, Lancaster, Pa., Science Press. (flower records)

FEMALE — Length 9.5-13 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks very slightly narrower than eyes, posterior margin sharply carinate; shorter side of basal segment of flagellum more than half the length of segment 2, longer side not equalling segment 2 in length, median segments somewhat longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming rather deeply infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd, veins testaceous to piceous, basal vein slightly basad of transverse median; tegulae shining between deep, distinct, rather coarse and close punctures; posterior margin of scutellum quite deeply grooved medially; front coxae not spined; apex of hind tibiae with a row of 7 or 8 robust, yellowish bristles; face and cheeks in large part yellow, with a limited amount of black above each antennae and around ocelli, these separated by a transverse yellow band, vertex and posterior margin of cheeks to some degree ferruginous; antennal scape yellowish anteriorly, becoming reddish to piceous posteriorly, basal segment of flagellum somewhat more reddish, the more apical segments piceous; pronotal collar, tubercles, tegulae, lateral margins of scutum, axillae, scutellum, adjacent median area of metanotum, posterior face of propodeum in large part, and upper half of mesopleura, bright yellow; scutum with a median black line slightly separated from a pair of narrow yellow lines by ferruginous, and a broad band of ferruginous between the median and lateral yellow lines; propodeum narrowly black medially, the lateral faces and metapleura largely black; mesopleura below ferruginous; coxae in part yellow, with some ferruginous infusions; trochanters testaceous, the femora testaceous basally, becoming more or less yellow apically; tibiae yellow at base and apex, more or less infused with testaceous medially; tarsi yellow-testaceous, the spurs pale yellow; basal abdominal tergum with a broad, transverse, yellow band, piceous basally, the impressed, apical margin ferruginous; discs of terga 2-5 yellow in large part, the apical impressed areas ferruginous; abdominal sterna yellow in large part, apical, impressed areas more testaceous-hyaline; punctures deep, distinct and quite close over

most of head, very coarse and quite distinct laterally and above, much finer and closer on cheeks, supraclypeal area and clypeus; scutum, scutellum and mesopleura coarsely rugoso-punctate, punctures of scutellum crowded but distinct; posterior face of propodeum with scattered, irregular, rather shallow, coarse punctures, these becoming closer on lateral faces above, shining and rather smooth below, triangle impunctate but rather dull, becoming very short striate above; abdominal terga very finely, closely and uniformly punctate throughout, punctures almost crowded, only the very narrow apical rims impunctate; pseudopygidium transverse, very short, forming the rather broad, apical margin of tergum 5, densely covered with suberect silvery tomentum; pubescence very short, thin and inconspicuous throughout, somewhat yellowish, very obscure on abdomen dorsally, hairs somewhat more elongate beneath; apex of sternum 5 with a pair of tufts of elongate yellowish hairs that converge medially.

MALE—Length 9-13.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat narrower than eyes, posterior margin strongly carinate; antennal scape swollen, apex quite deeply excavated, partially enclosing pedicel, basal segment of flagellum very short, the shorter side no more than half the length of segment 2, median segments somewhat longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd only slightly broader than 3rd anteriorly, veins testaceous to brownish, basal vein slightly basad of transverse median; tegulae shining between close, deep and distinct punctures; posterior margin of scutellum slightly grooved medially; front coxae not spinose; hind femora unmodified; face largely yellow below level of antennae, the supraclypeal area and upper half of clypeus narrowly bordered with black, cheeks quite broadly yellow just back of eye, a small yellow spot below anterior ocellus and a similar spot above each eye; face above antennae, vertex and cheeks posteriorly black, the lateral maculae ending rather narrowly on margin of eye slightly above antennae; antennal scape yellow anteriorly, piceous posteriorly, flagellum brownish-testaceous below, piceous above; pronotal collar, tubercles, tegulae, axillae, scutellum, adjacent median area of metanotum in part, a pair of broad, quadrangular maculae on propodeum, a rounded maculation below each wing, and a broad, transverse, yellow band on mesopleura medially, bright yellow; thorax otherwise chiefly black, scutum and metapleura entirely so, and adjacent areas of

propodeum black; coxae yellow in large part; front legs largely yellow, the trochanters and femora except apex more ferruginous posteriorly, and tibiae with a reddish infusion; mid and hind trochanters and femora ferruginous in part, femora becoming yellowish apically, and tarsi yellow; spurs pale yellow; abdominal terga 1-6 with broad, entire, transverse, yellow bands that are more or less median in position, bordered basally and apically by piceous areas, these becoming somewhat more ferruginous on the more apical terga; sterna 1-6 yellow in large part, the broad, depressed apical margins more or less reddish-hyaline; punctures close and deep over most of head, quite coarse and distinct on face laterally and above, and on vertex and cheeks, very fine and obscure on supraclypeal area and clypeus, becoming very sparse on each side of clypeus above mandibles; scutum, scutellum and mesopleura coarsely rugoso-punctate, scutum very densely so; posterior face of propodeum more finely and shallowly but quite densely rugoso-punctate, lateral faces becoming rather coarsely rugose above, rather smooth, somewhat shining below; abdominal terga very minutely, closely and uniformly punctate throughout, only the very narrow apical rims impunctate; pubescence very short and thin but quite copious over head and thorax, entirely pale yellowish, very short and obscure, hardly evident on abdomen dorsally, abdominal sterna with somewhat more elongate, sparse hairs; apex of sternum 6 with considerable erect and rather elongate yellowish pubescence medially; median length of pygidial plate somewhat greater than basal width, rather strongly narrowed apically, tip deeply incised, margins carinate, surface rather shallowly, irregularly punctate; exposed abdominal sterna unmodified, sternum 6 strongly narrowed apically; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION—Illinois to Virginia, south to Florida, March to June.

FLOWER RECORDS — *Batodendron*, *Malus*, *Prunus*, *Pyracantha*, *Rubus*, *Taraxacum* and *Vaccinium*. This is recorded by Robertson (1929) on *Antennaria*, *Arabis*, *Cercis*, *Dentaria*, *Erythronium*, *Geranium*, *Ribes*, *Salix*, *Stellaria*, *Taenidia* and *Zanthoxylum*.

The form described above is that which has come to be accepted as Olivier's *luteola*, but it is not certain that it is correct. The description is too brief, and the type specimen has not been located. It seems best to

continue using this name, however, until it has been shown to be erroneous.

***Nomada (Heminomada) miniata* Smith**

Nomada miniata Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 250. ♀

Nomada miniata Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 311.

No specimens of *miniata* have been collected, nor any found in any of the collections studied by this writer. The following descriptive note was made from the type specimen in the British Museum:

FEMALE—Length 10 mm.; mandibles very long and slender, simple, tip of one nearly reaching base of other when closed; basal segment of flagellum not much longer than broad, shorter than segment 2 even when measured along the longer side; head almost entirely ferruginous, obscurely yellow on lower inner orbits, closely punctate, rather finely so below antennae and on cheeks, somewhat more coarsely so above; front coxae not spined; legs entirely ferruginous, spurs yellow; scutum rugoso-punctate, largely red, with a pair of lateral yellowish lines (probably discolored); scutellum pale ferruginous, quite deeply incised medially, shallowly rugoso-punctate;

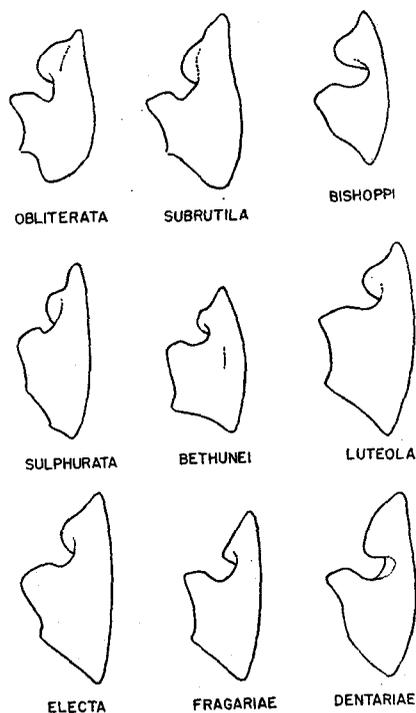


Figure 105
Right gonocoxite in males of *Nomada*,

pleura red, with a median, transverse, yellowish band, finely rugoso-punctate; metapleura red; propodeum red laterally and in triangle, posterior surface yellowish; tegulae very closely and rather coarsely punctate; wings subhyaline, narrowly infumate toward apex, basal vein nearly interstitial with transverse median; basal abdominal tergum smooth, punctures exceedingly minute and obscure, entirely red; 2nd and following terga very finely and closely punctate, punctures invading to some degree the depressed apical margins, these somewhat yellowish-hyaline, but discs red, tergum 2 with a pair of conspicuous, widely separated, yellow maculae; pseudopygidium of normal size.

DISTRIBUTION—Georgia.

Nomada (Heminomada) obliterata
Cresson

(Figs. 105 & 106)

?*Nomada pulchella* Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 247. ♂

Nomada obliterata Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 301. ♀

Nomada viburni Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 341. ♂

Heminomada obliterata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 7-8.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks only slightly narrower than eyes, posterior margin carinate; longer side of basal segment of flagellum equal to segment 2, median segments slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming somewhat yellowish apically, with only two submarginal cells due to the loss of the first transverse cubitus (fig. 106), the first recurrent vein thus entering the first submarginal cell, the 2nd entering the 2nd submarginal near the middle, veins testaceous, basal vein slightly basad of transverse median; tegulae shining between quite deep and distinct punctures, these quite sparse posteriorly and along outer margin; posterior margin of scutellum slightly impressed medially; front coxae not spined; apex of hind tibiae with 3 or 4 short but distinct, testaceous bristles; face largely yellow below level of antennae, with a small amount of black between ocelli, upper part of face, vertex and cheeks largely ferruginous, a small area of yellow posterior to eyes below, the lateral face marks ending narrowly near top of eye; antennal scape reddish-yellow anteriorly, flagellum more brownish-testaceous; thorax largely red, but pronotal collar, tu-

bercles, two large spots on scutellum and some more or less vague spots on propodeum posteriorly, yellow; tegulae more testaceous; metapleura and narrow adjacent margin of propodeum black; posterior surface narrowly black medially; abdomen red, terga 2-5 with broad, transverse, yellow bands, those on 2 and 3 strongly constricted medially, sometimes more or less broadly interrupted, those on 4 and 5 of rather uniform width, submedian on all except on 5 where it is more nearly apical; legs in large part reddish-testaceous, spurs pale yellow; face above antennae, vertex and cheeks rather coarsely rugoso-punctate, punctures close but distinct on lower part of face, very fine and close on supraclypeal area, shallow but distinct and rather coarse on clypeus; scutum with coarse, deep and contiguous punctures, those on the shining scutellum quite sparse, mesopleura quite coarsely rugoso-punctate, propodeum more finely rugose, especially at sides, triangle somewhat rugose medially, becoming irregularly and finely striate at each side above; discs of abdominal terga very finely, closely and rather distinctly punctate, rather sparsely so toward apical margins; tergum 1 impunctate laterally and basally; pseudopygidium transverse, rather extensive, median length nearly half the breadth, forming the truncate apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence extremely short in general, thin, more elongate and copious on head below, entirely whitish where evident, very obscure on abdomen dorsally, sternum 5 apically with a pair of tufts of elongate hairs on each side which converge medially.

MALE—Length 7-9 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin subcarinate; antennal scape strongly swollen, apex deeply excavated and completely enclosing pedicel, longer side of basal segment of flagellum somewhat shorter than segment 2, median segments slightly broader than long; mandibles slender and simple apically; wings hyaline basally, becoming somewhat yellowish apically, with but two submarginal cells due to the loss of the first transverse cubitus, 1st recurrent vein thus entering 1st submarginal, 2nd entering at middle of 2nd submarginal, veins testaceous to piceous, basal vein somewhat basad of transverse median; tegulae shining between rather deep, distinct, fine and rather close punctures; posterior margin of scutellum rather deeply grooved; front coxae not spined; hind femora slender and simple; face entirely yellow below level of antennae, lateral face marks extending very narrowly to top of eye, and cheeks below

yellow along posterior eye margin nearly to the top; face above antennae, vertex and cheeks posteriorly, black; antennal scape yellow anteriorly, piceous posteriorly, flagellum brownish-testaceous; pronotal collar, tubercles, tegulae, scutellum in large part, a pair of rather conspicuous, lateral maculations on propodeum posteriorly, and a large anterior maculation on mesopleura, bright yellow, thorax otherwise black; front legs, including coxae, largely yellow, the femora and trochanters more ferruginous posteriorly; mid and hind legs more ferruginous, femora yellow apically, mid tibiae more or less yellow anteriorly, mid basitarsi yellow, spurs pale yellow; abdominal terga 2-6 with broad, transverse, yellow bands, these somewhat constricted medially on 2 and 3, of more uniform width on 4-6, basal tergum piceous basally, more or less testaceous medially, and darker red apically; sterna 2-6 more or less yellow, apical margins testaceous-hyaline; face above antennae, vertex and cheeks quite coarsely rugoso-punctate, punctures rather shallow but close and coarse on face below antennae, crowded on supraclypeal area, and quite distinct on clypeus, becoming very sparse on each side; scutum and mesopleura densely and rather coarsely rugoso-punctate, punctures of scutellum more distinct, coarse, deep and rather close, more shallowly rugose on propodeum, both posteriorly and laterally, the triangle rather coarsely and sparsely striate; discs of abdominal terga with close, fine, quite deep and distinct punctures, these becoming somewhat more coarse and sparse apically on the more apical terga, but quite close across disc of tergum 6; pubescence rather short, entirely pale, quite copious over most of head and thorax, very short and inconspicuous on abdomen dorsally, very thin and sparse on sterna 1-5, sternum 6 with quite dense, erect, pale hairs apically; median length of pygidial plate about equal to basal width, quite strongly narrowed to the subtruncate tip which is sometimes incised medially, margins carinate, surface very closely punctate; exposed sternal plates unmodified, sternum 6 subtriangular, apex rather narrowly rounded; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION — Minnesota to New York, south to South Carolina, April to June.

FLOWER RECORDS — *Stellaria* and *Taraxacum*. Robertson (1929) records this species on *Antennaria*, *Chaerophyllum*, *Claytonia*, *Heracleum*, *Prunus*, *Salix* and *Viburnum*.

Efforts to locate the type of *Nomada pulchella* Smith in the British Museum and in the Hope Museum at Oxford were fruitless, and its identity remains in doubt. The brief description indicates a similarity with a small specimen of *obliterata*, but there are some slight differences and much is omitted, including any reference to the number of submarginal cells.

Nomada (?*Heminomada*) *ochlerata*
new species

MALE—Length 7 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat narrower than eyes, posterior margin carinate; antennal scape only slightly swollen, but apex deeply excavated and completely enclosing pedicel, basal segment of flagellum very short, not much longer than the apical breadth, and very much shorter than segment 2, median segments somewhat longer than broad; mandibles quite slender and simple apically; wings hyaline basally, becoming rather faintly infuscated at apex and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma testaceous, basal vein slightly basad of transverse median; tegulae shining, punctures fine, close anteriorly, becoming rather sparse posteriorly; posterior margin of scutellum slightly impressed medially; front coxae not spined; hind femora slender and unmodified; clypeus, labrum, mandibles and lateral facial maculae, yellow, the maculae ending rather abruptly at level of antennae; supraclypeal and adjacent areas of face, cheeks in large part and entire face above antennae black, cheeks below with a yellow mark along eye margin; antennal scape yellow anteriorly, piceous posteriorly, flagellum more brownish-testaceous; thorax largely black, only the tubercles, tegulae and a pair of spots on scutellum, yellow; coxae black, front legs largely testaceous, the femora more brownish along lower margin; middle legs testaceous, the femora brownish posteriorly, and tibiae infused with brownish; hind femora more piceous, becoming yellow apically, tibiae yellowish at base and apex but more brownish-testaceous medially; all spurs pale yellow; abdominal terga 1-6 more or less completely yellow banded, that on 1 rather narrow, subinterrupted medially, becoming quite broad laterally, that on 5 quite narrow, entire, subapical, and 6 quite broadly yellow across disc; tergum 1 piceous basally, more reddish apically, nonmaculated areas of 3 somewhat more piceous, and base of 4 and 5 piceous, apical margins of 4-6 yellowish-

hyaline; abdominal sterna largely dark, sternum 2 with some obscure, lateral, yellow areas, apical margins broadly yellowish-hyaline; vertex and upper part of face coarsely rugoso-punctate, cheeks somewhat more finely so, area between antennae and clypeus quite coarsely rugoso-punctate, punctures of clypeus very minute, close and obscure; scutum densely rugose, scutellum with somewhat more distinct but close and contiguous punctures, mesopleura very coarsely rugoso-punctate; posterior face of propodeum more shallowly but coarsely rugoso-punctate, becoming rather smooth on lateral faces below, triangle impunctate but dull and densely tessellate below, becoming rather narrowly striate above; discs of abdominal terga very finely, closely and rather distinctly punctate, punctures becoming more minute and obscure on apical impressed areas; tergum 1 becoming impunctate laterally and basally, the more median apical punctures minute but rather close; pubescence entirely pale, quite thin, rather copious on head and thorax, very thin and short on abdomen dorsally, becoming somewhat more elongate on the more apical terga, very thin and elongate on sterna, becoming rather dense but short and erect on sternum 6 apically; median length of pygidial plate about equal to basal width, rather strongly narrowed apically, tip with a rather deep, rounded, median emargination, carinate laterally, surface very closely but rather shallowly punctate; exposed sternal plates unmodified, sternum 6 rather strongly narrowed to the tip, thus subtriangular, with the apex narrowly rounded; gonocoxites of genital armature similar to those in *fragariae* (fig. 105).

TYPE — Holotype: Male, Ann Arbor, Washtenaw Co., Mich., May 9, 1935 (I. J. Cantrall) [Hubbell].

Nomada (Heminomada) pseudops
Cockerell

Nomada (Xanthidium) pseudops Cockerell, 1905. *Canad. Ent.* 37, p. 189. ♀.

FEMALE—Length 9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin conspicuously carinate; basal segment of flagellum very short, no longer in front than broad, the longer side considerably shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple; wings hyaline basally, becoming somewhat deeply infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein considerably basad of transverse

median; tegulae deeply, distinctly and rather coarsely and closely punctate throughout; posterior margin of scutellum deeply impressed medially; front coxae not spinose; apex of hind tibiae with a row of very short, quite robust, brownish bristles separated from a quite distinct posterior angle by a rounded or emarginate space; head largely red, the lower inner orbits, malar space and labrum more or less yellow, space between ocelli, and the narrow, posterior margin of cheeks black; antennal scape testaceous, flagellum more brownish-testaceous; pronotal collar, tubercles, two small anterior maculations on mesopleura below tubercle, and a small, posterior maculation just above mid coxae, yellow; posterior face of propodeum broadly yellow on each side of midline; thorax otherwise largely red, tegulae more testaceous, scutum with a narrow, median, black line, the metapleura and adjacent area of propodeum black; legs largely testaceous, but front and mid coxae in part, front tibiae anteriorly, and front tarsi, yellow, mid tarsi yellowish-testaceous, spurs pale yellow, mid and hind femora more or less infused with piceous basally; abdominal terga 2-5 with broad, transverse, yellow bands, those on 2 and 3 often interrupted medially, discs otherwise largely reddish, basal tergum with a median, reddish band, more piceous basally and apically, band on tergum 4 submedian, that on 5 more apical; abdominal sterna 3-5 to some degree yellow, the broadly impunctate rims testaceous-hyaline; head in large part closely and deeply rugoso-punctate, coarsely so on face above antennae and on vertex, more finely so on cheeks below and on supraclypeal area and clypeus, lateral areas of face closely and deeply punctate; scutum medially and scutellum coarsely, deeply and closely punctate, scutum becoming more finely rugose laterally, mesopleura very coarsely rugoso-punctate, propodeum more finely and shallowly rugose posteriorly, lateral faces becoming somewhat smoother but dull below; discs of abdominal terga very finely, closely and quite deeply punctate, punctures becoming slightly more sparse toward the narrowly impunctate, apical rims, tergum 1 becoming impunctate laterally toward base; pseudopygidium transverse, very narrow, forming the truncate apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence extremely short and thin, somewhat more copious and elongate on head below and on propodeum posteriorly, entirely whitish where visible, hardly evident on abdomen dorsally, very thin and sparse ventrally; sternum 5 with a pair of apical tufts of elongate, curved, brownish hairs on each side of midline, which tend to converge medially.

DISTRIBUTION—Wisconsin to Massachusetts, May and June.

FLOWER RECORD—*Rubus*.

Nomada (Heminomada) subrutila
Lovell and Cockerell

(Fig. 105)

Nomada (Xanthidium) subrutila Lovell and Cockerell, 1905. *Psyche* 21, p. 40. ♂.

MALE—Length 7-8.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks nearly as broad as eyes, posterior margin carinate; antennal scape somewhat swollen, apex deeply excavated, completely enclosing the pedicel, longer, upper side of basal segment of flagellum about equal to segment 2, median segments somewhat longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming faintly yellowish apically, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, veins yellowish to testaceous, basal vein interstitial with transverse median; tegulae shining between rather deep and distinct punctures, these becoming quite sparse along outer margin and posteriorly; posterior margin of scutellum shallowly impressed medially; front coxae not spined; hind femora slender and unmodified; clypeus, labrum, mandibles, lower half of supraclypeal area, and narrow lateral facial maculae, bright yellow, the lateral maculae extended narrowly to top of eye and separated from antennae and upper part of clypeal margin by a broad black area; face above, vertex, and most of cheeks, black, the hind margin of eyes narrowly bordered with yellow nearly to top; antennal scape bright yellow anteriorly, more piceous posteriorly, flagellum brownish-testaceous; two spots on pronotal collar (sometimes lacking), tubercles, tegulae, two small spots on scutellum, and small anterior maculations on mesopleura, bright yellow; thorax otherwise entirely black; front coxae yellow in large part, the mid and hind pair with small yellow maculations, otherwise black; front legs largely yellow, becoming piceous on posterior face of femora and a small red spot on tibiae posteriorly; mid and hind trochanters and femora more piceous, becoming somewhat reddish on anterior face basally, apex yellow, tibiae with median ferruginous to piceous infusions, mid tarsi yellow, hind tarsi yellow apically but basitarsi more testaceous, spurs pale yellow; abdominal terga 2-6 with broad, entire, bright yellow bands, these more or less submedian in position on the more basal terga, tergum 1 with a rather broad, submedian band which is rather widely interrupted medially, basal part

of disc piceous, the more apical part ferruginous; bands on terga 2 and 3 slightly narrowed medially, those on 5 and 6 more apical, apical margins of 5 and 6 rather broadly yellowish-hyaline; sterna 2-6 largely yellow basally, depressed apical rims becoming yellowish-hyaline; blackened areas of face coarsely rugoso-punctate, cheeks somewhat more finely so below, maculated areas of face more finely and closely punctate, becoming very sparsely so on each side of clypeus below, supraclypeal area and clypeus very finely and quite closely punctate; thorax densely rugoso-punctate, somewhat more coarsely so on mesopleura below, lateral faces of propodeum somewhat smoother but dull below, triangle dull and densely tessellate below, becoming quite coarsely, irregularly striate along upper margin; discs of abdominal terga very deeply, distinctly, finely and closely punctate in general, punctures becoming somewhat more sparse apically on the more apical segments, lateral and basal areas of tergum 1 becoming minutely and obscurely punctate; pubescence pale yellowish, thin but erect and rather copious on head and thorax, very short and inconspicuous on abdomen dorsally, more elongate and sparse on the sterna, sternum 6 with erect, pale yellowish pubescence apically; median length of pygidial plate slightly less than basal width, quite strongly narrowed to the narrowly incised, rounded tip, margins carinate, surface quite closely and coarsely punctate; exposed abdominal sterna not modified, sternum 6 rather broadly rounded apically; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION—Michigan to the New England states, in May.

Nomada (Heminomada) sulphurata
Smith

(Fig. 105)

Nomada sulphurata Smith, 1854. *Cat. Hym. Brit. Mus.* 2, p. 249. ♀.

Nomada luteoloides Robertson, 1895. *Amer. Ent. Soc. Trans.* 22, p. 124. ♀. New synonymy

?*Nomada (Heminomada) luteoloides* var. Rodeck, 1931. *Amer. Mus. Novitates* 496, p. 11. ♀.

Xanthidium luteoloides Robertson, 1929. *Flowers and Insects*, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9-11.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks much narrower than eyes, posterior margin carinate; basal seg-

ment of flagellum much shorter than segment 2, the shorter side no more than half the length of 2; mandibles slender and simple apically; wings subhyaline basally, becoming somewhat infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, veins testaceous to piceous, basal vein considerably basad of transverse median; tegulae very closely, deeply and rather coarsely punctate throughout; posterior margin of scutellum rather deeply impressed medially; front coxae not spined; apex of hind tibiae with a dense brush of short dark bristles separated from a posterior angle by an emarginate area; face largely yellow below level of antennae, clypeal sutures black in part, eyes completely encircled by yellow, and a rounded yellow spot below anterior ocellus; median areas of face above vertex and posterior half of cheeks, black; antennal scape yellow anteriorly, becoming piceous posteriorly, basal segment of flagellum more brownish-testaceous, following segments more reddish-piceous; pronotal collar, tubercles, tegulae, lateral margins and a pair of submedian longitudinal lines on scutum, scutellum, adjacent median area of metanotum except center, posterior face of propodeum except mid-line, median transverse area of mesopleura and a rounded spot above, bright yellow, intervening areas largely black, but pleura below more or less ferruginous; front legs, including coxae, largely yellow, trochanters and femora more or less ferruginous posteriorly; mid and hind coxae yellow, the trochanters ferruginous, mid femora ferruginous at base becoming yellow apically, the tibiae and tarsi largely yellow; hind femora yellow in part, the posterior and ventral surfaces more piceous, tibiae and basitarsi largely yellow, the more apical tarsal segments testaceous; spurs pale yellow; abdominal terga 2-5 with broad, extensive, yellow bands occupying most of discs, tergum 1 with a narrow yellow band, blackish basally and apically, 2 very narrowly piceous or blackish across base, apical impressed areas of 2 and 3 dark reddish-piceous, more testaceous on 4 and 5; discs of abdominal sterna yellow in large part, the smooth, apical, impressed areas more testaceous-hyaline; punctures of head in large part coarse, deep and close but quite distinct, becoming somewhat finer and closer on supra-clypeal area, very fine and vague on clypeus; scutum, scutellum and mesopleura coarsely rugoso-punctate, propodeum somewhat more finely so; discs of abdominal terga very finely and closely punctate throughout, but tergum 1 becoming impunctate laterally and basally, and the more apical punctures on tergum 5 becoming rather sparse and coarse; pseudopygidium transverse, very narrow, forming

the rather broadly truncate apical margin of tergum 5, densely covered with suberect silvery tomentum; pubescence very short and thin, somewhat more copious on head, especially below, whitish below, more yellowish above, hardly evident on abdomen dorsally, abdominal sterna with more sparse and elongate pale hairs; apex of sternum 5 with lateral tufts of elongate, yellowish hairs which converge medially.

MALE—Length 9.5-11 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, posterior margin obscurely carinate; antennal flagellum swollen, apex deeply excavated and completely enclosing pedicel, basal segment of flagellum no more than half length of segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming very lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd considerably broader anteriorly than 3rd, veins testaceous, basal vein much basad of transverse median; tegulae very closely, quite deeply and uniformly punctate throughout; posterior margin of scutellum quite deeply depressed medially; front coxae not spinose; hind femora slender and unmodified; lower half of face largely yellow, but with a narrow, blackened area below each antenna reaching margin of clypeus, the supra-clypeal area yellow, lateral maculae ending rather abruptly slightly above level of antennae; face above, vertex, and cheeks in large part, black, the lower end of cheeks yellow; antennal scape yellow anteriorly, blackish posteriorly, flagellum piceous; pronotal collar, tubercles, tegulae, two separated maculations on scutellum, a pair of rather small, lateral maculations on propodeum below, and a large anterior maculation on mesopleura, bright yellow, thorax otherwise black; front and middle legs, including coxae, in large part yellow, femora more or less testaceous posteriorly, and tibiae with a testaceous infusion posteriorly; hind coxae yellow, the trochanters and femora more or less testaceous or yellowish anteriorly, piceous posteriorly, hind tibiae yellow in large part anteriorly, with a somewhat testaceous, median area, posterior surface in part piceous, basitarsi dark testaceous, the more apical segment somewhat lighter, spurs pale yellow; abdominal terga 1-6 with transverse yellow bands, these becoming quite narrow medially on 2-4, but quite broad at each side, that on basal tergum of more uniform width but somewhat constricted medially, submedian on all except 5 and 6 where they are more subapical; discs of abdominal sterna yellow in large part, the apical smooth impressed areas more testa-

ceous or piceous, basal sternum with a median yellow blotch; head in large part coarsely rugoso-punctate, becoming rather finely so on cheeks below, supraclypeal area and clypeus very finely and quite closely and shallowly punctate, lateral areas below very sparsely punctate and shining; scutum and scutellum rather finely and densely rugose, mesopleura somewhat more coarsely so, propodeum rather finely rugose both laterally and posteriorly, triangle densely tessellate and dull, becoming irregularly and rather finely rugoso-striate along upper margin; discs of abdominal terga very finely, closely and quite regularly punctate, but basal tergum becoming impunctate laterally and basally, punctures of the more apical terga becoming somewhat coarser and more distinct; pubescence short but rather copious over head and thorax, pale yellow in large part, becoming more whitish on thorax below, very short and hardly evident on abdomen dorsally, sterna with more sparse but elongate yellowish hairs, sternum 6 becoming quite densely pubescent apically, the hairs erect, pale yellowish; median length of pygidial plate about equal to basal width, rather strongly narrowed apically, apex deeply incised, margins carinate, surface rather coarsely and closely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION—Minnesota to Massachusetts, south to Mississippi and Georgia, March to May.

FLOWER RECORDS—*Claytonia*. Robertson (1929) records this species (as *luteoloides*.) on *Cercis*, *Erythronium*, *Nothoscordum*, *Prunus*, *Ribes*, *Salix*, *Stellaria* and *Zanthoxyllum*.

***Nomada (Heminomada) xanthura*
Cockerell**

Nomada xanthura Cockerell, 1908. Ent. Soc. Wash. Proc. 10, p. 84. ♀.

FEMALE—Length 10 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin sharply carinate; longer side of basal segment of flagellum about equal to segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings somewhat yellowish basally, becoming rather deeply infuscated at apex and in marginal cell, with a hyaline area just beyond the submarginals, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins testaceous, stigma somewhat more ferruginous, basal vein slightly basad of transverse median; tegulae shining, very sparsely punctate, punctures evi-

dent only narrowly along inner margin; posterior margin of scutellum only faintly impressed medially; front coxae not spinose; apex of hind tibiae with a row of 4 or 5 rather slender, yellowish, seta-like bristles; head and thorax largely ferruginous, face with a median blackened area just above antennae and another between the ocelli; posterior margins of cheeks, upper half of clypeal sutures, and margin of supraclypeal area narrowly black; antennae testaceous beneath, more ferruginous above; tubercles and tegulae testaceous; pronotum laterally, mesopleura anteriorly and in part beneath, metapleura, mid coxae, adjacent rather narrow margin of propodeum, a very narrow, median line on scutum, and a broader, median line on propodeal triangle, black, thorax otherwise ferruginous; legs largely testaceous, femora more or less piceous at base, all spurs pale yellow; abdominal tergum 1 rather narrowly piceous basally, apical margin somewhat more reddish, the broad median area more or less testaceous; disc of tergum 2 largely yellow, 3 and 4 more narrowly yellow medially, and 5 largely yellow, impressed apical margins of all more ferruginous; abdominal sterna largely reddish-testaceous, with piceous infusions, impressed apical margins more or less yellowish-hyaline; face and vertex rather coarsely and deeply rugoso-punctate, cheeks much more finely so, becoming rather smooth below, supraclypeal area and clypeus with very fine and close but rather shallow and vague punctures; scutum and scutellum quite densely but not very coarsely rugoso-punctate, mesopleura much more coarsely rugose or reticulate, punctures becoming more distinct below; propodeum very finely but rather densely rugose, becoming somewhat more finely so on lateral margins anteriorly, triangle relatively smooth but dull below, becoming rather coarsely short-striate along upper margin; discs of abdominal terga very minutely and closely punctate, tergum 1 becoming impunctate laterally and basally, impressed apical margins of the more apical terga invaded to a considerable degree by minute and rather close punctures, tergum 5 more sparsely, coarsely and distinctly punctate apically; pseudopygidium very short, broadly transverse, forming the rather broad, truncate, apical margin of tergum 5, densely clothed with very fine, silvery tomentum; pubescence pale in large part but with conspicuous, erect, darker hairs on face, antennal scape, cheeks below and scutellum, pubescence very obscure on abdomen dorsally, but with numerous, erect, dark hairs visible in outline on the more apical terga, sterna with sparse erect darker hairs apically, apex of 5 with a transverse band of elongate, convergent, dark hairs on each side of mid-line.

DISTRIBUTION — New York to Nova Scotia, in June.

Nomada (Nomada) armatella
Cockerell

(Fig. 107)

Nomada armatella Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 606. ♂.

MALE—Length 8-10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat narrower than eyes, posterior margin only subcarinate at most; antennal scape only slightly swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum very short, the shorter side only about half the length of segment 2, median segments somewhat longer than broad; mandibles rather slender and simple apically; wings hyaline basally, becoming rather deeply but narrowly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd considerably broader than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining, punctures minute and obscure, sparse laterally, becoming rather close along inner margin; posterior margin of scutellum only very slightly impressed medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, and narrow lateral facial maculae ending narrowly on eye margin slightly above level of antennae, yellow, the supra-clypeal area more or less yellow medially, and cheeks with a yellow line below along margin of eye; face, vertex and cheeks otherwise black, extending to margin of clypeus and along clypeal sutures; antennal scape yellow anteriorly, more ferruginous posteriorly, flagellum brownish-testaceous beneath, somewhat more piceous above toward base, more ferruginous apically; pronotal collar, tubercles, tegulae and two large spots on scutellum, yellow, and mesopleura with a rather large anterior yellow maculation which is more or less bordered with ferruginous; scutum deep ferruginous, more or less blackish along median area, pleura and propodeum largely black, the mesopleura with a small reddish spot just below wing base; scutellum usually ferruginous along mid-line and posteriorly, adjacent area of metanotum ferruginous; front and mid tarsi and apices of all femora and tibiae, yellow, legs otherwise largely testaceous, hind femora more or less piceous, spurs pale yellow; abdominal tergum 1 broadly piceous at base and rather broadly ferruginous across apical margin, with a pair of transverse, yellow maculations at each side that are separated medially; discs of terga 2-4 largely yellow, interrupted medially with narrow red lines, apical impressed areas more reddish-testaceous, terga 5 and 6 with transverse,

subapical, yellow bands, that on 5 narrowly extended nearly to lateral margins; abdominal sterna largely reddish-testaceous, sternum 6 narrowly yellowish at apex; face coarsely and closely punctate, punctures becoming much finer and more distinctly separated on maculated areas below, and very fine and obscure on clypeus, rather coarse on vertex medially, becoming considerably finer laterally, and cheeks becoming rather coarsely rugose below; scutum coarsely rugoso-punctate, mesopleura somewhat more shallowly rugose, scutellum coarsely rugose basally and medially, becoming rather finely and vaguely rugose laterally and posteriorly, and propodeum rather finely rugose, triangle rather smooth below but becoming broadly, coarsely, rugose-striate across upper half; discs of abdominal terga finely but quite deeply and distinctly punctate, quite closely so basally except on tergum 1 which is impunctate laterally and basally, apical margins invaded by the punctures, only the narrow apical rims impunctate; pubescence entirely pale, quite copious and elongate over head and thorax, obscuring surface on thorax below, very fine and obscure on abdomen dorsally, the sterna with more elongate but very fine, pale hairs, sternum 6 becoming rather densely pale yellowish pubescent apically; median length of pygidial plate much greater than basal width, only slightly narrowed apically, apex very deeply emarginate, margins carinate, surface with rather shallow, coarse and close punctures; exposed sternal plates unmodified, sternum 6 subtriangular, the apex narrowly rounded; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Michigan to the New England states, May to August. The type locality is "Canada."

Nomada augustiana new species

FEMALE—Length 8.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks nearly as broad as eyes, posterior margin subcarinate; longer side of basal segment of flagellum equal to segment 2, median segments somewhat longer than broad; mandibles slender, elongate and simple; wings subhyaline basally, becoming somewhat infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins piceous, basal vein interstitial or nearly with transverse median; tegulae very finely, closely and deeply punctate throughout; posterior margin of scutellum rather deeply grooved medially; front coxae not spined; apex of hind tibiae with 4 or 5, rather elongate

and robust, spinelike setae; labrum, base of mandibles and lateral areas of face below antennae, bright yellow, the supraclypeal area, clypeus and median portion of mandibles more testaceous; face above antennae, vertex and cheeks in part more ferruginous, a small amount of black between and above antennae, between ocelli and over posterior half of cheeks, the latter yellow in part below; antennal scape yellowish anteriorly, flagellum more brownish-testaceous; pronotal collar narrowly, tubercles, upper surface of scutellum, posterior face of propodeum in large part, and a transverse, submedian band on pleura, bright yellow; thorax otherwise dark red, but scutum with a very narrow, median, blackish line, metapleura in part and lateral areas of pronotum, black; legs largely testaceous to ferruginous, femora somewhat blackened toward base, the mid and hind coxae blackish beneath; spurs pale yellow; tegulae more testaceous; abdominal terga 1-3 with rather extensive, lateral, yellow maculae which are somewhat separated medially, those on tergum 1 submedian, rather narrow, apical impressed area and base piceous, space between the maculae more or less ferruginous; terga 2 and 3 becoming somewhat piceous apically, more or less ferruginous between and basad of the maculae; terga 4 and 5 with more submedian maculations which are little if any interrupted medially, but with small, lateral maculations which are slightly separated from the median areas; punctures deep, distinct, very close and rather coarse on face above antennae and on vertex, becoming much finer and densely crowded on cheeks below, supraclypeal area and clypeus, lateral areas below more coarsely and deeply punctate; scutum densely and rather finely rugoso-punctate, scutellum with deeper, more distinct punctures, mesopleura rather finely rugoso-punctate, propodeum finely and rather shallowly rugose posteriorly and laterally, triangle almost entirely yellow, rather smooth below, becoming rather coarsely and irregularly striate above; discs of abdominal terga very closely, finely, but quite distinctly punctate, punctures becoming more minute and widely separated toward the apical impunctate rims, tergum 1 becoming impunctate laterally and basally, tergum 4 quite broadly impunctate apically; pseudopygidium transverse, very short, forming the truncate apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence very short, thin, entirely pale where evident, slightly more copious on head and thorax below and on propodeum posteriorly, hardly evident on abdomen dorsally; sternum 5 apically with a pair of tufts of elongate, curved, brownish hairs which converge medially.

TYPE — Holotype: Female, Augusta, Richmond Co., Ga., April 1, 1959 (R. R. Snelling, on *Salix*). [author's coll.].

Nomada azaleae new species

(Fig. 107)

MALE—Length 8 mm.; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks slightly narrower than eyes; posterior margin strongly carinate; antennal scape rather strongly swollen, apex deeply excavated and largely enclosing pedicel, longer side of basal segment of flagellum somewhat shorter than segment 2, median segments only slightly longer than broad; mandibles slender and simple; wings faintly yellowish, somewhat darker along apical margin, but with a hyaline area just beyond submarginal cells, veins and stigma brownish-testaceous, with the usual three submarginal cells, 2nd considerably broader anteriorly than 3rd, basal vein slightly basad of transverse median; tegulae testaceous-hyaline, somewhat yellowish anteriorly, smooth and shining, with sparse, fine punctures; scutellum very deeply grooved medially; front coxae not spinose; hind femora unmodified; clypeus, labrum, mandibles except tips, a spot on supraclypeal area, and narrow lateral maculations ending at level of antennae, bright yellow, more ferruginous, narrow maculations surrounding top of eye, extending down the outer orbits, lower margin yellow; median area of face around antennae and extending rather broadly down to margin of clypeus, black, this extending to vertex around ocelli and down the cheeks posteriorly; antennal scape yellow anteriorly, becoming darkened posteriorly, flagella testaceous beneath, brownish-piceous above; scutum with a median, rather broad, black band, anterior margin narrowly black, each lateral third red; scutellum red except for the narrow anterior margin; pleura laterally largely red but with a small yellow anterior spot and a narrow transverse line of black just below wing bases, the venter black; tubercles and pronotal collar yellow; propodeum largely black but with a faint, reddish area on each side of posterior surface; legs testaceous in large part, hind femora more piceous, spurs pale yellow; basal abdominal tergum black over basal half, apical half more reddish, somewhat yellowish adjacent to blackened area; tergum 2 with a very broad, transverse, yellow band occupying most of disc, this narrowly interrupted medially, apical impressed area red; tergum 3 with a pair of large, lateral maculations which occupy about one-third of the plate, median

third red and apical impressed area reddish; terga 4-6 with transverse, yellow bands, those on 4 and 5 partially interrupted medially; discs of abdominal sterna 2 and 3 largely yellow, apical margins darker but rims becoming narrowly, testaceous-hyaline; head and thorax rather coarsely rugoso-punctate, but lower portion of face considerably smoother over the maculated areas, punctures very fine and barely evident; cheeks somewhat more finely rugoso-punctate; basal abdominal tergum very minutely punctate, the punctures distinctly but not widely separated, barely visible; discs of terga 2-5 very finely and quite closely punctate, punctures extending on to impressed apical areas, the rather narrow rims impunctate; pubescence very short, thin and inconspicuous, entirely pale, rather copious on head below and thorax laterally and posteriorly, that on abdomen very fine, subappressed and barely evident basally, becoming more elongate and conspicuous apically; pygidial plate strongly narrowed apically, apex narrowly but quite deeply emarginate, margins carinate, surface rather coarsely but shallowly rugoso-punctate; sternum 8 with a slender, apical process; gonocoxites of genital armature as shown (fig. 107).

TYPE — Holotype: Male, Highlands, N. C., June 5, 1957 (Mitchell, on *Azalea*) [author's coll.].

Nomada (Nomada) banksi Cockerell

(Fig. 107)

Nomada vicina Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 293. ♂. (not ♀)

Nomada vicina Robertson, 1903. Canad. Ent. 35, p. 178. (not Cresson)

Nomada banksi Cockerell, 1907. Entomologist 40, p. 98. ♀.

Nomada vicina Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 7.5-9 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks much broader than eyes, posterior margin carinate; longer side of basal segment of flagellum equal to segment 2, median segments slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming rather deeply infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, veins and stigma largely testaceous, basal vein interstitial with transverse median; tegulae shining between deep and distinct but rather fine punctures, these rather sparse

and irregularly scattered; posterior margin of scutellum deeply grooved medially; front coxae with a triangular posterior tubercle, but not spined; apex of hind tibiae with 4 or 5 elongate, robust, piceous, seta-like bristles; face below ocelli almost completely ferruginous, narrowly yellow on inner orbits below, eyes completely and rather broadly encircled with ferruginous, median area of face above antennae, area around ocelli, and posterior margin of cheeks, black; antennal scape reddish-testaceous, flagellum more brownish-testaceous; tegulae yellowish-testaceous, tubercles more reddish-testaceous, the pronotal collar and scutellum ferruginous; scutum dull red along lateral margins, and with a pair of longitudinal red bands on each side of mid-line, intervening narrow stripes black; mesopleura with a narrow, transverse, bright yellow maculation, bordered above and below with rather bright ferruginous; venter in part, metapleura, and lateral faces of propodeum, black, the propodeum dull yellow on each side posteriorly, triangle black medially, reddish laterally; legs largely ferruginous, front pair somewhat yellowish, spurs pale yellow; abdominal terga blackish or piceous, with bright yellow fasciae, tergum 1 with a narrow, transverse band which is ferruginous in part, with a pair of small yellow spots on each side of center; tergum 2 with a broad, sub-basal, yellow band which is very slightly interrupted medially, rather widely removed from apical margin; tergum 3 with rather widely separated, transverse, yellow bands that are quite broad laterally, 4 with a rather narrow, transverse, yellow band which is deeply constricted at mid-line, and a pair of distinctly separated, lateral, yellow maculations; disc of tergum 5 broadly yellow medially, with a very small lateral spot on each side; abdominal sterna largely ferruginous, 3 and 4 with small, vague, yellowish spots; face above antennae very coarsely, deeply and closely punctate, almost rugose, vertex and cheeks somewhat more finely so, supra-clypeal area and clypeus very finely and closely punctate, lateral areas shining, with distinct, well separated punctures; scutum and mesopleura coarsely and densely rugose, scutellum with somewhat more coarse and distinct punctures; propodeum much more finely and closely rugose, lateral faces becoming somewhat shining but still punctate below, triangle smooth but dull, becoming very finely and irregularly rugoso-striate above; discs of abdominal terga very finely, closely and quite deeply punctate, the punctures becoming somewhat more minute and more widely separated apically, tergum 1 impunctate laterally and basally, very finely but distinctly punctate medially, punctures of the

more apical terga becoming somewhat coarser and deeper apically; pseudopygidium transverse, rather short, forming the rather narrow, apical, truncate margin of tergum 5, covered apically with dense, suberect, silvery tomentum and with some very fine, suberect, more yellowish pubescence basally; pubescence very short, thin and obscure, entirely pale, rather dense on propodeum posteriorly and on venter of thorax, hardly visible on abdomen dorsally, sternum 5 apically with a pair of tufts of elongate, somewhat curved, pale bristles that converge medially.

MALE—Length 7.5-8.5 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks much narrower than eyes, posterior margin carinate; antennal scape somewhat swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum much shorter than segment 2, median segments very slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming rather deeply infuscated apically and in marginal cell, with a hyaline area just beyond 3rd submarginal cell, with the usual three submarginal cells, 2nd and 3rd nearly equal anteriorly, veins testaceous to piceous, basal vein interstitial with, or slightly basad of, transverse median; tegulae shining, punctures very fine but deep, distinct, rather sparse; posterior margin of scutellum deeply grooved medially; front coxae not spined; hind femora unmodified; clypeus, labrum, mandibles, a pair of narrow, lateral, facial maculae, and a narrow, yellow maculation adjacent to eye margin on cheeks below, bright yellow, the lateral maculae ending abruptly at level of antennae; face, vertex and cheeks otherwise largely black, including areas between the lateral maculae and clypeal margin below; antennal scape bright yellow anteriorly, piceous posteriorly, flagellum brownish-testaceous; tubercles and tegulae yellowish-testaceous, and pleura with a rather large, anterior, yellow maculation, thorax otherwise black; coxae black at least in part, with some yellow laterally or apically, legs otherwise largely reddish, somewhat yellowish anteriorly on front and middle legs, spurs pale yellow; abdominal terga black, with bright yellow maculae, that on tergum 1 narrow, submedian, slightly interrupted medially; tergum 2 with a pair of broad, sub-basal maculations that are much narrowed, but nearly meet medially; tergum 3 with a pair of rather widely separated but extensive, sub-basal, yellow maculations at each extreme side; tergum 4 with a transverse yellow band which is rather widely interrupted medially and deeply emarginate posteriorly on each side; tergum

5 with a somewhat similar but complete median band, and small lateral maculations, these sometimes narrowly joined; tergum 6 with a narrower but rather extensive, median, yellow band; discs of abdominal sterna 2-3 largely yellow, the broadly impressed and impunctate apical margins more reddish-hyaline; vertex and face above antennae very coarsely and densely rugose, cheeks more finely, closely and distinctly punctate below, black areas of face below closely and finely punctate, the punctures more scattered in lateral maculated areas; scutum, scutellum and mesopleura very coarsely rugose or rugoso-punctate, the propodeum somewhat more finely apically on each plate, tergum 1 becoming impunctate laterally and basally, the more apical terga becoming rather coarsely and deeply punctate toward the impressed apical rims; pubescence very short, rather thin, somewhat yellowish above, becoming somewhat more whitish and more dense on face and thorax beneath, quite dense on venter of thorax, very fine and hardly visible on the more basal abdominal terga but more elongate on the more apical terga; sterna with very fine, suberect, scattered, pale hairs; sternum 6 becoming quite densely pale pubescent, the hairs erect along median area; median length of pygidial plate much greater than basal width, only very slightly narrowed apically, apex rather narrowly rounded, with a small median incision, margins carinate, surface quite densely rugoso-punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed apically to the narrowly rounded tip; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION — Ontario and New York, south to southern Illinois and North Carolina, August and September.

FLOWER RECORDS—Robertson (1929) records this species (as *vicina*) on *Aster*, *Bidens*, *Eupatorium*, *Polygonum*, and *Solidago*.

This species was mistaken for *vicina* by Robertson, but the two are quite distinct. In both sexes of *vicina* the scutellum is at least partly red, and the clypeus in part black. Females of *banksi* have an entirely red clypeus, and while the scutellum also is red, it is more deeply grooved and more closely and finely punctate than in *vicina*. In the males of *banksi* the clypeus is en-

tirely bright yellow, and the scutellum either is entirely black or has a pair of small yellow spots. The gonocoxites differ in form in the two species, as shown (fig. 107). The maculation of the abdominal terga is superficially similar in the two, although minor differences are evident.

Nomada vicina stevensi Swenk (1913: Nebr. Univ. Stud. 12, p. 56), which is not known to occur east of the Dakotas, is apparently correctly associated with *vicina* as a subspecies.

Nomada capillata new species

MALE—Length 6 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks much narrower than eyes, posterior margin not evidently carinate; antennal scape only slightly swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum very short, the shorter side not much more than half the length of segment 2, median segments nearly as broad as long; mandibles slender and simple; wings hyaline basally, becoming faintly infuscated at apex and in marginal cell, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, veins and stigma testaceous, basal vein slightly basad of transverse median; tegulae shining, punctures very fine, rather sparse toward outer margin; posterior margin of scutellum very slightly impressed medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles basally, and very narrow, lateral, facial maculae, bright yellow; face, vertex and cheeks otherwise black; antennal scape bright yellow anteriorly, becoming more piceous posteriorly, flagella entirely testaceous; tubercles, tegulae, and two nearly contiguous spots on scutellum, yellow, and mesopleura with a very small yellow spot anteriorly; thorax otherwise black; abdominal tergum 1 piceous across basal half, apical half reddish-testaceous; terga 2 and 3 testaceous medially, with extensive, lateral, widely separated, yellow maculations, apical impressed areas becoming somewhat darkened, rims narrowly yellowish-hyaline; terga 4-6 dark, not maculated, yellowish-hyaline apically; abdominal sterna largely piceous, with yellowish-hyaline apical margins; vertex and upper half of face coarsely and quite deeply rugoso-punctate, cheeks much more finely so, and punctures rather fine on lower half of face, lateral maculated areas almost impunctate, clypeus with very minute, close and obscure punctures; scutum, scutellum and mesopleura densely rugose, propodeum some-

what more finely so, triangle almost completely and coarsely reticulate or irregularly striate; discs of abdominal terga with exceedingly minute, barely visible and slightly separated punctures, the depressed apical rims invaded in part by scattered, sparse and minute punctures; pubescence entirely pale, quite short but rather copious on head and thorax, largely hiding surface on thorax below, barely evident on abdomen dorsally and ventrally; sternum 6 becoming rather densely pubescent toward apex; median length of pygidial plate about equal to basal width, elongate triangular in form, apex much narrowed and quite narrowly but deeply emarginate, margins carinate, surface very finely and closely punctate; exposed sternal plates unmodified, (sternum 8 and genital armature missing).

TYPE—Holotype: Male, Milton, Mass., May 4, 1902 [M.C.Z.].

Nomada (Nomada) ceanothi Cockerell (Fig. 107)

Nomada (Nomada) ceanothi Cockerell, 1907. Entomologist 40, p. 97. ♀.

FEMALE—Length 6-7 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin only obscurely carinate at most; longer side of basal segment of flagellum considerably shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming lightly infuscated apically, with a hyaline area just beyond submarginal cells, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining, punctures exceedingly minute, sparse and obscure, becoming somewhat closer along inner margin; posterior margin of scutellum rather broadly and shallowly impressed medially; front coxae not spinose; apex of hind tibiae with three or four very slender, elongate, yellowish, hair-like bristles; eyes narrowly but almost completely encircled with reddish-testaceous, lower half of face largely of the same color, with a small amount of black immediately beneath each antenna, the broad, median area above antennae, vertex and cheeks largely black; antennal scape and base of flagellum more testaceous, following segments more brownish-testaceous beneath, somewhat reddish above; scutum and scutellum ferruginous, scutum narrowly black anteriorly and in mid-line, mesopleura black beneath and below wing

base, yellowish-ferruginous medially, with a smaller, more reddish spot just below wing base; metapleura and propodeum largely black, propodeum with an obscure yellowish spot on each side of posterior face; pronotal collar, tubercles, tegulae, and legs in large part, testaceous, spurs pale yellow; discs of abdominal terga 1-5 reddish-testaceous, tergum 1 black across basal third, terga 2 and 3 with lateral, widely separated, yellow maculae, tergum 5 with a pair of vague, subapical, yellow infusions; abdominal sterna largely reddish-testaceous; face, vertex and cheeks coarsely, closely and deeply punctate, cheeks becoming somewhat more rugose below, clypeus with very minute, fine, close and obscure punctures; scutum and upper portion of mesopleura very coarsely and deeply rugoso-punctate, pleura more distinctly and finely punctate below, scutellum with somewhat finer but rather coarse and contiguous punctures; propodeum more finely but densely rugose, triangle narrowly smooth below, becoming broadly and coarsely rugoso-striate across upper two-thirds; discs of abdominal terga very finely and rather closely punctate, tergum 1 becoming impunctate laterally and basally, and the median punctures very minute and obscure, apical margin broadly impunctate; apical margins of terga 2-4 very broadly impressed, becoming more or less hyaline along rims, these invaded only very slightly by a few very minute, scattered punctures, those of tergum 5 becoming rather sparse but somewhat coarser toward the apex; pseudopygidium very short, transverse, forming the truncate apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence very short and obscure in large part, entirely pale where visible, somewhat more copious and evident on face, cheeks below, on thorax laterally and beneath, and on propodeum, very minute and obscure on abdomen dorsally, sternal plates with somewhat more elongate but sparse, pale hairs, apex of sternum 5 with a rather small tuft of somewhat elongate, more or less brownish, convergent hairs on each side of mid-line.

MALE—Length 5-7 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin obscurely carinate, if at all; antennal scape only slightly swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum very short, its shorter side only about half the length of segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd much broader

than 3rd anteriorly, veins testaceous, basal vein much basad of transverse median; tegulae shining, punctures exceedingly minute and sparse, evident chiefly along inner margin; posterior margin of scutellum very broadly and slightly impressed medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, supraclypeal area, and narrow, lateral, facial maculations, bright yellow, and cheeks narrowly yellow along margin of eye below; face above antennae, vertex and cheeks black, and black separating the supraclypeal maculation from the narrow lateral maculations which end narrowly on eye margin at level of antennae; antennal scape yellow anteriorly, piceous posteriorly, flagellum more brownish-testaceous beneath, upper surface darkened, piceous basally, becoming lighter apically; pronotal collar, tubercles, tegulae, and an anterior maculation on mesopleura, bright yellow; scutellum red, but anterior margin and remainder of thorax black; coxae and trochanters in part blackish, legs otherwise more testaceous, hind femora somewhat infuscated, spurs pale yellow; basal half of abdominal tergum 1 piceous, apical half more yellowish-ferruginous, terga 2 and 3 with extensive, lateral, yellow maculations which are rather widely separated medially, the non-maculated areas more testaceous or ferruginous, terga 4 and 5 with narrower, transverse bands which are interrupted both laterally and medially, and tergum 6 broadly yellow medially; abdominal sterna largely reddish-testaceous, sternum 6 narrowly yellow at apex; face, vertex and cheeks coarsely, and deeply rugoso-punctate, punctures becoming somewhat finer and more sparse on each side below, clypeus with very minute, close and obscure punctures; scutum very coarsely and deeply rugose, scutellum somewhat more finely rugoso-punctate, and mesopleura rugose above, punctures becoming somewhat more distinct but still close below; propodeum somewhat more finely but densely rugose, triangle somewhat shining below, upper two-thirds becoming rather coarsely, irregularly striate; discs of abdominal terga very finely and quite closely punctate, tergum 1 becoming impunctate basally and laterally, apical impressed areas of the following terga invaded with minute, rather sparse punctures, only the more or less yellowish-hyaline apical rims being impunctate; terga 4-6 rather coarsely and deeply punctate apically; pubescence entirely whitish, very short and inconspicuous on head and thorax above, becoming somewhat more copious but still short on face below and lower portions of head, on thorax laterally, posteriorly and beneath; abdomen very minutely and obscurely pubescent above, sternal plates

with very fine, sparse but more elongate, pale hairs, sternum 6 becoming quite densely pubescent apically; median length of pygidial plate about equal to basal width, slightly narrowed apically, apex somewhat rounded but deeply incised, margins carinate, surface quite closely and rather finely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—New York to North Carolina, March to July.

FLOWER RECORDS — *Amelanchier*, *Aruncus*, *Ceanothus* and *Senecio*.

Nomada composita new species

FEMALE—Length 7-10 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin sharply carinate; longer side of basal segment of flagellum somewhat shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple; wings subhyaline basally, becoming rather deeply infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, a hyaline area just beyond the 3rd, veins testaceous to piceous, stigma testaceous, basal vein much basad of transverse median; tegulae shining, punctures minute and sparse, somewhat closer along inner margin; posterior margin of scutellum only slightly depressed medially; front coxae not spinose; apex of hind tibiae with a row of three, of four short but rather robust, seta-like bristles; head and thorax largely ferruginous, face somewhat more testaceous below, a restricted area of black just above antennae, this extended narrowly below to lateral margin of clypeus, area between ocelli and posterior half of cheeks black; antennal scape and base of flagellum testaceous, flagellum otherwise testaceous beneath, somewhat brownish above; tubercles and tegulae more testaceous, scutum with a narrow, median, black line, pronotum laterally, mesopleura beneath, metapleura, and adjacent lateral surfaces of propodeum, black; posterior face of propodeum including the triangle largely ferruginous; front and middle coxae largely black, the hind coxae ferruginous, trochanters reddish-testaceous, femora rather narrowly piceous at base, becoming more testaceous apically, tibiae and tarsi testaceous,

spurs pale yellow, the hind basitarsi somewhat darkened; tergum 1 of abdomen piceous over basal half, otherwise ferruginous, becoming somewhat darkened along rim, remaining terga ferruginous in large part, tergum 2 with a pair of widely separated, lateral, yellow maculae, tergum 3 with a similar but much smaller pair, terga 4 and 5 not maculated, sterna reddish-testaceous, more or less suffused with piceous; vertex and face above antennae coarsely, deeply, and quite closely rugoso-punctate, cheeks becoming more finely, shallowly and obscurely below; lower half of face distinctly and rather coarsely punctate on each side, the supraclypeal area finely and densely rugose, and clypeus with very fine and close punctures; scutum coarsely and deeply rugoso-punctate; punctures of scutellum deep and distinct, not quite as coarse; pleura coarsely reticulate above, becoming somewhat more distinctly and irregularly punctate beneath; propodeum finely and densely rugose, lateral faces becoming somewhat smoother below, triangle smooth over lower half, becoming rather coarsely striate along upper margin, median striations finer and rather vague; abdominal tergum 1 becoming impunctate laterally and basally, median punctures barely evident, discs of following terga minutely and rather closely punctate, apical margins rather broadly impunctate, invaded only slightly by very minute, scattered punctures, tergum 5 becoming somewhat more coarsely and irregularly punctate apically; pseudopygidium transverse, very short, forming the rather narrow, truncate, apical margin of tergum 5, densely covered with rather yellowish, suberect tomentum; pubescence very short and inconspicuous, largely pale, face with a few rather short but erect hairs, with rather dense pubescence on propodeum posteriorly, that on abdomen dorsally hardly evident, becoming somewhat more conspicuous laterally on the more apical terga; sterna with very sparse, scattered, somewhat more elongate, pale hairs, apex of sternum 5 with a pair of tufts of erect, curved, brownish hairs that converge medially.

TYPES—Holotype: Female, Colebrook, Conn. (no other data) [M.C.Z.]. Paratypes: 4 ♀♀, topotypical; 1 ♀, Presque Isle, Marquette, Mich., July 9, 1939. The Colebrook series was probably collected by W. M. Wheeler.

Paratypes are in the Museum of Comparative Zoology and in collections of R. R. Dreisbach and the author.

***Nomada (Nomada) cressonii* Robertson**
(Fig. 107)

Nomada cressonii Robertson, 1893. Amer. Ent. Soc. Trans. 20, p. 275. ♀ ♂.

Nomada mera Cockerell, 1908. Ent. Soc. Wash. Proc. 10, p. 83. ♀. New synonymy

Nomada mera Cockerell, 1911. U. S. Natl. Mus. Proc. 41, p. 239. ♂ ♀.

Nomada cressonii Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8-10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes, posterior margin not distinctly carinate; longer side of basal segment of flagellum somewhat shorter than segment 2 which is much elongated, median segments considerably longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming rather deeply infuscated along narrow outer margin and in marginal cell, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, veins piceous, basal vein much basad of transverse median; tegulae shining between very minute, quite sparse punctures; posterior margin of scutellum only slightly impressed medially; front coxae not spinose; apex of hind tibiae with 3 or 4 slender, elongate, yellowish, hair-like bristles; face largely ferruginous, lower half somewhat more testaceous, labrum bright yellow around basal and lateral margins, a restricted black area between and slightly above antennae, another between ocelli, and posterior half of cheeks black, the eyes completely encircled with reddish-testaceous; antennal scape reddish-testaceous, flagellum more brownish-testaceous below, dull ferruginous above; thorax in large part ferruginous, tegulae somewhat more yellowish-ferruginous; prothorax laterally, mesopleura below, metapleura and narrow adjacent margin of propodeum, and median lines on scutum and on posterior face of propodeum, black; legs largely testaceous, front and mid femora darkened at base, hind femora largely dark, spurs pale yellow; abdominal terga largely ferruginous, basal tergum narrowly piceous at base, terga 2 and 3 with large, lateral, yellow maculae that are widely separated medially, tergum 5 with a pair of subapical, slightly separated, yellow maculations, impressed apical margins of all quite broadly impunctate, somewhat more yellowish; abdominal sterna piceous in large part, becoming somewhat more testaceous on the more apical sterna; vertex and face above antennae very coarsely, closely and deeply punctate, cheeks becoming somewhat more rugose, lower

part of face coarsely and deeply punctate at each side, but supraclypeal area and clypeus with very fine, close, shallow and rather obscure punctures; scutum and scutellum very coarsely, deeply and closely punctate, the mesopleura more rugose, punctures becoming somewhat more distinct below; propodeum posteriorly rather finely, obscurely and shallowly rugose, lateral faces becoming somewhat smoother below; discs of abdominal terga finely and rather closely and deeply punctate toward base, punctures becoming more minute and sparse toward the broad, apical, impunctate margins; basal tergum becoming impunctate laterally and basally, very minutely punctate medially; tergum 6 becoming rather sparsely, coarsely and deeply punctate toward apical rims; pseudopygidium transverse, very short forming the rather broadly truncate apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence very short and thin, entirely whitish, somewhat more copious on thorax laterally and posteriorly, very fine and obscure on abdomen, apex of sternum 5 with a dense patch of elongate, curved and convergent, fuscous hairs on each side.

MALE—Length 7-9 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin not distinctly carinate; antennal scape only slightly swollen, apex deeply excavated and largely enclosing pedicel, basal segment of flagellum in front only half the length of segment 2, median segments somewhat longer than broad, 3-5 slightly swollen beneath; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd usually somewhat broader than 3rd anteriorly, but these sometimes equal, veins largely piceous, basal vein much basad of transverse median; tegulae shining between very minute, sparse punctures; posterior margin of scutellum quite deeply impressed medially; front coxae not spinose; hind femora slender and unmodified; face below antennae largely yellow, median area of face above antennae and around ocelli, black, narrowly ferruginous around margin of eye above and posteriorly, becoming narrowly yellow on cheeks below, cheeks medially and posteriorly black; antennal scape bright yellow anteriorly, narrowly piceous posteriorly, flagellum brownish-testaceous; tubercles and tegulae more yellowish; pronotum black, the collar testaceous; mesopleura largely ferruginous above, black below, the scutum with a median, rather broad, black area, otherwise ferruginous; scutellum entirely ferruginous,

the metapleura and propodeum largely black; legs testaceous in large part, front and mid legs more or less yellowish anteriorly and their tarsi yellow, hind basitarsi more brownish, all spurs pale yellow; abdominal terga reddish-testaceous in part, tergum 1 blackish toward base, apical margin more ferruginous, 2 and 3 with broad, transverse, sub-basal bands that are slightly interrupted medially, apical areas more ferruginous, 4 with rather widely separated, lateral, yellow maculae, the median area more piceous, the broad depressed rim somewhat yellowish-hyaline, 5 and 6 rather broadly yellow medially, apical rims yellowish-hyaline; discs of abdominal sterna yellowish to testaceous, the broad, impunctate, apical rims more testaceous, sternum 6 bright yellow medially toward apex; vertex and face above antennae very coarsely, deeply and closely punctate, the cheeks becoming more finely rugose below, lower part of face rather deeply punctate on each side, and punctures of supraclypeal area rather coarse and very close; clypeus very finely and closely punctate beneath rather dense pubescence; scutum, scutellum and mesopleura very coarsely rugoso-punctate, posterior face of propodeum somewhat more finely rugose, lateral faces becoming somewhat smoother below, propodeal triangle smooth and somewhat shining below, becoming rather coarsely but irregularly rugoso-striate above; discs of abdominal terga very finely, closely and rather shallowly punctate, basally the punctures becoming somewhat more minute, but invading apical margins nearly to the rims, tergum 1 impunctate laterally and basally, 4-6 becoming somewhat more coarsely and sparsely punctate toward the depressed apical rims; pubescence rather copious over head and thorax, rather short but entirely white, quite dense on face, on cheeks below, on thorax laterally and below, very fine and obscure on abdomen, becoming somewhat more elongate on the more apical terga, more elongate but very fine and sparse on sterna, becoming quite dense at apex of sternum 6; median length of pygidial plate about equal to basal width, rather strongly narrowed to the apex which is very deeply incised, margins carinate, surface closely and rather finely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded tip; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION — North Dakota to Nova Scotia, south to Tennessee and North Carolina, April to August.

FLOWER RECORDS — *Azalea*, *Oeno-*

thera, *Rubus* and *Senecio*. This is recorded by Robertson (1929) on *Antennaria*, *Claytonia*, *Dentaria*, *Erigeron*, *Nothoscordum*, *Oxalis*, *Salix*, *Smilacina*, *Taenidia*, *Viburnum* and *Zanthoxylum*.

There is either a considerable range of variation in *cressonii*, or more than a single species is included in the material at hand. The differences involve the relative lengths of the antennal segments, the relation of the basal vein to the transverse median vein, and the extent of red coloration of the thorax. Both sexes show much the same variations, but there is no correspondence of these variations with distribution and sex.

Nomada crudelis Cresson

Nomada crudelis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 82. ♀.

FEMALE—Length 15 mm.; lateral ocelli nearer margin of vertex than to eyes; cheeks subequal to eyes in width; longer side of basal segment of flagellum slightly shorter than segment 2, median segments slightly longer than broad; mandibles simple, robust; wings pale fuliginous, veins brownish, 3rd submarginal cell subequal to 2nd anteriorly, basal vein somewhat basad of transverse median; tegulae closely and quite coarsely punctate; scutellum deeply grooved medially; front coxae not spinose; apex of hind tibiae with a row of three or four very short bristles; color largely red, mandibles and labrum more yellowish, segments 2-11 of flagella brownish-piceous; scutum with three rather faint, longitudinal blackish lines; pronotum laterally, metapleura below, and lower, anterior margin of propodeum laterally, black; legs entirely red, spurs yellowish; basal half of abdominal tergum 1 black, abdomen otherwise red, but impressed apical margins of 2-4 yellowish; vertex and upper half of face rather coarsely rugose, cheeks finely so; clypeus minutely and closely punctate; thorax rather coarsely rugose throughout, but lower half of propodeal triangle smooth and dull; punctures of abdominal terga minute, and very closely crowded, only the very narrow, apical rims impunctate; pseudopygidium of the usual form; pubescence very short and inconspicuous, pale yellowish.

TYPE LOCALITY—Georgia.

It seems possible that *Andrena obscuripennis* Smith is the host of *crudelis*.

No specimens other than the type have been seen. In the Catalog of Hymenoptera

(p. 1198) this is listed in the subgenus *Heminomada*, but it bears little or no resemblance to the other species of that group. There are no yellow bands on the abdominal terga, and the yellowish impressed apical areas of the terga are quite obscure.

Nomada decepta new species

FEMALE—Length 8 mm.; lateral ocelli much nearer margin of vertex than to each other, more distant from eyes; cheeks slightly narrower than eyes, hind margin obscurely carinate; longer side of basal segment of flagellum equal to segment 2, median segments somewhat longer than broad; mandibles slender and simple; wings brownish-hyaline, veins and stigma more testaceous, 1st transverse cubitus missing, thus with but two submarginal cells, the 2nd strongly narrowed apically, (resembling *obliterata*, fig. 106) basal vein interstitial or nearly with transverse median; tegulae testaceous-hyaline, smooth and shining, very minutely and sparsely punctate; scutellum with a deep median groove; front coxae not spinose; apex of hind tibiae with 2 or 3 short, spine-like setae; head and thorax largely red, clypeus, labrum and mandibles somewhat yellowish, area surrounding ocelli black; antennae testaceous, scape somewhat more yellowish; scutum, scutellum and mesopleura red, scutum with or without a narrow median black line; prothorax laterally, metapleura, adjacent lateral areas of propodeum, and propodeal triangle, black; posterior face of propodeum reddish-yellow on each side; tubercles yellowish; legs largely testaceous, spurs pale yellow; abdomen almost entirely red, apical margins of the terga becoming narrowly yellowish-hyaline; abdominal sterna somewhat darker toward base, the broad apical margins yellowish-hyaline; punctures of head and thorax coarse, close and deep, but somewhat finer on lower half of face, more or less separated and rather shallow on clypeus, those on scutellum very coarse and well separated, each half with only a few, deep, rounded punctures that are much more coarse than those on scutum and on posterior face of scutellum; punctures on pleura very coarse but rather shallow, contiguous, somewhat finer and densely crowded on propodeum, but the triangle largely impunctate, with a few coarse striations toward upper margin; punctures on abdominal terga very fine and close, invading somewhat more sparsely the apical impressed areas, nearly reaching rims; pseudopygidium very narrow, of the usual form; pubescence very short, thin and ob-

scure, entirely pale, somewhat more elongate on cheeks and lower part of head and on pleura and propodeum, very short, inconspicuous and sub-appressed on abdomen.

TYPES—Holotype: Female, Alabama, N. Y., May 30, 1951 (L. L. Pechuman) [U.S.N.M.]. Paratype: 1 ♀, Midland Co., Mich., May 15, 1955 (Dreisbach) [Dreisbach].

Nomada (Nomada) denticulata
Robertson

(Fig. 107)

- Nomada articulata* Robertson, 1895. (not Smith). Amer. Ent. Soc. Trans. 22, p. 124. ♂.
Nomada bella Robertson, 1897. (not Cresson). Acad. Sci. St. Louis, Trans. 7, p. 340. ♀.
Nomada articulata Robertson, 1898 (not Smith). Acad. Sci. St. Louis, Trans. 8, p. 51. ♀.
Nomada denticulata Robertson, 1902. Canad. Ent. 34, p. 49.
Nomada simplex Robertson, 1902. Ent. News 13, p. 80. New synonymy.
Nomada denticulata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 7-8 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin strongly carinate; longer side of basal segment of flagellum equal to segment 2, median segments slightly longer than broad; mandibles simple; wings subhyaline basally, becoming rather deeply infuscated along outer margin and in marginal cell, with a hyaline area just beyond the submarginals, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd, veins piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct, quite close punctures; posterior margin of scutellum deeply impressed medially; front coxae with triangular, posterior, spine-like tubercles; apex of hind tibiae with two or three long, yellowish, hair-like bristles; head and thorax largely ferruginous, but face somewhat more testaceous, with a small amount of black between antennae, between ocelli, and along posterior margin of cheeks; tubercles, tegulae and legs more testaceous; scutum with a median black line, and metapleura and adjacent anterior margin of propodeum, black; spurs pale yellow; discs of abdominal terga ferruginous, basal tergum narrowly blackish or piceous at base and along apical margin, terga 2-4 more or less piceous apically, 2 and

3 with lateral, widely separated, yellow maculae; antennal scape and base of flagellum more testaceous, following segments ferruginous beneath, more piceous above; punctures of face above antennae very coarse, deep and close, becoming somewhat finer on vertex, shallow but quite coarse and close on each side of face below, cheeks more coarsely rugose, supraclypeal area more finely rugoso-punctate, the clypeus finely and shallowly punctate; scutum coarsely rugoso-punctate medially, becoming somewhat more finely so laterally, the scutellum and pleura quite coarsely rugoso-punctate above, punctures becoming somewhat more distinct and finer on pleura below; propodeum rather finely rugose posteriorly, becoming very finely so on each lateral surface, triangle smooth and somewhat shining below, becoming quite coarsely striate on each side above, more finely reticulate medially; discs of abdominal terga very finely and rather closely punctate, apical impressed areas largely impunctate, invaded only slightly by very minute, sparse punctures, tergum 1 becoming impunctate basally and laterally; punctures of tergum 5 somewhat more coarse and distinct, well separated apically; pseudopygidium very short, transverse, forming the rather narrowly truncate apical margin of tergum 5, densely clothed with suberect silvery tomentum; pubescence very short, inconspicuous, somewhat more elongate on cheeks below and on pleura and propodeum, entirely pale where visible, hardly evident on abdomen dorsally, somewhat more elongate but very fine and sparse on abdominal sterna; sternum 5 with a dense, transverse tuft of elongate, brownish, convergent hairs on each side of mid-line apically.

MALE—Length 7-9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks much narrower than eyes, posterior margin quite strongly carinate; antennal scape only slightly swollen, apex deeply excavated, completely enclosing pedicel, longer side of basal segment of flagellum equal to segment 2, median segments only very slightly longer than broad, each of segments 2-7 with a basal depression above, resulting in a tuberculate appearance of the apex; mandibles rather robust, entirely simple; wings subhyaline basally, becoming rather deeply infuscated apically and in marginal cell, a hyaline area just beyond the submarginals, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining, punctures fine but close, deep and distinct throughout; posterior margin of scutellum quite deeply depressed medially; front coxae

with posterior, triangular, spine-like tubercles; hind femora quite slender and unmodified; clypeus, labrum, mandibles, narrow lateral facial maculae ending rather abruptly at level of antennae, and supraclypeal area medially, bright yellow, and cheeks with a narrow, yellow band along margin of eye below; face above, vertex and cheeks otherwise black, the black area reaching lateral margins of clypeus below; antennal scape bright yellow anteriorly, becoming more ferruginous posteriorly, flagellum more brownish-testaceous beneath, piceous above; pronotal collar and a rather large maculation on pleura, bright yellow, pleural maculation bordered above and below with ferruginous; scutum and scutellum ferruginous, with a rather broad, median, black band on scutum; propodeum and metapleura largely black, the mesopleura becoming black beneath; tubercles and tegulae more testaceous; tergum 1 of abdomen, piceous basally and very narrowly piceous across apical margin, more ferruginous medially, with a small yellow maculation on each side; disc of tergum 2 ferruginous medially, with a large yellow maculation on each extreme side, apical margin becoming somewhat darker; terga 3-6 with more or less complete, transverse, yellow bands, these sub-basal or median on 2 and 3, more nearly apical on 5, narrowly interrupted medially on 3, becoming very broad at each extreme side, and broad on 4 laterally, posterior margins of the bands more or less emarginated on each extreme side; discs of abdominal sterna 2-4 more or less yellow medially, tergum 1 largely ferruginous, the more apical terga becoming more piceous apically, but tergum 6 largely testaceous; legs largely testaceous, hind femora more ferruginous, with piceous infusions, spurs pale yellow; punctures coarse, deep and close on face above antennae, somewhat shallower but quite coarse and very close below, very fine, close and shallow on clypeus; vertex posteriorly very closely and coarsely punctate, punctures becoming somewhat more sparse toward eyes, cheeks much more finely rugose; scutum, scutellum and mesopleura coarsely rugoso-punctate, punctures becoming somewhat more distinct on mesopleura below; propodeum posteriorly somewhat more finely rugose, becoming smoother on each side toward metapleural margin, triangle rather smooth below, becoming rather finely reticulate above medially, coarsely but narrowly striate on each side; discs of abdominal terga very finely and rather closely punctate, punctures sparsely invading the broad, impressed, apical margins nearly to the rims, tergum 1 becoming impunctate laterally and basally, terga 5 and 6 becoming more coarsely and sparsely punc-

tate apically; pubescence entirely pale, very short, somewhat more copious on face and on thorax laterally, posteriorly and beneath, barely evident on abdomen dorsally, sternal plates with more sparse but elongate, fine, pale hairs, sternum 6 becoming quite densely short pubescent apically; median length of pygidial plate hardly equal to basal width, slightly narrowed apically, apex broadly truncate and slightly emarginate, margins carinate, surface with rather close but distinct, fine punctures; exposed abdominal sterna unmodified, sternum 6 subtriangular, apex narrowly rounded; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Minnesota to New York, south to Georgia, March to May.

FLOWER RECORDS—*Crataegus*, *Prunus*, *Rubus*, *Salix* and *Stellaria*. Robertson (1929) records this species on *Amelanchier*, *Cardamine*, *Cercis*, *Erigeron*, *Geranium*, *Ribes*, *Taenidia*, *Taraxacum*, *Thaspium*, *Zanthoxylum* and *Zizia*.

It seems doubtful that there is any real difference between *denticulata* and *simplex* Robertson. In Robertson's key (1903) the males are separated by the color of the abdomen, but there is considerable variation in this character and is thus unreliable. The short, triangular coxal spines of *denticulata* are included as a key character, but these vary in the relative degree of development, and are very poorly developed in a specimen that has been compared with the lectotype specimen and thought to be identical with it. The females Robertson associated with these males may or may not be correctly associated. There is need for a re-study of the Robertson material, but of more significance yet is the collection of a good series of both sexes from the nesting site of its unknown *Andrena* host.

***Nomada (Nomada) depressa* Cresson**

Nomada depressa Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 302. ♀.

Nomada depressicauda Cockerell, 1908. Ent. News 19, p. 323. ♀. New synonymy

FEMALE—Length 6-12 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks nearly as broad as eyes, posterior margin rather strongly carinate; longer side of basal segment of flagellum somewhat shorter than segment 2, median segments considerably longer than broad; man-

dibles slender and simple; wings faintly yellowish at base, becoming somewhat more deeply infuscated at apex and in marginal cell, with the usual three submarginal cells, a hyaline area just beyond the 3rd, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein considerably basad of transverse median; tegulae shining between rather fine but deep and distinct punctures, these rather close along inner margin, becoming very sparse along outer margin; posterior margin of scutellum quite deeply impressed medially; front coxae not spinose; apex of hind tibiae with a row of three or four rather short but stout, spine-like bristles; head and thorax ferruginous, with varying amounts of black between antennae, between the ocelli, along posterior margin of cheeks, mesopleura laterally and beneath. metapleura, mid coxae and adjacent areas of propodeum; legs chiefly ferruginous, the femora more or less piceous basally, spurs pale yellow; abdominal terga ferruginous in large part, tergum 1 with the basal third piceous, 2 and 3 with large, lateral, yellow maculations that are widely separated medially, 4 with a pair of much smaller, sublateral maculations that are nearer to each other than to the extreme lateral margins of the tergum, and 5 with a broad but rather short yellow patch bordering the pseudopygidium; face and vertex rather coarsely and closely rugosopunctate, cheeks becoming very finely so below, supraclypeal area and clypeus with very fine, closely crowded and rather shallow punctures; scutum and scutellum quite densely and not very coarsely rugosopunctate, mesopleura somewhat more coarsely rugose above, punctures becoming more distinct but still quite close below; propodeum very finely and densely rugose, triangle rather smooth but dull below, becoming rather broadly rugostriate across upper margin; discs of abdominal terga very finely and rather closely punctate, tergum 1 impunctate basally and laterally, and the apical margin narrowly impunctate, depressed apical rims of 2-4 only partially invaded by very minute, scattered punctures; pseudopygidium extremely large, its median length about half that of the entire plate, basal margin strongly arched, apical margin truncate, surface quite smooth, densely clothed with extremely minute, silvery tomentum which is visible only at certain angles; pubescence pale in general but some of hairs on face and on vertex laterally rather dark and erect, otherwise very thin and short, hardly visible on abdomen dorsally, very short, thin and sparse on sternal plates; apex of sternum 5 with a transverse row of piceous, convergent hairs on each side of midline.

DISTRIBUTION—Michigan to Maine, south to North Carolina, April to August.

FLOWER RECORDS—*Azalea* and *Rubus*.

Nomada detrita new species

(Figs. 106 & 107)

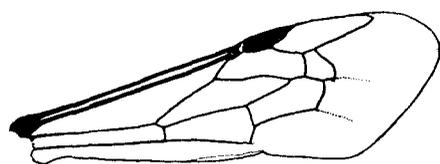
MALE—Length 8 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes, posterior margin not distinctly carinate; antennal scape very slightly swollen, apex deeply excavated and completely enclosing pedicel, basal segment of flagellum very much shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple, outer margin slightly angulate medially; wings slightly yellowish, becoming somewhat more distinctly clouded apically and in marginal cell, with but two submarginal cells (fig. 106), 1st recurrent vein interstitial with 1st transverse cubitus, veins testaceous, stigma somewhat more reddish, basal vein interstitial with transverse median; tegulae rather dull, punctures shallow and obscure, sparse toward outer margin; posterior margin of scutellum rather deeply depressed medially; front coxae not spinose; hind femora simple and unmodified; clypeus, labrum, mandibles, narrow lateral facial maculations ending very narrowly on eye margin at level of antennae, and antennal scape anteriorly, bright yellow; face, vertex and cheeks otherwise black; basal segment of flagellum somewhat yellowish, flagellum otherwise testaceous beneath, more brownish-piceous above, tubercles and tegulae testaceous, thorax otherwise black; coxae and trochanters in large part black, femora piceous basally, becoming somewhat testaceous apically and above, ti-

biae more testaceous, the tarsi yellowish, and spurs pale yellow; basal abdominal tergum largely piceous, becoming infused with ferruginous apically, discs of terga 2-4 largely yellow, very slightly interrupted medially by a reddish line, abruptly piceous laterally, apical impressed areas more reddish-piceous; terga 5 and 6 blackish basally, with some vague, subapical, yellowish areas, apical margins obscurely yellowish-hyaline; abdominal sterna largely piceous, apical margins more or less yellowish-hyaline; face, vertex and cheeks above rather coarsely and deeply rugose, cheeks becoming somewhat more finely and shallowly so below, punctures of lower part of face laterally somewhat more distinct, supraclypeal area rather finely rugose, clypeal punctures very fine, close, shallow and obscure, the lateral maculated areas with only a few, widely scattered punctures; scutum, scutellum and pleura quite coarsely rugose, pleura somewhat more distinctly and deeply punctate below; propodeum rather shallowly rugose, triangle smooth, but dull and tessellate below, becoming reticulate above medially, striate on each side; discs of abdominal terga exceedingly minutely punctate, the punctures barely visible, quite close, tergum 1 becoming impunctate laterally and basally, depressed apical margins invaded by minute, close punctures nearly to rims; pubescence entirely whitish, rather short but erect, rather copious on head and thorax but not hiding surface, very fine, barely visible on abdomen dorsally, sternal plates with more sparse and elongate pale hairs, sternum 6 becoming rather densely short pubescent at apex; median length of pygidial plate somewhat greater than basal width, only slightly narrowed apically, apex subtruncate, slightly incurved medially, hardly emarginate, margins carinate, surface very finely and closely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

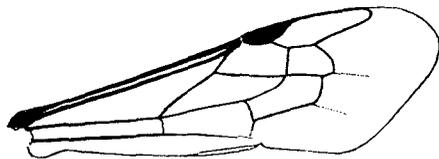
TYPE—Holotype: Male, Randolph, N. H., June 25, 1930 [M.C.Z.].

Nomada dreisbachi new species

MALE—Length 8-9 mm.; lateral ocelli much nearer margin of vertex than to each other, slightly nearer each other than to eyes; cheeks considerably narrower than eyes, not distinctly carinate posteriorly; antennal scape somewhat swollen, apex deeply excavated and largely enclosing pedicel, basal segment of flagellum much shorter than segment 2, median segments considerably longer



OBLITERATA



DETRITA

Figure 106

Venation of front wing of *Nomada obliterated* and *N. detrita*.

than broad; mandibles slender and simple; wings subhyaline, becoming narrowly infuscated apically, veins and stigma brownish-testaceous to piceous, with the usual three submarginal cells, 2nd very much broader anteriorly than 3rd, basal vein slightly basad of transverse median; tegulae yellowish-hyaline, shining and nearly impunctate; scutellum rounded, without a distinct median groove; front coxae not spined; hind femora unmodified; clypeus, labrum and mandibles yellow, and lateral face marks yellow ending narrowly on eye margin at level of antennae, head otherwise black; antennal scape yellow anteriorly, piceous posteriorly, flagellum testaceous beneath, more brownish above; thorax largely black, tubercles yellowish, pleura with a small anterior yellow maculation, scutellum ferruginous posteriorly; legs largely yellowish-testaceous, hind femora largely piceous except toward apex, spurs pale yellow; basal abdominal tergum black across basal half, apical half yellowish-ferruginous; terga 2-5 with broad, transverse, yellow bands, these very narrowly interrupted by a red line on 2-4, apical areas more ferruginous; sterna ferruginous, each somewhat darker apically; head and thorax rather coarsely rugoso-punctate, but maculated areas of face more obscurely and finely sculptured; propodeum rather finely rugoso-punctate laterally, triangle of posterior face rather smooth below, becoming coarsely rugoso-reticulate along upper margin; punctures of abdominal terga minute and rather close, becoming somewhat more sparse and minute on impressed apical margins, rims narrowly impunctate; pubescence quite short but rather copious, faintly yellowish on head and thorax above, becoming white laterally and below, very thin and sparse on abdominal terga; pygidial plate narrow and elongate, tip narrowly but deeply incised, margins carinate, surface rather coarsely rugoso-punctate; sternum 8 with a slender apical process; gonocoxites of genital armature similar to *bethunei* (fig. 105).

TYPES—Holotype: Male, Newago Co., Mich., May 13, 1956 (R. & K. Dreisbach) [author's coll.]. Paratypes: MAINE: 1 ♂, Orono, May, 1936. MASSACHUSETTS: 1 ♂, Randolph, May 12, 1901 (Percy Gardner Bolster coll.). MICHIGAN: 2 ♂♂, Midland Co., May 4 & 8, 1943; 1 ♂, Kent Co., April 20, 1946; 1 ♂, Osceola Co., May 3, 1952.

Paratypes are in collections of the University of Maine, the Museum of Comparative Zoology, R. R. Dreisbach and the author.

Nomada (Nomada) florilega
Lovell and Cockerell

Nomada (Nomada) florilega Lovell and Cockerell, 1905. *Psyche* 12, p. 41. ♀.

FEMALE—Length 7-8 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin rounded; longer side of basal segment of flagellum slightly shorter than segment 2, median segments considerably longer than broad; mandibles simple; wings lightly infuscated, becoming somewhat more deeply so along apical margin and in marginal cell, with a hyaline area just beyond the submarginal and discoidal cells, with the usual three submarginal cells, 2nd considerably broader anteriorly than 3rd which is very strongly narrowed, veins and stigma piceous, basal vein considerably basad of transverse median; tegulae shining, punctures very fine, rather close along inner margin, becoming very sparse and minute along outer margin; posterior margin of scutellum quite deeply grooved medially; front coxae not spinose; apex of hind tibiae with only one or two very slender but elongate, inconspicuous bristles; clypeus, labrum and mandibles reddish-testaceous, eyes narrowly bordered with ferruginous, very narrowly along inner orbits but reaching lateral ocelli above, median area of face from clypeal margin to anterior ocellus, black; cheeks largely black, but narrowly ferruginous along margin of eye; antennal scape reddish-testaceous, flagellum more brownish-testaceous beneath, piceous above; tubercles and tegulae reddish-testaceous; pronotal collar, lateral maculations on mesopleura, scutellum entirely, and scutum laterally, dull ferruginous; venter of thorax, metapleura, entire propodeum, and narrow median area of scutum, black; coxae chiefly black, legs otherwise more testaceous, mid and hind femora more or less piceous basally, spurs pale yellow; abdominal terga largely ferruginous, the apical, impunctate margins becoming more yellowish-hyaline, tergum 2 with a pair of widely separated, lateral, yellow maculae; face and vertex very coarsely, deeply and quite closely punctate, punctures becoming very fine and densely crowded on supraclypeal area and clypeus, cheeks rather coarsely rugoso-punctate; scutum, scutellum and pleura coarsely rugoso-punctate, punctures somewhat more distinct on mesopleura below, propodeum rather coarsely rugose posteriorly, becoming somewhat more finely and shallowly so on lateral faces below, triangle dull and densely tessellate below, becoming rather coarsely striate above; discs of abdominal terga very finely

and rather closely punctate basally, becoming impunctate on the broad, apical, impressed margins; basal tergum becoming impunctate laterally and basally, punctures exceedingly minute, barely visible medially; punctures of tergum 5 becoming somewhat more sparse and coarse apically; pseudopygidium transverse, very short, forming the rather narrow, truncate, apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence very short, rather copious on face, cheeks, and on thorax laterally and beneath, entirely white, barely evident on abdomen dorsally except toward apex, more thin and elongate on the sterna; apex of sternum 5 with a pair of tufts of elongate, brownish hairs that converge medially.

DISTRIBUTION—Michigan to Maine, south to North Carolina, May to August.

FLOWER RECORDS—This has been recorded on *Aralia* and *Spiraea*.

***Nomada (Nomada) gracilis* Cresson**
(Fig. 107)

Nomada gracilis Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 295. ♂.

MALE—Length 7.5-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin subcarinate; antennal scape only slightly swollen, apex deeply excavated, more or less completely enclosing pedicel, longer side of basal segment of flagellum about equal to segment 2, median segments considerably longer than broad; mandibles rather slender and simple apically; wings hyaline basally, becoming lightly and narrowly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins and stigma testaceous to ferruginous, basal vein considerably basad of transverse median; tegulae shining, punctures rather close along inner margin, becoming very sparse toward outer margin; posterior margin of scutellum rounded, not at all depressed medially; front coxae not spinose; hind femora slender and unmodified; apical third of clypeus yellow, basal two-thirds black, labrum and mandibles bright yellow, and a pair of small, lateral, yellow maculations continuous with the marginal band of clypeus, ending very narrowly on eye margin slightly below level of antennae; face, vertex and cheeks otherwise black; antennal scape black, somewhat reddened at apex, basal segment of flagellum more reddish-testaceous, flagellum brownish-testaceous below, piceous above; tubercles and tegulae yellowish-testa-

ceous, thorax otherwise black; coxae black, and femora black in large part, becoming rather narrowly testaceous apically, front and middle tibiae somewhat darkened medially, tarsi pale testaceous, the hind tibiae and tarsi more reddish-testaceous, all spurs pale yellow; abdominal terga piceous in large part, tergum 1 entirely so, tergum 2 with a pair of lateral, extensive, yellow maculations which are rather widely separated medially, but occupy most of disc laterally, terga 3 and 4 with very narrow, transverse, yellow bands that are slightly interrupted medially and are adjacent to the broad, depressed apical rims, terga 5 and 6 dull yellow across median, apical area, piceous basally and laterally; abdominal sterna 2-4 with more or less conspicuous, subapical, transverse, yellow bands, sternum 6 yellow over apical half, sterna otherwise piceous; vertex and face above antennae very coarsely and deeply rugoso-punctate, cheeks somewhat more finely so, supraclypeal area and lateral areas of face below antennae quite coarsely and shallowly rugoso-punctate, clypeus with very minute, densely crowded punctures; scutum, scutellum and mesopleura coarsely rugose, scutellum somewhat more finely so, posterior and lateral faces of propodeum coarsely, shallowly rugose, triangle rather smooth but dull below, becoming irregularly rugoso-striate along upper margin; discs of abdominal terga deeply but very finely and closely punctate, minute punctures invading to some degree the depressed apical margins, only the narrow rims impunctate; tergum 1 impunctate laterally and basally, terga 5 and 6 becoming somewhat more coarsely and sparsely punctate toward the depressed apical margins; pubescence entirely pale, rather long, erect and copious on head and thorax, antennal scape quite copiously long pubescent, very short, sparse and obscure on abdominal terga, becoming somewhat more elongate and conspicuous apically, very fine but more elongate and erect on abdominal sterna, sternum 6 rather densely short pubescent apically; median length of pygidial plate somewhat less than basal width, rather strongly narrowed apically, apex more or less deeply emarginate, margins carinate, surface very finely, closely and obscurely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—New York and the New England states, March and April.

FLOWER RECORD—*Salix*.

***Nomada (Nomada) illinoensis*
Robertson**

(Fig. 107)

- Nomada Illinoensis* Robertson, 1900. *Canad. Ent.* 32, p. 294. ♀ ♂.
Nomada illinoensis Swenk, 1913. *Univ. Nebr. Stud.* 12, p. 48. Emend.
Nomada illinoensis Swenk, 1916. *Univ. Nebr. Stud.* 15, p. 6. Emend.
Nomada illinoensis Robertson, 1929. *Flowers and Insects*, Lancaster, Pa., Science Press. (flower records)
Nomada illinoensis Rodeck, 1951. In *Hymenoptera of America North of Mexico*, Synoptic Catalog, U. S. D. A. Agr. Monog. 2, p. 1191. Emend.

FEMALE—Length 6-7 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks subequal to eyes in width, posterior margin obscurely subcarinate; longer side of basal segment of flagellum about equal to segment 2, median segments nearly as broad as long; mandibles slender and simple apically; wings lightly infuscated, somewhat more deeply so at apex and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma piceous, basal vein considerably basad of transverse median; tegulae somewhat shining between fine, close punctures which become somewhat more widely separated laterally; posterior margin of scutellum quite deeply impressed; front coxae not spinose; apex of hind tibiae with two or three elongate, very fine, slender bristles; head reddish-testaceous in large part, very small areas of black between bases of antennae, between the ocelli, and along posterior margin of cheeks; antennae testaceous; thorax largely ferruginous, tubercles and tegulae more testaceous, scutum with a narrow, median, black line, and propodeum anteriorly and on median line, black; legs testaceous in general, femora somewhat darkened posteriorly, spurs pale yellow; abdominal terga chiefly pale ferruginous, tergum 2 with a pair of widely separated, rather large, yellow maculae laterally, tergum 3 with similar pair of smaller maculations, tergum 1 piceous basally and more narrowly along apical margin; vertex and face above antennae very coarsely rugosopunctate, becoming much more finely so on supraclypeal area and clypeus, cheeks finely rugose below; scutum, scutellum and mesopleura quite coarsely rugose, propodeum much more finely and shallowly so, the triangle dull, rather smooth below, becoming irregularly striate above; discs of abdominal terga very finely, closely and quite distinctly punctate toward base, apical margins becom-

ing broadly impunctate, tergum 1 impunctate laterally and basally, the more median punctures very obscure; pseudopygidium transverse, very short, forming the rather narrowly truncate, apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence very short and thin, entirely pale, somewhat more copious on thorax laterally and beneath, very fine and obscure on abdomen dorsally, but becoming somewhat more distinct apically; sternal plates with a subapical row of very fine slender pale hairs, sternum 5 apically with lateral tufts of rather elongate, fuscous hairs that converge medially.

MALE—Length 5.5-6.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin not distinctly carinate; antennal scape only very slightly swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum much shorter than segment 2, median segments nearly as broad as long; mandibles slender and simple apically; wings subhyaline basally, becoming faintly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma testaceous, basal vein considerably basad of transverse median; tegulae shining between fine, close punctures; posterior margin of scutellum only very slightly impressed medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles and lateral facial maculations that extend very narrowly up margin of eye to level of antennae, and a very small yellow spot just posterior to base of mandible on cheeks below, bright yellow; face above margin of clypeus, vertex and cheeks black; antennal scape bright yellow anteriorly, reddish-piceous posteriorly, flagellum testaceous; pronotal tubercles yellow, the tegulae more testaceous, scutellum with a pair of very small, obscure, ferruginous spots, thorax otherwise black; coxae black in large part, legs otherwise chiefly testaceous, hind femora largely piceous, spurs pale yellow; abdominal terga reddish in large part, tergum 1 piceous basally, yellowish medially, becoming ferruginous on apical rim; abdominal terga 2-4 with lateral, yellow maculae that are rather widely separated medially, these more extensive on tergum 2, successively smaller on 3 and 4, discs of 5 and 6 rather broadly yellow medially, apical margins becoming rather broadly yellowish-hyaline; abdominal sterna testaceous in part, with more piceous, irregular infusions; vertex and face above antennae quite coarsely rugose, cheeks much more finely so below, lower half of face more finely and

obscurely punctate, minutely and closely so on supraclypeal area and clypeus, very sparsely so on maculated areas at each side of clypeus; scutum, scutellum and mesopleura very densely rugose, propodeum posteriorly somewhat more shallowly rugose, lateral faces becoming somewhat smoother but very dull and obscurely rugose; discs of abdominal terga very minutely and quite closely punctate toward base, punctures becoming very minute apically, but invading depressed apical margins nearly to rims, tergum 1 becoming impunctate laterally and basally; terga 5 and 6 with somewhat coarser, more distinct punctures apically; pubescence entirely pale, rather short but quite copious over head and thorax, somewhat hiding surface on lower half of face and on venter of thorax, very minute and obscure on abdominal terga, becoming somewhat more elongate apically, abdominal sterna with more elongate, sparse, straight hairs, sternum 6 somewhat more densely pubescent apically; median length of pygidial plate about equal to basal width, quite strongly narrowed apically, apex very narrowly incised, margins carinate, surface very finely, closely and obscurely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Minnesota to Massachusetts, south to Georgia, March to June.

FLOWER RECORDS—*Crataegus*, *Rubus* and *Senecio*. Robertson (1929) records *illinoensis* on *Amelanchier*, *Claytonia*, *Cornus*, *Dentaria*, *Fragaria*, *Heracleum*, *Krigia*, *Polytaenia*, *Prunus*, *Radicula*, *Ribes*, *Salix*, *Viburnum* and *Zanthoxylum*.

Nomada indusata new species

(Fig. 107)

MALE—Length 7-9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks subequal to eyes in width, posterior margin subcarinate; antennal scape strongly swollen, apex deeply excavated and completely enclosing pedicel, longer side of basal segment of flagellum nearly equal to segment 2, median segments somewhat longer than broad; mandible slender and simple apically; wings subhyaline basally, becoming lightly infuscated apically, more deeply so at apex and in marginal cell, with the usual three submarginal cells, 3rd somewhat broader anteriorly than 2nd, veins testaceous to piceous, stigma somewhat more brownish, basal vein intersitial with transverse median;

tegulae very finely and closely punctate, the more apical punctures slightly separated; posterior margin of scutellum deeply grooved; front coxae not spinose; hind femora slender and unmodified; entire face below level of antennae bright yellow, eyes completely encircled with yellow, but this becoming somewhat tinged with reddish above; median portion of face above antennae and around ocelli, and posterior two-thirds of cheeks, black; posterior margin of vertex somewhat reddish; antennal scape bright yellow anteriorly, narrowly piceous posteriorly, flagellum testaceous beneath, more piceous above; pronotal collar, tubercles, tegulae, scutellum, two small triangular maculations on propodeum, and a transverse yellow stripe on mesopleura, bright yellow, the pleural maculation broadly bordered with red above and with a red spot beneath wing bases; propodeum largely red posteriorly and along posterior margin of lateral faces, scutum dark red, with a median, rather broad, black line; metanotum and lower margin of scutellum, metapleura and anterior portion of propodeum, black, mesopleura below black in part, with some reddish infusions; coxae more or less black at base, becoming yellowish apically, the trochanters more testaceous; hind femora largely piceous, becoming narrowly yellowish at apex, front and middle femora with a very small amount of black at base; all tibiae and tarsi testaceous, spurs pale yellow; abdominal tergum 1 black at base, reddish-piceous at apex, a rather broad median stripe of yellow on each side, somewhat reddened in center; discs of terga 2-6 with broad, transverse, yellow bands that occupy most of each one, slightly interrupted medially on 2, more broadly so on 3, very narrowly on 4, and entire on 5 and 6, broad apical margins of 2 and 3 somewhat piceous or reddish, more red or testaceous on the following terga; discs of the sterna more or less yellowish, apical margins more yellowish-hyaline; face and vertex quite coarsely rugosopunctate, cheeks much more finely so, punctures of face below somewhat more distinct on each side, minute and obscure on supraclypeal area and clypeus; scutum and propodeum densely and rather finely rugose, punctures of scutellum close and rather coarse but obscure because of the color, mesopleura rather finely rugose or reticulate above, somewhat more coarsely so below; triangle of propodeum smooth on each side below, the median, blackened area finely rugose, becoming short striate on each side above; discs of abdominal terga minutely and very closely punctate, tergum 1 becoming impunctate laterally and basally, apical impressed areas very minutely but rather closely punctate nearly to the rims, apical margins of 4 and 5

somewhat more broadly impunctate; pubescence entirely pale, very short but rather copious on head and thorax, especially beneath, barely evident on abdomen dorsally, very fine and somewhat more elongate on sternal plates, sternum 6 becoming quite densely short pubescent apically; median length of pygidial plate about equal to basal width, strongly narrowed apically, apex narrow and quite deeply emarginate, margins carinate, surface finely and quite closely punctate; exposed abdominal sterna unmodified; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

TYPES—Holotype: Male, Wendell, N. C., Mar. 26, 1925 (Mitchell, on *Amelanchier*) [author's coll.]. Paratypes: NORTH CAROLINA: 1 ♂, Washington, April 4, 1922 (Mitchell); 1 ♂, Raleigh, April 11, 1930 (C. S. Brimley). GEORGIA: 3 ♂♂, Augusta, April 1, 1959 (R. R. Snelling, on *Salix*).

Paratypes are in collections of the North Carolina Department of Agriculture, R. R. Snelling and the author.

Nomada inepta new species

FEMALE—Length 8-11 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, posterior margin only subcarinate at most; longer side of basal segment of flagellum nearly as long as segment 2, median segments somewhat longer than broad; mandibles slender, elongate and simple; wings subhyaline or pale yellowish basally, becoming rather deeply infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, a hyaline area just beyond the 3rd, veins testaceous to piceous, stigma testaceous, basal vein much basad of transverse median; tegulae shining, punctures deep and distinct, but fine, rather close along inner margin, becoming very sparse over outer half; posterior margin of scutellum only slightly impressed or grooved medially; front coxae with short, triangular, spine-like tubercles; apex of hind tibiae with 4 or 5, rather robust, seta-like bristles; head and thorax largely ferruginous, eyes completely encircled with ferruginous, and ocelli largely surrounded by this color, the broad, median area of face above clypeal margin and around antennae, black, this continuing to the ocelli, and posterior two-thirds of cheeks black; antennae testaceous in general; pronotal collar, tubercles and tegulae somewhat more testaceous, thorax otherwise large-

ly ferruginous, scutum with a rather broad, median black band, and a pair of very narrow sublateral black bands, the mesopleura black beneath, ferruginous above; metapleura and adjacent margin of propodeum entirely black, propodeum posteriorly more ferruginous, with a median black line; coxae largely black, more or less infused with testaceous apically, front and middle trochanters testaceous, all femora more piceous, becoming testaceous apically, the tibiae and tarsi testaceous, and spurs pale yellow; abdominal tergum 1 piceous over basal half and across apical impressed area, ferruginous medially; tergum 2 with a broad, lateral, yellow maculation on each side, these widely separated medially, disc otherwise ferruginous, apical impressed area piceous; tergum 3 similar to 2 but with a very small, yellow maculation on each side, sometimes absent; tergum 4 with a subapical, narrow, transverse band which is slightly interrupted medially and is terminated abruptly toward each side; tergum 5 broadly yellow over median half; vertex and face very coarsely, deeply and closely rugoso-punctate, punctures below antennae coarse, deep and distinct on each side, supra-clypeal area rather finely rugose, and clypeus with very fine and densely crowded but distinct punctures; cheeks becoming finely rugoso-punctate below; scutum and scutellum coarsely and very closely rugoso-punctate, the mesopleura rather coarsely reticulate above, becoming more distinctly but quite closely and deeply punctate below; propodeum somewhat more finely and quite densely rugose, lateral faces becoming quite smooth anteriorly, triangle rather smooth and dull below, becoming quite coarsely and irregularly striate along upper margin; abdominal tergum 1 becoming impunctate laterally and basally, median punctures extremely minute and close; discs of terga 2-4 with very fine and close punctures, apical margins becoming smooth and impunctate apically, invaded only slightly with very minute, scattered punctures, tergum 5 closely punctate across base, punctures becoming rather coarse and well separated toward apical margin; pseudopygidium transverse, very narrow, forming the rather broad, apical margin of tergum 5, very slightly outcurved, covered with dense, suberect, silvery tomentum; head with very fine, thin, subappressed pubescence and with erect, elongate, dark hairs, conspicuously evident in front and on head below; thoracic pubescence very short, largely inconspicuous and pale, but scutellum with elongate, erect, dark hairs in evidence; pubescence hardly evident on abdomen dorsally, becoming somewhat more elongate and conspicuous apically, sternal plates with fine, elongate, suberect, pale hairs;

apex of sternum 5 with a marginal fringe of elongate, brownish hairs that curve and tend to converge toward mid-line.

TYPES — Holotype: Female, Reading, Mass., April 7, 1929 (Richard Dow) [M.C.Z.]. Paratypes: MASSACHUSETTS: 1 ♀, toptotypical; 1 ♀, Forest Hills, April 6 (or June 4), 1912; 2 ♀♀, Wollaston, June 1, 1895 (F. H. Sprague); 1 ♀, Salem, April 19, 1914 (S. E. Cassino). NORTH CAROLINA: 1 ♀, Grandfather Mt., Watauga Co., June 20, 1950. (Mitchell). MAINE: 1 ♀, Mt. Desert, April 21, 1933 (on *Salix*); 1 ♀, Orono, May 6, 1926. NEW HAMPSHIRE: 1 ♀, Jaffrey, June 19. NEW YORK: 1 ♀, Ithaca, May 13, 1934 (H. Dietrich). MINNESOTA: 1 ♀, Itasca Park, LaSalle Valley, May 30, 1935 (C. E. Mickel).

Paratypes are in collections of the Museum of Comparative Zoology, the University of Maine, the University of Minnesota, and the author.

Nomada kingstonensis new species

FEMALE—Length 6.5 mm.; lateral ocelli considerably nearer margin of vertex than to each other, and nearer each other than to eyes; cheeks nearly as broad as eyes, hind margin conspicuously carinate; longer side of basal segment of flagellum considerably shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple; wings hyaline, faintly clouded apically, veins and stigma testaceous, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd which is narrowed nearly to a point, basal vein interstitial with transverse median; tegulae yellowish-hyaline, smooth and shining, minutely and quite sparsely punctate; scutellum with a very faint, median impression; front coxae not spinose; apex of hind tibiae with 4 or 5 elongate, seta-like bristles; clypeus, labrum, mandibles and lower portion of face adjacent to eyes, pale yellow, a narrow band of yellow completely surrounding eyes; median portion of face around antennae and ocelli, and cheeks in large part, blackish, the area below antennae partially infused with yellow; antennal scape yellowish anteriorly, flagellum more testaceous beneath, brownish above; scutum black in large part, narrowly margined with yellow on each side, scutellum, pronotal collar and tubercles yellow, mesopleura with a small yellow spot beneath wing bases and a larger, transverse, yellowish area beneath, the narrow intermediate area darkened, venter large-

ly black; propodeum largely yellowish; legs largely yellow, becoming somewhat more testaceous basally, spurs pale yellow; discs of abdominal terga 1-4 piceous, but apical margins very broadly yellowish-hyaline, these areas forming about half of each disc, tergum 5 in large part pale yellowish; head and thorax rather coarsely rugoso-punctate, somewhat more finely so below antennae and on cheeks; basal areas of abdominal terga very finely but deeply, distinctly and closely punctate, apical impressed areas entirely impunctate; pseudopygidium very narrow, transverse, of the usual form; pubescence short and thin, entirely pale, hardly evident on abdomen basally, becoming rather copious although still short and thin, apically.

TYPE — Holotype: Female, Kingston, R. I., April 26, 1904 [Univ. of Rhode Island].

Nomada (Nomada) lehighensis Cockerell

Nomada lehighensis Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 605. ♀. (♂ misidentified)

FEMALE—Length 6.5-8 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin not distinctly carinate; longer side of basal segment of flagellum about equal to segment 2, median segments very slightly longer than broad; mandibles quite slender and simple; wings hyaline basally, becoming rather deeply infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, a distinct hyaline area beyond the 3rd, veins testaceous to piceous, stigma pale testaceous, basal vein slightly basad of transverse median; tegulae shining between fine but rather close and distinct punctures, these becoming somewhat more sparse toward outer margin; posterior margin of scutellum somewhat rounded, not at all impressed medially; front coxae not spinose; apex of hind tibiae with a row of three or four robust, fuscous, seta-like bristles, and a slender, more elongate, hair-like bristle; head and thorax chiefly ferruginous, face with a small black area above each antenna and another surrounding ocelli, and posterior margin of cheeks rather narrowly black; lower half of face somewhat more testaceous, antennae entirely testaceous; tubercles, tegulae and pronotal collar somewhat more testaceous; scutum and propodeum ferruginous, each with a median black line, the metapleura black, and a limited amount of black beneath

just posterior to front coxae; legs largely testaceous, spurs pale yellow, hind basitarsi somewhat darkened anteriorly; abdomen entirely ferruginous or testaceous, without yellow maculations; vertex and face above antennae coarsely, deeply rugoso-punctate, lower half of face with more distinctly separated but quite coarse punctures laterally, supra-clypeal area and clypeus very finely and closely punctate, and cheeks with shallow but rather coarse punctures below; scutum coarsely rugoso-punctate medially, becoming somewhat more finely and densely so laterally; scutellum somewhat more finely rugoso-punctate throughout, mesopleura quite coarsely reticulate above, becoming more distinctly but still closely punctate below; propodeum very finely and rather shallowly rugoso-punctate, becoming somewhat smoother below on each lateral face, triangle smooth below, median black area becoming finely rugoso-striate over upper half, the lateral ferruginous areas narrowly short striate along upper margin; abdominal tergum 1 practically impunctate, discs of 2-5 minutely and closely punctate basally, impressed apical margins broadly yellowish-hyaline and impunctate, punctures of tergum 5 becoming somewhat more sparse and distinct apically; pseudopygidium very short, transverse, forming the rather narrow, truncate, apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence entirely pale, short but rather copious and erect on head and thorax, more dense on thorax beneath and along lateral margins of propodeum, hardly evident on abdomen dorsally, becoming somewhat more elongate and conspicuous on tergum 5 apically; sternal plates with more elongate but very sparse, fine, pale hairs; apex of sternum 5 with a row of elongate hairs on each side of mid-line which are brownish, more or less curved, and convergent toward mid-line.

DISTRIBUTION — Michigan to Nova Scotia, south to Georgia, March to July.

FLOWER RECORD—*Crataegus*.

Nomada media new species

(Fig. 107)

FEMALE—Length 9 mm.; lateral ocelli very slightly nearer margin of vertex than to each other, somewhat more distant from eyes; cheeks nearly as broad as eyes, posterior margin strongly carinate; longer side of basal segment of flagellum slightly shorter than segment 2, median segments somewhat longer than broad; mandibles slender and simple; wings subhyaline at base, narrowly and rather lightly infuscated apically, but with a pro-

nounced hyaline area just beyond 3rd sub-marginal cell, 2nd very broad anteriorly, 3rd narrowed nearly to a point, veins and stigma testaceous to piceous, basal vein slightly basad of transverse median; tegulae shining, punctures deep and distinct, rather sparse except along inner margin; scutellum quite deeply grooved medially; front coxae not spined; apex of hind tibiae with a row of 5 or 6 rather short, spine-like setae; head largely red, clypeus narrowly yellowish along apical margin, labrum yellowish and supra-clypeal area with a small yellowish spot; area between and just above antennae, extending downward on each side along margin of clypeus, posterior half of cheeks, and space between ocelli, black; scape and basal segment of flagellum ferruginous, the more apical antennal segments reddish-testaceous beneath, somewhat more brownish above; thorax red in large part but scutum with a median black line, pronotum narrowly yellow, becoming black laterally; tubercles and an anterior spot on pleura yellow, and propodeum rather narrowly yellow on each side of a median blackened area; metapleura and adjacent lateral faces of propodeum black; legs in large part reddish-testaceous, femora more or less blackened toward base, spurs pale yellow; basal abdominal tergum ferruginous over apical half, basal half blackish, tergum 2 with a pair of large, widely separated, yellow maculations, terga 3 and 4 with very small, lateral yellow spots, and 5 with a transverse yellow line just anterior to the pseudopygidium; abdominal sterna largely ferruginous, the impressed apical margins darker; pseudopygidium very broad and extensive (as in *depressa*), its width considerably more than one-third the total width of the plate, covered with fine silvery tomentum; punctures quite coarse, close and deep in general over head and thorax but becoming rather fine and shallow on lower part of face, those on scutum and scutellum distinct and coarse but not crowded; punctures finer and rather densely crowded on propodeum, the triangle more tessellate below, becoming quite coarsely striate along upper margin; abdominal terga very minutely punctate, punctures barely evident on tergum 1, well separated but distinct on 2, somewhat closer on the successive, more apical terga, apical margins rather narrowly shining and impunctate; pubescence very short and thin, somewhat yellowish on upper portions of head and thorax, more whitish laterally and beneath, barely evident on abdominal terga, but apical segments with more conspicuous, elongate, fuscous hairs.

MALE—Length 7-9 mm.; lateral ocelli slightly nearer margin of vertex than to each

other; cheeks slightly narrower than eyes, posterior margin strongly carinate; antennal scape slightly swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum much shorter than segment 2, the shorter side not much longer than apical breadth, median segments somewhat longer than broad; mandibles slender and simple; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd only very slightly broader anteriorly than 3rd, veins and stigma testaceous, basal vein interstitial with transverse median; tegulae shining, punctures very minute, obscure and sparse; posterior margin of scutellum deeply grooved; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, and very narrow lateral facial maculations, bright yellow; face, vertex and cheeks otherwise black; antennae, including scape, largely testaceous, flagellum piceous above; tubercles testaceous, tegulae yellowish-testaceous; scutellum ferruginous, the scutum ferruginous and black, in more or less alternating stripes, mesopleura with a dull reddish, lateral maculation, otherwise pleura and propodeum black; coxae black in large part, the trochanters testaceous; front and middle femora piceous at base, becoming testaceous apically, hind femora largely piceous and only very narrowly testaceous at apex; front and mid tibiae and tarsi pale testaceous, the hind tibiae more ferruginous, tarsi somewhat darkened, and all spurs pale yellow; abdominal tergum 1 piceous over basal half, dull testaceous medially and somewhat darkened apically; tergum 2 with a pair of conspicuous, lateral, yellow maculations that are rather widely separated medially, surface otherwise piceous basally and apically, more or less ferruginous medially; tergum 3 with a similar but very much smaller pair of maculae, the disc more testaceous, apical margins somewhat darkened; disc of tergum 4 more piceous, apical impressed area becoming yellowish-hyaline; tergum 5 largely testaceous; the more basal abdominal sterna piceous, the more apical plates testaceous; face and vertex coarsely and deeply rugoso-punctate, cheeks becoming more finely reticulate below, supraclypeal area with fine, crowded punctures, and clypeus with minute, close punctures, the lateral maculae largely impunctate; scutum, scutellum and mesopleura coarsely rugose or reticulate, propodeum posteriorly somewhat more shallowly but rather coarsely rugose, becoming somewhat smoother below on each side, triangle very finely reticulate medially, only very narrowly smooth on each side below, with coarse, elongate striations across upper margin; discs of abdominal terga mi-

nutely and rather closely punctate, tergum 1 becoming impunctate laterally and basally, apical impressed areas on the following terga invaded to a considerable degree by exceedingly minute, rather widely scattered punctures; pubescence entirely pale, quite short but erect and clearly evident on head and thorax, extremely fine and obscure on abdomen dorsally, becoming more evident apically, sternal plates with very fine but more elongate, whitish hairs, sternum 6 becoming quite densely short pubescent at apex; median length of pygidial plate somewhat greater than basal width, rather strongly narrowed apically, apex rather deeply emarginate, margins carinate, surface quite closely and rather finely punctate; exposed sternal plates unmodified, sternum 6 narrowed apically to the narrowly rounded tip; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

TYPES—Holotype: Female, Highlands, N. C., June 7, 1957. Allotype: Male, topotypical (both Mitchell) [author's coll.]. Paratypes: NORTH CAROLINA: 2 ♀♀, topotypical, June 5, 1957 (on *Azalea*); 1 ♀, Whiteside Mt., June 6, 1957 (on *Rubus*); 1 ♀, Blowing Rock, Aug. 10, 1920; 1 ♂, Blue Ridge Pkwy., Ashe Co., June 28, 1948; 1 ♂, Blue Ridge Pkwy., Wilkes Co., June 2, 1950 (on *Vaccinium*); 1 ♂, Linville, July 27, 1923 (all Mitchell); 1 ♂, Mt. Pisgah, 4-5,000 ft., July 8, 1959; 1 ♂, Haywood Co., July, 1959 (both H. V. Weems, Jr.); 1 ♀, Great Smoky Nat. Pk., June 25, 1940 (C. T. Brues); 1 ♀, Spence Field, GSMNP, Aug. 13, 1947 (Bullock-Dreisbach). TENNESSEE: 1 ♀, New Found Gap, GSMNP, Aug. 14, 1947 (Bullock-Dreisbach); 1 ♀, 2 ♂♂, Gatlinburg, GSMNP, June 13 & 29, 1947 (R. H. Whittaker).

Paratypes are in collections of the North Carolina Department of Agriculture, the Florida Plant Board, the Museum of Comparative Zoology, the U. S. National Museum, R. R. Dreisbach, and the author.

Nomada mendica new species

(Fig. 107)

MALE—Length 7-8.5 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin indistinctly carinate if at all; antennal scape rather strongly swollen, apex deeply excavated and completely enclosing pedicel, longer side of basal segment of flagellum considerably shorter

than segment 2, median segments considerably longer than broad; mandibles slender and elongate, entirely simple; wings largely hyaline, very faintly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd slightly narrower than 3rd anteriorly, veins pale testaceous, stigma more brownish-testaceous, basal vein interstitial with, or slightly basad of, transverse median; tegulae somewhat shining, punctures minute, indistinct and quite sparse; posterior margin of scutellum slightly impressed medially; front coxae not spinose; hind femora quite slender and unmodified; clypeus, labrum, mandibles, and narrow, lateral facial maculae ending narrowly on eye margin at level of antennae, bright yellow; remainder of face, vertex and cheeks black, the black very slightly invading upper margin of clypeus; antennal scape yellow anteriorly, piceous posteriorly, basal segment of flagellum somewhat yellowish, the more apical segments testaceous beneath, piceous above; tubercles and tegulae yellowish-testaceous, and mesopleura with a very small anterior yellowish spot that is partially surrounded with ferruginous; scutellum largely ferruginous; thorax otherwise black; coxae black, the trochanters testaceous at least in part, front and mid femora narrowly piceous at base, hind femora more extensively piceous, all becoming testaceous apically, the tibiae and tarsi entirely testaceous, spurs pale yellow; tergum 1 of abdomen piceous across basal half, apical half more testaceous, somewhat yellowish medially; terga 2-5 narrowly yellowish-hyaline apically, with broad, yellowish-testaceous, lateral maculae, slightly interrupted medially on 2 and 3, less extensive on 4 and 5, tergum 6 more or less yellowish before the apical margin; abdominal sterna 2 and 3 testaceous medially, the more apical sterna piceous, sternum 6 pale yellow; vertex and face above antennae coarsely, closely and deeply punctate, punctures becoming fine, shallow and subcontiguous on cheeks below, rather closely and quite coarsely punctate between supraclypeal area and eyes, supraclypeal area very finely rugose, the clypeal punctures very minute and rather sparse; scutellum coarsely reticulate, pleura quite coarsely reticulate above, punctures becoming more distinct and separated below; propodeum posteriorly and laterally rather finely reticulate, becoming somewhat smoother below on each side, triangle smooth but rather dull below, becoming rather widely rugoso-striate above medially, very coarsely, short striate on each extreme side; punctures of abdominal terga exceedingly minute and close throughout, only the rather narrow, apical rims entirely impunctate, tergum 1 becoming impunctate

laterally and basally; discs of terga 5 and 6 somewhat more deeply and coarsely punctate apically; pubescence largely pale, whitish below, more yellowish on head and thorax above, short but rather copious on face, cheeks below, and on thorax laterally and below, barely evident on abdomen dorsally, becoming somewhat more elongate and conspicuous on the more apical terga, very fine and sparse but more elongate on the sterna, sternum 6 becoming rather densely short pubescent toward apex; median length of pygidial plate very slightly longer than basal width, only slightly narrowed apically, apex rather broadly truncate, slightly incurved but hardly emarginate, margins carinate, surface rather finely and closely punctate; exposed abdominal sterna unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

TYPES—Holotype: Male, Hartland, Vt., May 21, 1913 (P. W. Whiting) [M.C.Z.]. Paratypes: VERMONT: 1 ♂, topotypical; 1 ♂, Putney, May 24, 1913 (both Whiting). NEW HAMPSHIRE: 1 ♂, carriage road, Mt. Washington, July 1.

Paratypes are in the Museum of Comparative Zoology and in the author's collection.

Nomada minima new species

MALE—Length 4.5-5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, posterior margin not carinate; antennal scape slender, apex deeply excavated, with only apex of pedicel exposed, basal segment of flagellum much shorter than segment 2, median segments slightly longer than broad; mandibles rather short, entirely simple; wings hyaline basally becoming very lightly infuscated at apex, violaceous, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, veins and stigma pale testaceous, basal vein much basad of transverse median; tegulae shining, punctures exceedingly minute and vague; posterior margin of scutellum rounded, not at all grooved; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles and narrow lateral maculae bright yellow, face, vertex and cheeks otherwise black, the facial maculae ending narrowly on eye margin at level of antennae; antennal scape yellowish anteriorly, more piceous posteriorly, flagellum entirely testaceous; tubercles and tegulae yellowish, pronotal collar, scutum and scu-

tellum testaceous or ferruginous, scutum with a rather broad, median, longitudinal, black band, thorax otherwise black; legs entirely pale testaceous to yellowish, spurs pale yellow; discs of abdominal terga testaceous, with yellow maculations, tergum 1 broadly piceous at base, 2 and 3 with extensive, lateral maculations which nearly meet medially and are very broad laterally, terga 1, 4 and 5 with or without smaller, lateral maculations, that on 5 more median; abdominal sterna testaceous in large part; face and vertex quite coarsely and deeply rugoso-punctate, cheeks much more finely so, lower part of face coarsely rugose on each side, but maculated areas much more finely and sparsely punctate, clypeus with very minute, obscure and close punctures; scutum, scutellum and mesopleura quite coarsely and densely rugose, propodeum posteriorly somewhat more shining and vaguely subrugose, more coarsely so on each side, but lateral faces becoming smooth below, triangle smooth below, becoming irregularly striate across upper margin; discs of abdominal terga minutely and closely punctate, tergum 1 becoming impunctate laterally and basally, depressed apical margins invaded by scattered, exceedingly minute punctures, only the narrow rims impunctate; pubescence entirely white, rather short but copious on head and thorax, nearly hiding surface on thorax beneath, barely evident on abdomen dorsally, but becoming somewhat more conspicuous apically, sternal plates with very sparse pale hairs, sternum 6 becoming rather densely pubescent toward apex; median length of pygidial plate about equal to basal width, strongly narrowed apically, apex deeply but narrowly emarginate, margins carinate, surface very finely and rather closely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature similar to those of *sayi* (fig. 107).

TYPES—Holotype: Male, Great Falls, Va., April 30 (N. Banks) [M.C.Z.]. Paratype: 1 ♂, Great Falls, Md., April 27 (Banks) [author's coll.], 1 ♂, Raleigh, N. C., April 23, 1961 (Mitchell).

Nomada (Nomada) nigrocincta Smith

Nomada nigrocincta Smith, 1879. Deser. New Species Hym. Brit. Mus., p. 99. ♀.

Nomada nigrocincta var. *d* Lovell and Cockerell, 1905. Psyche 12, p. 41. ♀.

Nomada nigrocincta Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 311.

No specimens of *nigrocincta* have been found in any of the collections studied. The

single specimen from Maine described by Lovell and Cockerell as var. *d* may or may not represent that species. It has not been seen, as it was not in the collection of Lovell types received from Harvey B. Lovell. The following descriptive note was made from the type in the British museum:

FEMALE—Length 9 mm.; mandibles slender, simple; 2nd segment of flagellum equal to longer side of basal segment; antennae entirely ferruginous; face black between antenna, extending up around ocelli and cheeks posteriorly, face otherwise red, but a black line extending along upper margin of clypeus and around supraclypeal area; scutum dark red, with a narrow median black line, contiguously and rather deeply punctate; scutellum red, not at all bilobed (evenly rounded), closely and finely punctate; mesopleura red, rather coarsely rugoso-punctate, the sternum black; metapleura and propodeum black, posterior surface of propodeum somewhat reddened on each side; tubercles shining, finely and sparsely punctate; wings subhyaline, narrowly infuscated along outer margin, basal vein slightly basad of transverse median; front coxae simple; legs mostly red, but base of all femora blackened; abdominal terga largely red or ferruginous, basal tergum black over basal half and along apical margin, and apical margin of second and third blackened, punctures very close, fine and shallow, hardly visible; pseudopygidium of the usual form.

DISTRIBUTION — “Arctic America,” possibly Maine.

Nomada orba new species

(Fig. 107)

MALE—Length 6 mm.; lateral ocelli somewhat nearer margin of vertex than to each other, and considerably nearer each other than to eyes; cheeks subequal to eyes in width, posterior margin not distinctly carinate; antennal scape rather strongly swollen, apex deeply excavated, largely enclosing pedicel, longer side of basal segment of flagellum somewhat shorter than segment 2, median segments slightly longer than broad; mandible slender and simple; wings hyaline, becoming faintly clouded along apex, veins testaceous, stigma somewhat brownish, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, basal vein interstitial with transverse median; tegulae yellowish-hyaline, smooth and shining, very finely and sparsely punctate; scutellum narrow, rounded, not at all impressed; front coxae not spinose; hind femora not modified; clypeus, labrum, mandibles except tips, and small lateral macu-

lations adjacent to mandibles, yellow; head otherwise black; antennal scape yellow anteriorly, otherwise dark, flagella testaceous beneath, piceous above; tubercles yellowish, thorax otherwise black; tibiae and tarsi yellowish-testaceous, spurs pale yellow, femora becoming yellowish at apex but otherwise more piceous, front femora more or less yellowish anteriorly; basal abdominal tergum blackish over basal half, more or less reddish otherwise, but with dark infusions; discs of terga 2 and 3 very broadly yellowish laterally, these nearly meeting medially, but definitely separated, apical impressed areas more testaceous-hyaline; terga 4 and 5 with somewhat smaller, lateral, yellow maculations that are slightly interrupted, 6 with a median, subapical, yellow blotch; head and thorax coarsely rugoso-punctate, clypeus very finely and closely punctate beneath rather dense pubescence, the maculated areas with only sparse, fine punctures; abdominal terga very minutely punctate, punctures barely evident on tergum 1, somewhat more distinct and very close on the others; pubescence entirely pale, short but rather copious on lower portions of face and cheeks, and on thorax laterally, posteriorly and beneath, very fine and barely evident on abdomen basally, becoming more conspicuous and more elongate apically; pygidial plate narrow and elongate, somewhat narrowed apically, apex subtruncate, without a distinct emargination, margins carinate, surface finely and closely punctate; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

TYPE—Holotype: Male, Ithaca, N. Y., April 22 (year?) [Cornell].

Nomada (Nomada) parva Robertson
(Fig. 107)

Nomada parva Robertson, 1900. Canad. Ent. 32, p. 294. ♀ ♂.

Nomada infantula Cockerell, 1907. Entomologist 40, p. 98. ♀ ♂. New synonymy

Nomada parva Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 5-5.5 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks much narrower than eyes, posterior margin subcarinate; longer side of basal segment of flagellum equal to segment 2, median segments only very slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming rather deeply infuscated along apical margin and in marginal cell, with the

usual three submarginal cells, 2nd very much broader anteriorly than 3rd, veins pale testaceous, stigma somewhat more ferruginous, basal vein somewhat basad of transverse median; tegulae shining between very fine and indistinct punctures, these close along inner margin, becoming quite sparse along outer margin; posterior margin of scutellum slightly impressed medially; front coxae not spinose; apex of hind tibiae with a row of four or five very slender but elongate hair-like bristles; head largely yellowish-ferruginous, quite strongly yellow along margins of eyes below, a small amount of black between and above antennae and around ocelli, and cheeks rather narrowly black along posterior margin; antennal scape yellowish anteriorly, somewhat more reddish-piceous posteriorly, flagellum brownish-testaceous below, more brownish-piceous above; tubercles and tegulae strongly yellow, thorax otherwise largely yellowish-ferruginous, pronotal collar somewhat more yellowish, scutum with a median black line, and mesopleura with a restricted black area below; abdominal terga largely testaceous, becoming broadly yellowish-hyaline apically, terga 2 and 3 with small, widely separated, yellow maculae; vertex and face above antennae coarsely, closely and deeply punctate, cheeks much more finely so, supra-clypeal area and clypeus very finely and closely punctate, the lateral areas of face below antennae quite coarsely and distinctly punctate; scutum, scutellum and mesopleura quite densely rugose, propodeum somewhat more finely so posteriorly, lateral faces becoming somewhat smoother below, triangle rather smooth but dull below, becoming obscurely rugoso-striate above; legs testaceous in large part, front legs more yellowish anteriorly, spurs pale yellow; abdominal terga practically impunctate, the more apical terga with scattered, shallow and fine punctures evident apically; pseudopygidium very short, transverse forming the very narrow, truncate, apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence very short and thin, entirely whitish, rather dense on thorax laterally and below and on cheeks below, hardly evident on abdomen dorsally, sterna with very fine and sparse, whitish hairs; apex of sternum 5 with a tuft of rather elongate, yellowish hairs on each side of midline, which converge medially.

MALE—Length 4.5-6 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin only obscurely subcarinate; antennal scape slightly swollen, apex deeply excavated, largely enclosing pedicel, basal segment of flagellum very short, the

longer side somewhat shorter than segment 2 which is also short, median segments little if any longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated along apical margin and marginal cell, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins testaceous to piceous, basal vein slightly basad of, or interstitial with, transverse median; tegulae shining between minute, rather sparse, barely visible punctures; scutellum rounded posteriorly, not appreciably impressed; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, and lateral facial maculae that extend very narrowly up margin of eye to level of antennae, bright yellow; face above clypeus largely black, vertex and cheeks entirely so; antennal scape yellow anteriorly, piceous posteriorly, flagellum pale testaceous below, somewhat more brownish above; tubercles and a very small anterior spot on mesopleura, yellow, tegulae more testaceous-hyaline, thorax otherwise black; legs entirely yellowish-testaceous, spurs pale yellow, hind tarsi somewhat darkened; abdominal terga reddish-testaceous in part, basal tergum blackish across base, terga 2-6 with lateral, widely separated, bright yellow maculae, those on 2 rather large, successively smaller on the succeeding terga, median basal areas of discs testaceous to piceous, the broad, apical, impressed rims yellowish-hyaline; sterna yellowish at least in part, apical rims broadly hyaline, sternum 6 bright yellow in large part; vertex, face above antennae and upper part of cheeks densely and rather coarsely rugose, cheeks below and lower half of face more finely rugose; clypeus and supraclypeal area very minutely and closely punctate beneath rather dense pubescence; scutum, scutellum and mesopleura densely rugose, pleura somewhat more coarsely so; propodeum posteriorly rather coarsely rugose, becoming rather smooth on each lateral face below, triangle somewhat smoother below, becoming quite coarsely and irregularly reticulate above; discs of abdominal terga very minutely and rather closely punctate basally, punctures invading the depressed apical rims but becoming extremely minute and obscure, especially on the more apical terga; pubescence rather short, entirely whitish, quite dense over face, lower cheeks and thorax below and posteriorly, very fine and inconspicuous on abdomen dorsally, more elongate but very sparse on abdominal sterna, sternum 6 becoming rather densely but very finely pubescent along mid-line toward apex; pygidial plate rather narrow, median length somewhat greater than basal width, the narrow apex rather deeply incised, margins carinate, surface very finely

and closely punctate; exposed abdominal sterna unmodified, sternum 6 strongly narrowed to the narrowly rounded tip; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Michigan to the New England states, south to Mississippi, March to June.

FLOWER RECORDS—*Fragaria*, *Rubus* and *Senecio*. This species is recorded by Robertson (1929) on *Capsella*, *Geum*, *Nothoscordum*, *Osmorrhiza*, *Potentilla*, *Ranunculus* and *Smilax*.

Nomada (Nomada) pygmaea Cresson
(Fig. 107)

Nomada pygmaea Cresson, 1863. Ent. Soc.

Phila. Proc. 2, p. 299. ♂.

Nomada (Nomada) bilobata Swenk, 1913.

Nebr. Univ., Studies 12, p. 25. ♂. New synonymy

FEMALE—Length 7-8 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks nearly equal to eyes in width, posterior margin quite distinctly carinate; longer side of basal segment of flagellum slightly shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings subhyaline basally, sometimes distinctly yellowish, becoming rather deeply infuscated along outer margin and in marginal cell anteriorly, with the usual three submarginal cells, 2nd slightly broader than 3rd anteriorly, veins testaceous to piceous, basal vein considerably basad of transverse median; tegulae somewhat shining, punctures quite deep and distinct, rather close along inner margin, becoming sparse along outer margin; posterior margin of scutellum quite deeply depressed medially; front coxae not spinose; apex of hind tibiae with two or three elongate, seta-like bristles; head largely ferruginous, somewhat more yellowish below, eyes completely encircled with ferruginous, a restricted area between and above antennae, another between ocelli, and posterior half or more of cheeks, black; antennal scape more testaceous, flagellum brownish-testaceous below, more piceous above; thorax largely dark red, tubercles and tegulae more yellowish-testaceous, metapleura and narrow adjoining margin of propodeum black, scutum and posterior face of propodeum with a median black line, mesopleura with some black beneath anteriorly; legs largely testaceous, femora more or less piceous except at apex, spurs pale yellow, hind basitarsi darkened; abdominal terga red-

dish in large part, tergum 1 piceous across base, 2 and 3 with lateral, widely separated, yellow maculations; abdominal sterna largely reddish, impressed apical margins of 1 and 2 more piceous, on 3 and 4 more yellowish; vertex, face above antennae, and cheeks above, very coarsely, deeply and closely punctate, cheeks below becoming more finely rugose; supraclypeal area and clypeus very finely rugoso-punctate, the punctures becoming more indefinite on clypeus apically, face laterally rather finely, closely and obscurely punctate; scutum, scutellum and mesopleura very coarsely and closely punctate, punctures becoming somewhat finer on pleura below; propodeum more finely and densely rugoso-punctate posteriorly, lateral faces becoming somewhat smoother, triangle dull and tessellate below, becoming rather broadly striate along upper margin; discs of abdominal terga with very fine, close punctures toward base, the broad apical impressed areas entirely impunctate, tergum 1 impunctate laterally and basally, tergum 5 becoming somewhat more distinctly but rather sparsely punctate apically; pseudopygidium transverse, extremely short, forming the truncate apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence extremely short and inconspicuous, white where visible, somewhat more dense on lower part of face, cheeks and on thorax posteriorly and below, quite dense on posterior face of propodeum, barely evident on abdomen dorsally, becoming somewhat more evident apically, apex of sternum 5 with a very small tuft of elongate, brownish hairs that converge medially.

MALE—Length 6-8.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks considerably narrower than eyes, posterior margin subcarinate; antennal scape strongly swollen, apex deeply excavated and completely enclosing pedicel, longer side of basal segment of flagellum much shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming faintly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd usually much broader than 3rd anteriorly, veins largely testaceous, basal vein much basad of transverse median; tegulae shining, punctures minute, rather close along inner margin, becoming very sparse toward outer margin; posterior margin of scutellum quite deeply depressed medially; front coxae not spinose; hind femora slender and unmodified; clypeus, supraclypeal area, labrum, mandibles and narrow lateral maculae, bright yellow, lateral maculae continuing over top of eye, somewhat more ferruginous above; vertex and median area of face above antennae black, with some black

between supraclypeal mark and lateral maculations, cheeks largely black, with a narrow yellow band along eye margin below; antennal scape bright yellow anteriorly, becoming more or less piceous posteriorly, flagellum testaceous; pronotal collar, tubercles and tegulae more or less yellowish; scutum, scutellum and large median area of mesopleura more ferruginous, scutum with a median black line, mesopleura black below, metapleura and entire propodeum black; discs of abdominal terga 2 and 3 more testaceous, with broad, lateral, yellow maculations which are widely separated medially, impressed apical margins becoming somewhat more yellowish; tergum 1 piceous or black basally, more or less testaceous medially as a broad band, becoming somewhat darkened toward the rim; terga 4-6 more or less testaceous basally, becoming somewhat darkened toward the broadly impressed, yellowish-hyaline, apical margins; discs of abdominal sterna 2-4 testaceous, the broad, apical rims more yellowish-hyaline, sterna 1, 5 and 6 more piceous; vertex medially and face above antennae coarsely and deeply rugoso-punctate, becoming somewhat more finely so on cheeks and on vertex laterally; supraclypeal area and lateral areas of face closely and rather coarsely punctate, clypeus very finely and closely so; scutum, scutellum and mesopleura very coarsely rugoso-punctate, propodeum somewhat more finely rugose posteriorly and laterally, triangle somewhat smoother below but dull, becoming rather coarsely rugoso-striate along upper margin; discs of abdominal terga minutely and rather closely punctate basally, the punctures invading to some degree the impressed apical margins, but very minute and obscure; tergum 1 impunctate laterally and basally, and the more apical terga with somewhat coarser and more sparse punctures apically; pubescence entirely white, rather copious on face, on cheeks below, on thorax laterally and beneath, very fine and obscure on abdominal terga, becoming somewhat more conspicuous apically, sterna with very fine and sparse suberect hairs, sternum 6 becoming quite densely pubescent apically; median length of pygidial plate about equal to basal width, apex more or less deeply emarginate, margins carinate, surface quite closely and finely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed apically to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Minnesota to Maine, south to Virginia, April to July.

FLOWER RECORDS—*Evonymus*, *Rhus* and *Rubus*.

***Nomada salicis* Robertson**

Nomada salicis Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 52. ♂.

Nomada salicis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

No specimens of *salicis* have been collected, nor have any been found in other collections received for study. The following descriptive note was made from the type in the Illinois Natural History Survey:

MALE—Face black, with entire clypeus, labrum and mandibles yellow, with yellow lateral face marks ending abruptly on eye margin about at level of antennae; scape and basal segment of flagellum yellow, flagellum otherwise brownish-ferruginous beneath, piceous above, median segments broader than long, basal segment shorter than segment 2; mandibles simple; thorax black, finely and densely rugoso-punctate; tubercles, a pair of spots on scutellum, and a narrow band on pleura below, yellow; coxae and legs largely yellow, the femora more or less piceous; wings hyaline, lightly infuscated apically, basal vein basad of transverse median; front coxae not spined; abdominal terga shining, nearly impunctate, terga 1-6 with entire, transverse, yellow bands, that on 2 narrowed medially; pygidial plate notched at apex.

DISTRIBUTION—Illinois.

FLOWER RECORD—Recorded by Robertson (1929) on *Salix amygdaloides*.

***Nomada (Nomada) sayi* Robertson**

(Fig. 107)

Nomada sayi Robertson, 1893. Amer. Ent. Soc. Trans. 20, p. 276. ♀ ♂.

Nomada sayi Robertson, 1900. Canad. Ent. 32, pp. 293-294. ♀ ♂. (redescribed)

Nomada sayi Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 5.5-8 mm.; lateral ocelli nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin not carinate; longer side of basal segment of flagellum considerably shorter than segment 2, median segments considerably longer than broad; mandibles simple; wings hyaline basally, becoming lightly infuscated along apical margin and marginal cell, with the usual three submarginal cells, 2nd usually somewhat broader than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining

between exceedingly minute and inconspicuous punctures, these rather close along inner margin, very sparse toward outer margin; posterior margin of scutellum deeply depressed medially; front coxae not spinose; apex of hind tibiae with 2 or 3 elongate, hair-like, yellowish bristles; head testaceous in large part, with a limited area of black between antennae, between the ocelli, and over posterior half of cheeks; antennae testaceous; thorax somewhat more reddish, tubercles and tegulae yellowish-testaceous, scutum with a median black line, metapleura black, mesopleura with blackened areas below; legs largely testaceous, femora more or less darkened basally, hind tibiae and tarsi somewhat darkened, all spurs pale yellow; abdominal terga reddish-testaceous, 2 and 3 with lateral, widely separated, yellow maculations, the broad, impressed, apical margins becoming more or less yellowish-hyaline; abdominal sterna largely testaceous; vertex, cheeks above, upper part of face and lateral areas below antennae very coarsely, deeply and closely punctate, cheeks much more finely punctate below, the supraclypeal area and clypeus very finely and closely so; scutum, scutellum and mesopleura very densely rugose, punctures becoming somewhat more distinct on mesopleura below, posterior face of propodeum more finely or shallowly rugose, lateral faces becoming somewhat smoother below, triangle smooth and somewhat shining below, becoming irregularly and rather coarsely striate along upper margin; discs of abdominal terga very finely and rather closely punctate toward base; punctures becoming somewhat more widely separated toward the broad, impressed, apical margins which are to some degree invaded by exceedingly minute and sparse punctures, tergum 1 impunctate laterally and basally, median punctures very minute, and tergum 5 becoming very sparsely and finely punctate apically; pseudopygidium very short, transverse, forming the rather short, truncate, apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence very short and thin, entirely white, somewhat more copious on face, cheeks and propodeum, hardly evident on abdomen dorsally, becoming somewhat more conspicuous apically, apex of sternum 5 with a small tuft of elongate, convergent, fuscous hairs on each side of mid-line.

MALE—Length 5.5-7 mm.; lateral ocelli nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin subcarinate; antennal scape only slightly swollen, apex deeply excavated, completely enclosing pedicel, longer side of basal segment of flagellum considerably shorter than segment 2, median segments slightly

longer than broad; mandibles slender and simple apically; wings hyaline, faintly infuscated apically, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins and stigma testaceous, basal vein much basad of transverse median; tegulae shining between very fine and rather sparse punctures; posterior margin of scutellum only slightly grooved medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, a very narrow line below eye at base of mandibles, narrow lateral facial maculae ending narrowly on eye margin at level of antennae, and antennal scape, bright yellow; face, vertex and cheeks otherwise black; antennal flagellum brownish-testaceous; tubercles and tegulae yellowish-testaceous, thorax otherwise entirely black; legs testaceous in large part, mid and hind femora more or less blackened, spurs pale yellow; abdominal terga reddish in large part, but 2 and 3 with broad, basal, transverse maculations which are very slightly interrupted medially, forming nearly complete bands, 3-5 often with more obscure, submedian or apical, yellow maculations; tergum 1 piceous across base, yellowish-ferruginous medially, forming a vague, transverse band, reddish apically; broad apical margins of following terga becoming yellowish-hyaline; vertex, face above antennae and upper part of cheeks very coarsely and deeply rugoso-punctate, cheeks much more finely so below; supra-clypeal area and clypeus very minutely and rather vaguely punctate, the dark lateral areas with coarser, close punctures, but these very sparse on maculated areas; scutum, scutellum and mesopleura coarsely rugose, scutellum and propodeum rather finely so, triangle dull and densely tessellate below, becoming rather coarsely rugoso-striate along upper margin; discs of abdominal terga very finely and rather closely punctate basally, punctures becoming more minute and widely separated toward the depressed apical margins, these invaded in part by exceedingly minute, vague punctures; pubescence entirely whitish, short but rather copious over head and thorax, very fine and sparse on abdomen dorsally, finer and more elongate on the sterna, becoming more copious apically, sternum 6 with considerable dense, suberect, pale pubescence apically; median length of pygidial plate about equal to basal width, rather strongly narrowed apically, apex deeply incised, margins carinate, surface very fine and closely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Minnesota to Quebec and Maine, south to Georgia, March to June.

FLOWER RECORDS — *Amelanchier*, *Claytonia*, *Crataegus*, *Malus*, *Pyracantha*, *Salix*, *Senecio* and *Stellaria*. Robertson (1929) records *sayi* on *Antennaria*, *Cercis*, *Chaerophyllum*, *Collinsia*, *Dentaria*, *Isopyrum*, *Nothoscordum*, *Osmorrhiza*, *Ranunculus*, *Ribes*, *Rubus*, *Thaspium*, *Viburnum*, *Viola*, *Zanthoxylum* and *Zizia*.

Nomada (Nomada) skinneri Cockerell
(Fig. 107)

Nomada skinneri Cockerell, 1908. Ent. News 19, p. 323. ♀.

FEMALE—Length 9-12 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks fully as broad as eyes, posterior margin sharply carinate; longer side of basal segment of flagellum equal to segment 2, median segments considerably longer than broad; mandibles slender and simple; wings subhyaline basally becoming rather deeply infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd very much broader than 3rd anteriorly, veins testaceous to piceous, basal vein nearly interstitial with transverse median; tegulae shining, punctures exceedingly minute and sparse, barely evident along inner margin; pronotal collar rather sharply carinate, lateral angles distinct; posterior margin of scutellum only very slightly impressed medially; front coxae not spinose; apex of hind tibiae with two or three rather short but very robust spine-like bristles and a pair of more slender and elongate, setae-like bristles; clypeus, labrum and mandibles testaceous, eyes completely encircled with a testaceous band, this broader above, nearly meeting ocelli; broad median area of face to clypeal margin, vertex, area around ocelli, and posterior two-thirds of cheeks, black; antennal scape and base of flagellum testaceous, following segments brownish-testaceous below, more piceous above; scutum, scutellum and pleura largely ferruginous, prothorax laterally, metapleura, and propodeum in large part, black; scutum somewhat blackened along anterior margin and with a median, rather broad, black band; mesopleura black beneath and with a very limited black area below wing bases; posterior face of propodeum with some vague, pale maculations evident; coxae largely black, becoming somewhat testaceous apically, front and middle trochanters testaceous, hind trochanters and all the femora more or less piceous, becoming to some degree

ferruginous or testaceous apically, tibiae and tarsi reddish-testaceous, spurs pale yellow; abdominal terga largely ferruginous, tergum 1 piceous at base and somewhat darkened along apical margin; tergum 2 with broad, lateral, yellow maculae which are widely separated; tergum 3 with a similar but much smaller pair of maculations, and 4 and 5 without maculae; abdominal sterna largely testaceous, without maculations; punctures of face coarse and deep, well separated above antennae, sometimes widely so, becoming finer and closer on supraclypeal area, clypeus shining, with barely visible, minute, slightly separated punctures; vertex coarsely and rather sparsely punctate medially, very minutely and quite sparsely so between ocelli and eyes, the surface shining, cheeks minutely punctate above, becoming rather dull and vaguely reticulate below; scutum shining between deep and distinct punctures, these quite coarse and well separated medially, especially toward posterior margin, somewhat finer and closer laterally; scutellum shining, punctures coarse, deep, irregular and quite sparse; pleura very coarsely reticulate above, punctures becoming somewhat more distinct beneath; propodeum quite finely and shallowly rugose, lateral faces becoming rather smooth below, triangle smooth and impunctate below, becoming rather coarsely striate along upper margin; discs of abdominal terga with minute, slightly separated punctures, tergum 1 practically impunctate and shining, the depressed, apical margins of the following terga rather broadly impunctate, invaded only slightly by scattered, minute punctures; pseudopygidium extensive, covering about half the median length of the disc of tergum 5, median length about half its apical width, apex slightly incurved, surface densely covered with minute, silvery tomentum, visible only at certain angles; pubescence short, in part erect, head and thorax with fine, subappressed, pale pubescence and scattered suberect, somewhat darker hairs, surface not obscured; abdomen dorsally with hardly evident pubescence, sterna with only scattered somewhat elongate, very fine pale hairs, sternum 5 apically with a fringe of stout, curved, convergent hairs on each side of mid-line.

MALE—Length 9 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks nearly as broad as eyes, posterior margin sharply carinate; antennal scape somewhat swollen, apex deeply excavated and completely enclosing pedicel, basal segment of flagellum much shorter than segment 2, the shorter side no longer than the apical width, median segments somewhat longer than broad; mandibles slender and simple,

outer margin with a slight angle at basal third; wings hyaline basally becoming lightly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins and stigma testaceous, basal vein very slightly basad of transverse median; tegulae shining, punctures exceedingly minute and sparse; pronotal collar sharply carinate, lateral angles distinct; posterior margin of scutellum rather deeply grooved medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, base of mandibles, and narrow, lateral, facial maculae, bright yellow, the maculae ending narrowly but rather abruptly at level of antennae on eye margin; upper margin of clypeus very narrowly blackened, and entire face, vertex and cheeks otherwise black; antennal scape bright yellow anteriorly, becoming piceous posteriorly, basal segment of flagellum testaceous, the following segments more brownish-testaceous beneath, piceous above; tubercles testaceous, tegulae somewhat more yellowish; scutellum dull reddish posteriorly and above, thorax otherwise black; abdominal tergum 1 piceous basally, becoming somewhat more reddened apically; tergum 2 with a pair of lateral, very large, bright yellow maculae which are widely separated, otherwise ferruginous, and tergum 3 ferruginous, with a pair of similar but smaller lateral maculations; terga 4 and 5 somewhat more piceous, the broad, apical margins more or less yellowish-hyaline, 6 somewhat more testaceous; basal abdominal sternum piceous, the following sterna more testaceous, with some piceous infusions; face and vertex coarsely, deeply and rather closely punctate, punctures below antennae somewhat more shallow and vague, maculated areas smooth and shining, with hardly evident punctures, and punctures of clypeus extremely minute and barely visible; cheeks rather closely, shallowly and quite finely punctate, becoming somewhat more deeply so beneath; scutum coarsely and deeply rugoso-punctate medially, becoming more definitely rugose anteriorly and laterally; scutellum shining between coarse, deep and well separated punctures; pleura very coarsely reticulate above, becoming somewhat more distinctly and finely punctate below; propodeum more finely reticulate, lateral faces becoming rather smooth below and anteriorly, triangle smooth below, becoming rather coarsely striate across upper margin; abdominal tergum 1 impunctate laterally and basally, with some barely evident, minute, well separated punctures medially; discs of the following terga very finely and rather closely punctate, the impressed apical margins largely impunctate, invaded only slightly by scattered minute punctures, the

more apical terga becoming somewhat more coarsely, deeply and sparsely punctate apically; pubescence entirely pale, very thin above, somewhat more copious on head beneath and on thorax laterally and beneath, barely evident on abdomen dorsally, sterna with very fine, scattered, suberect, pale hairs, sternum 6 becoming rather densely short pubescent toward apex; median length of pygidial plate about equal to basal width, quite strongly narrowed apically, apex deeply incised, margins carinate, surface finely and rather closely punctate; exposed sternal plates unmodified; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION — North Carolina to Connecticut, June and July.

FLOWER RECORD — *Galax.*

Nomada sobrina new species

(Fig. 107)

MALE—Length 9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks much narrower than eyes, posterior margin not carinate; antennal scape quite strongly swollen, apex deeply excavated and partially enclosing pedicel, basal segment of flagellum much shorter than segment 2, median segments somewhat longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, veins and stigma testaceous, basal vein much basad of transverse median; tegulae shining, punctures very fine and quite sparse toward outer margin; posterior margin of scutellum quite deeply grooved medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, a small spot on supraclypeal area, rather extensive facial maculae, and cheeks below, bright yellow, eyes nearly encircled with yellowish-ferruginous, the band becoming ferruginous above; median area of face around antennae and ocelli, and posterior half of cheeks, black, this area reaching upper margin of clypeus; antennal scape bright yellow anteriorly, becoming piceous posteriorly near apex, flagellum testaceous beneath, upper surface more piceous toward base, more ferruginous apically; pronotal collar, tubercles, scutellum, and a transverse band on mesopleura, bright yellow, the mesopleural maculation bordered above with ferruginous; scutum bright ferruginous, with a broad me-

dian black band; mesopleura below and more narrowly above, metapleura and entire propodeum, black; tegulae yellowish-testaceous; coxae largely black, becoming somewhat yellowish toward apex, the trochanters testaceous, with piceous infusions beneath, front and mid femora piceous basally, otherwise testaceous, the hind femora more fully piceous, all tibiae and tarsi entirely testaceous, spurs pale yellow; abdominal terga chiefly ferruginous, tergum 1 piceous across basal half, 2 and 3 with extensive, lateral, yellow maculae, those on 2 nearly meeting medially, more widely separated on 3, tergum 3 more piceous, with small, lateral, yellow maculations that are widely separated, 5 and 6 more ferruginous, 5 with vague, subapical, lateral maculations, 6 with a rather extensive, median, yellow maculation; abdominal sterna piceous in part, the more apical plates becoming testaceous; face, vertex and cheeks above very coarsely and deeply rugoso-punctate, cheeks becoming somewhat more shallowly rugose below, lower part of face somewhat more finely rugoso-punctate, maculated areas with very fine and sparse punctures; clypeus minutely, closely and vaguely punctate; scutum very coarsely and deeply rugoso-punctate, punctures of scutellum deep but rather variable in size, and mesopleura rather coarsely reticulate above, becoming somewhat more finely but deeply and closely punctate below; posterior face of propodeum rather smooth but dull, lateral faces finely and irregularly rugose, triangle rather smooth below, becoming rather finely long striate across upper margin; discs of abdominal terga very finely and closely punctate, tergum 1 impunctate laterally and basally, impressed apical margins invaded by scattered, very minute punctures nearly to the narrowly impunctate rims; pubescence entirely pale, very short, somewhat more copious but largely appressed on face, somewhat more copious on thorax, partially hiding surface beneath, very short and hardly evident on abdomen dorsally, more evident toward apical impressed areas of the sterna, sternum 6 quite densely short pubescent toward apex; median length of pygidial plate very slightly longer than basal width, apex rather strongly narrowed and deeply emarginate, margins strongly carinate, surface with fine and very close punctures; exposed sternal plates unmodified; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

TYPE—Holotype: Male, Macomb Co., Mich., May 28, 1949 (R. R. Dreisbach) [author's coll.].

Nomada (Nomada) sphaerogaster
Cockerell

Nomada sphaerogaster Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 611. ♀.

This description was made from the type in the Philadelphia Academy of Science. No other specimens have been seen.

FEMALE—Length 8 mm.; lateral ocelli considerably nearer margin of vertex than to eyes; cheeks subequal to eyes in width; longer side of basal segment of flagellum shorter than segment 2, median segments very slightly longer than broad; clypeus very short, median length only about a fourth the breadth, with erect, dark hairs; mandibles simple; wings slightly infuscated, veins testaceous to brownish, stigma somewhat darker, 3rd submarginal cell narrower than 2nd anteriorly, basal vein very slightly basad of transverse median; tegulae yellow, shining, sparsely and minutely punctate; scutellum not grooved; front coxae not spined; apex of hind tibiae with a row of four or five rather short, brownish setae; head and thorax black, the labrum, mandibles except tips, clypeus, and very short lateral maculations, yellow; antennal scape yellowish anteriorly, flagella testaceous beneath, brownish above tubercles and a pair of blotches on scutellum, bright yellow; propodeum with a pair of very small, yellow spots in triangle; abdominal terga black, 1-4 with transverse yellow bands, interrupted medially except on 2 which is only subinterrupted, 5 largely yellow; legs black basally, the femora apically and all tibia and tarsi, yellow; head and thorax finely rugoso-punctate, but clypeus very minutely punctate; abdominal terga very minutely and quite closely punctate, rims narrowly impunctate; pseudopygidium short, of the usual form; pubescence of head and thorax quite copious and erect, but rather short, pale yellowish above, more whitish laterally and beneath; abdominal terga with only very short, thin and obscure pale pubescence.

TYPE LOCALITY — Riverton, N. J., 4-22.

Nomada townesi new species

MALE—Length 8 mm.; lateral ocelli much nearer margin of vertex than to each other, and much nearer each other than to eyes; cheeks somewhat narrower than eyes, posterior margin not noticeably carinate; antennal scape somewhat swollen, apex deeply excavated and enclosing the pedicel, longer side of basal segment of flagellum about equal to segment 2, median segments slightly longer than broad; mandibles slender and simple;

wings subhyaline, becoming faintly infuscated apically, but with a distinct hyaline area just beyond the submarginal cells, veins and stigma brownish-testaceous, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, basal vein very slightly basad of transverse median, almost interstitial; tegulae testaceous except along inner margin, shining, finely and rather sparsely punctate; scutellum rounded, not at all impressed medially; front coxae not spinose; hind femora simple and unmodified; clypeus except upper margin, labrum, mandibles except tips, and very small lateral face marks, bright yellow, head otherwise black; antennal scape yellow anteriorly, blackish posteriorly, flagellum testaceous beneath, blackish above toward base, becoming testaceous apically; margin of tubercles narrowly testaceous, thorax otherwise entirely black; coxae and trochanters black, femora more or less blackened posteriorly, but anterior face of front and mid femora testaceous, the hind femora testaceous apically; tibiae largely testaceous but somewhat blackened on outer face medially; tarsi testaceous, spurs pale yellow; basal abdominal tergum black basally, with narrow, lateral maculations which are somewhat separated medially, apical margin rather broadly testaceous-hyaline; terga 2 and 3 with broad, lateral, yellow maculations which are strongly narrowed toward mid-line, nearly meeting, basal area blackish, apical impressed areas yellowish-hyaline; terga 4-6 with transverse, yellow bands which are narrowly constricted medially but not interrupted; abdominal sterna dark, with rather vague, transverse, yellowish maculations; head and thorax coarsely rugoso-punctate, but lower portions of face and clypeus more finely so, the lateral maculated areas smooth and only sparsely punctate; abdominal terga finely but closely, deeply and distinctly punctate, punctures invading apical impressed areas nearly to rims, these very narrowly impunctate; pubescence erect and rather copious but not hiding surface, somewhat yellowish above on head and thorax, more whitish below and on thorax posteriorly, very short and thin, barely evident on the more basal abdominal terga, becoming somewhat more elongate apically; pygidial plate slightly narrowed apically, apex rather broadly emarginate, margins carinate, surface shallowly but closely punctate; sternum 8 with a slender apical process; gonocoxites of genital armature quite similar to those in *fragariae* (fig. 105).

TYPE — Holotype: Male, Takoma Pk., Md., Mar. 26, 1944 (H. & M. Townes) [Townes].

Nomada tyrrellensis new species

FEMALE—Length 8 mm.; lateral ocelli considerably nearer margin of vertex than to each other or to eyes; cheeks nearly as broad as eyes, posterior margin not distinctly carinate; basal segment of flagellum rather elongate but the longer side slightly shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple; wings subhyaline basally, becoming somewhat clouded apically, with a distinct hyaline area just beyond 3rd submarginal cell, the 2nd and 3rd subequal anteriorly, veins and stigma piceous, basal vein much basad of transverse median; tegulae finely and quite closely punctate; scutellum with a broad and deep median groove; front coxae without spines; apex of hind tibiae with two or three very fine, elongate hairs; head largely red, face with some black between and just above antennae, around ocelli and on posterior half of cheeks; thorax largely red, but scutum with a distinct median black line, prothorax black laterally, metapleura margined with black but ferruginous medially, propodeum almost entirely black; head and thorax very coarsely rugoso-punctate, but becoming quite finely and less distinctly so on face below; punctures of scutum, scutellum and pleura coarse and very close; propodeum rather coarsely punctate on posterior face, triangle rather smooth but dull, becoming coarsely short-striate along upper margin, lateral faces somewhat more finely and closely punctate; the more basal areas of abdominal terga 2-5 with minute, rather close but distinct punctures, those on 1 very minute and barely visible; pseudopygidium transverse, very short, rather densely covered with silvery tomentum; pubescence extremely short and rather thin, quite copious on head and lower portions of thorax; abdominal terga largely red but 2 and 3 with rather large, widely separated yellow spots, pubescence very short and thin, largely silvery-white, hardly visible on dorsum of thorax and on abdominal terga.

TYPES—Holotype: Female, Tyrrell Co., N. C., May 1, 1954 (D. M. Weisman) [author's coll.]. Paratypes: NORTH CAROLINA: 2 ♀♀, Raleigh, May 25, 1941 and April 7, 1954; 1 ♀, Pettigrew State Park, Tyrrell Co., May 27, 1959, (on *Erigeron*); 1 ♀, White Lake, Bladen Co., Mar. 14, 1953 (on *Amelanchier*) (both Mitchell). FLORIDA: 1 ♀, Alachua Co., April 7, 1954 (H. V. Weems, Jr.); 1 ♀, Orlando, Mar., 1944 (R. & G. Bohart).

Paratypes are in collections of the Florida Plant Board, R. M. Bohart and the author.

Nomada ulsterensis new species
(Fig. 107)

Nomada (Nomada) subnigrocincta Swenk, 1915. Nebr. Univ. Studies 15, p. 155. ♂. (wrongly associated with holotype ♀)

MALE—Length 6.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks nearly equal to eyes in width, posterior margin not carinate; antennal scape only slightly swollen, apex rather deeply excavated, partially enclosing pedicel, longer side of basal segment of flagellum slightly shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple; wings hyaline, very faintly infuscated along apical margin, with the usual three submarginal cells, 2nd and 3rd nearly equal anteriorly, veins testaceous, basal vein interstitial with transverse median; tegulae shining, punctures minute, scattered and rather sparse; posterior margin of scutellum rounded, not appreciably depressed or grooved; front coxae not spinose; hind femora unmodified; clypeus except upper margin, labrum, mandibles except tips, small lateral facial maculae, and anterior face of antennal scape, yellowish-testaceous, flagellum testaceous; head otherwise black; tubercles, tegulae, tibiae and tarsi testaceous at least in large part; spurs pale yellow, femora more piceous, becoming testaceous apically or along upper and anterior faces; thorax otherwise black; abdominal terga more or less reddish, basal tergum becoming more piceous at extreme base, terga 2-6 with more or less conspicuous, yellow maculae laterally, these extensive on 2, apical margins of terga yellowish-hyaline, more ferruginous basally; punctures coarse, close and deep on face above antennae, on vertex and cheeks, and between antennae and clypeus below, the clypeus and lateral maculated areas with very obscure, sparse punctures; scutum, scutellum and mesopleura coarsely and densely rugoso-punctate, lateral faces of propodeum dull, tessellate, with scattered, obscure and rather fine reticulations, posterior face more fully rugose, triangle impunctate but becoming rather coarsely striate along upper margin; punctures of abdominal terga minute, rather close throughout, barely visible toward base of tergum 1, evident but very fine on the following terga, minute and close over basal areas of each disc, becoming hardly visible apically; pubescence entirely pale, short but rather copious over head and thorax, hardly visible on abdomen both dor-

sally and ventrally; median length of pygidial plate somewhat greater than basal width, rather strongly narrowed apically, tip narrowly subtruncate and shallowly emarginate, margins carinate, surface obscurely but rather closely punctate; abdominal sterna dark; sternum 8 with a slender apical process; gonostyli of genital armature as shown (fig. 107).

TYPES—Holotype: Male, Slide Mt., Ulster Co., N. Y., June 12, 1941 (H. Dietrich). Paratypes: 1 ♂, Washington, D. C., May 15, 1944 (G. E. Bohart).

It seems probable that the male from Pennsylvania associated by Swenk with his *subnigrocincta* is this species.

Nomada (Nomada) valida Smith

Nomada valida Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 246. ♀.
Nomada valida Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 310.

FEMALE—Length 8-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin subcarinate; longer side of basal segment of flagellum equal to segment 2, median segments somewhat longer than broad; mandibles rather robust, entire; wings faintly yellowish, becoming slightly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd slightly broader than 3rd anteriorly, veins testaceous to piceous, stigma somewhat more reddish, basal vein very slightly basad of, or interstitial with, transverse median; tegulae shining between fine and rather deep punctures, these close along inner margin, becoming very sparse toward outer margin; posterior margin of scutellum rounded, without a definite median impression; front coxae not spinose; apex of hind tibiae with a row of 5 or 6 rather short, fuscous, seta-like bristles; face laterally and below reddish-testaceous, eyes completely and rather broadly encircled, a broad median area above antennae, another surrounding ocelli and posterior two-thirds of cheeks, black, the clypeal suture narrowly black; antennae testaceous; tubercles and tegulae yellowish-testaceous; pronotal collar, mesopleura above, scutum and scutellum largely red, propodeal triangle reddish on each side; pleura below and along the narrow anterior and upper margins, scutum, anteriorly and along mid-line, metapleura entirely, and propodeum other than triangle, black; coxae largely black, but legs otherwise testaceous in large part, mid and hind femora more or less piceous basally, spurs pale yellow; discs of abdominal terga yellowish-testaceous, ter-

gum 1 piceous or black basally, apical impressed areas of 1-3 more ferruginous, that of 4 more yellowish-hyaline; sterna largely yellowish-testaceous, apical margins yellowish-hyaline, vertex and face above antennae coarsely rugose, cheeks somewhat more finely so, supra-clypeal area and clypeus very finely and quite densely punctate, lateral areas of face below with coarse, deep and close punctures; scutum, scutellum and mesopleura coarsely rugose, pleura below becoming somewhat more distinctly punctate; propodeum very finely and densely rugose, triangle somewhat shining and smoother below, very finely rugose medially, coarsely so along upper margin; abdominal terga minutely and quite closely punctate toward base, punctures becoming somewhat more widely separated and more minute on apical impressed areas, only the narrow apical rims entirely impunctate; pseudopygidium transverse, extremely short, forming the broadly truncate, apical margin of tergum 5, densely clothed with suberect, silvery tomentum; face with quite elongate, conspicuous, erect, fuscous hairs, cheeks with more whitish but erect pubescence; thorax with erect, more yellowish pubescence above, this becoming more fuscous below, whitish on propodeum; abdomen dorsally very obscurely and finely pubescent, hairs becoming more elongate and conspicuous apically, elongate but very fine and rather sparse on sternal plates, more evident along the impressed apical areas; apex of sternum 5 with a rather broad and dense tuft of elongate, curved and convergent, more or less fuscous hairs on each side of mid-line.

DISTRIBUTION—British Columbia to New York and Nova Scotia, in April.

Nomada (Nomada) vicina vicina Cresson (Fig. 107)

Nomada vicina Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 292. ♀. (♂ misident.)

FEMALE—Length 9 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, posterior margin strongly carinate; longer side of basal segment of flagellum slightly shorter than segment 2, median segments very slightly longer than broad; mandibles slender and simple apically; wings lightly infuscated, becoming quite deeply so along apical margin and in marginal cell, with a hyaline area just beyond the marginal and discoidal cells, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins largely piceous, the stigma more testaceous, basal vein interstitial, or nearly, with transverse

median; tegulae shining, punctures deep and distinct but rather fine, close along inner margin, becoming sparse along outer margin; posterior margin of scutellum quite deeply depressed medially; front coxae not spinose; apex of hind tibiae with three short, robust, seta-like bristles; face, vertex and cheeks black in large part, eyes completely but narrowly encircled with ferruginous, labrum and mandibles ferruginous, the clypeus black except for the very narrow apical margin; scape, pedicel and basal segment of flagellum more testaceous, the more apical segments brownish-testaceous below, more piceous above; tubercles and tegulae testaceous; pronotal collar, large mesopleural maculations, lateral margins and a pair of elongate submedian maculations on scutum, and scutellum entirely, ferruginous; propodeum posteriorly with a pair of widely separated, small, yellowish maculations, thorax otherwise black; coxae more or less black basally, becoming somewhat reddened apically, front and middle legs largely reddish-testaceous, hind pair more ferruginous, femora piceous posteriorly, all spurs pale yellow; basal abdominal tergum largely black, with a pair of submedian, transverse, yellow maculations that are slightly separated medially; tergum 2 black, becoming somewhat reddened apically, with a pair of broad, transverse, yellow maculations that nearly meet medially; tergum 3 black across disc, apical margin more ferruginous, with a pair of sub-basal transverse, widely separated maculations; tergum 4 with a pair of submedian, transverse, yellow maculations that nearly meet medially and are deeply emarginate on each side posteriorly; tergum 5 with a broad, transverse, yellow band that is deeply emarginate on each side apically; abdominal sterna 2-3 with rather widely separated, lateral, yellow maculations, 4 with a median, more transverse, yellow band that is quite short; apical margins of the sterna rather broadly ferruginous-hyaline, sternum 5 piceous; vertex and face above antennae very deeply, coarsely, distinctly and closely punctate, becoming more finely and shallowly so on cheeks below, punctures quite coarse and distinct on each extreme side below antennae, fine and densely crowded on supra-clypeal area and clypeus; scutum, scutellum and mesopleura coarsely and deeply punctate, punctures becoming much finer and quite densely crowded on scutum laterally, well separated medially, rather widely separated on scutellum dorsally, somewhat separated on pleura below, becoming closely crowded above; propodeum very finely and closely rugosopunctate, becoming somewhat smoother and more shining on each side below, triangle densely tessellate below, becoming irregularly

reticulate above; discs of abdominal terga very finely and closely punctate basally, the punctures becoming somewhat more distinctly separated toward the impressed apical margins, these rather broadly impunctate; tergum 1 becoming impunctate laterally and basally; pseudopygidium transverse, very short, forming the rather narrow, truncate margin of tergum 5; pubescence extremely short, thin and inconspicuous, entirely pale where at all visible, apex of sternum 5 with a patch of elongate, brownish, convergent bristles on each side of mid-line.

MALE—Length 7-10 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin carinate; antennal scape somewhat swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum very short, the shorter side only about half the length of segment 2, median segments only slightly longer than broad; mandibles slender and simple apically; wings lightly infuscated, becoming quite deeply so along apical margin and in marginal cell, a hyaline area just beyond the submarginal and discoidal cells, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins chiefly piceous, stigma more testaceous, basal vein interstitial with transverse median; tegulae quite deeply, closely and rather finely punctate, becoming slightly separated toward outer margin; posterior margin of scutellum rather deeply depressed medially; front coxae not spined; hind femora unmodified, relatively slender; lower third of clypeus, labrum, mandibles and small facial maculae, ending very narrowly on eye margin slightly below level of antennae, yellow; head otherwise black; antennal scape bright yellow anteriorly, piceous above, flagellum brownish-testaceous below, more piceous above; tubercles and tegulae reddish-testaceous; pronotal collar, a pair of rather vague lateral maculations on mesopleura, and entire scutellum, ferruginous; thorax otherwise black; basal abdominal tergum largely black, with a pair of submedian, transverse, yellow maculations that are slightly separated medially; tergum 2 black, becoming somewhat reddened apically, with a pair of broad, transverse, yellow maculations that nearly meet medially; tergum 3 black across disc, apical margin more ferruginous, with a pair of sub-basal, transverse, widely separated maculations; tergum 4 with a pair of submedian, transverse, yellow maculations that nearly meet medially and are deeply emarginate on each side posteriorly; tergum 5 with a broad, transverse, yellow band that is deeply emarginate on each side apically; discs of abdominal

sterna 2-6 with extensive yellow maculations, more or less interrupted medially on the more basal sterna, apical margins of the sterna broadly testaceous-hyaline; coxae more or less blackish, becoming somewhat testaceous apically, legs otherwise largely testaceous, front femora and tibiae more yellowish anteriorly, mid and hind femora with small, yellow maculations at extreme tips, hind femora piceous posteriorly, spurs pale yellow; vertex and face above antennae coarsely, deeply and closely punctate, punctures becoming much finer on cheeks below and on supra-clypeal area and clypeus, rather deep and distinct on each side of face below, maculated areas largely impunctate; scutum, scutellum and mesopleura coarsely and deeply punctate, much more finely and densely so on scutum laterally, the more median punctures coarse and distinct, those on scutellum widely separated, those on pleura below somewhat finer but distinctly separated, becoming closely crowded above; propodeum rather finely rugose, becoming somewhat shining on each side below, triangle dull and densely tessellate, becoming rather finely short-striate along upper margin; discs of abdominal terga very finely, closely and quite deeply punctate, punctures becoming somewhat more distinctly

separated on apical impressed areas, only the narrow apical rims impunctate; tergum 1 becoming impunctate laterally and basally, the more apical terga with somewhat coarser and deeper punctures apically; pubescence short and inconspicuous in general, rather dense on face and cheeks, quite dense on propodeum posteriorly, entirely pale, hardly evident on abdomen dorsally, the sterna with very short scattered fine hairs, sternum 6 with short erect hairs apically; median length of pygidial plate much greater than basal width, only slightly narrowed apically, apex rather deeply emarginate, margins carinate, surface closely punctate; exposed sterna unmodified, sternum 6 subtriangular, apex very narrowly rounded; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Michigan to Quebec, the New England states and New Jersey, August and September.

FLOWER RECORD—*Solidago*.

The subspecific designation of *vicina* is made necessary by the recognition of another subspecies, *stevensi* Swenk, which has not been collected east of the Dakotas (see p. 406).

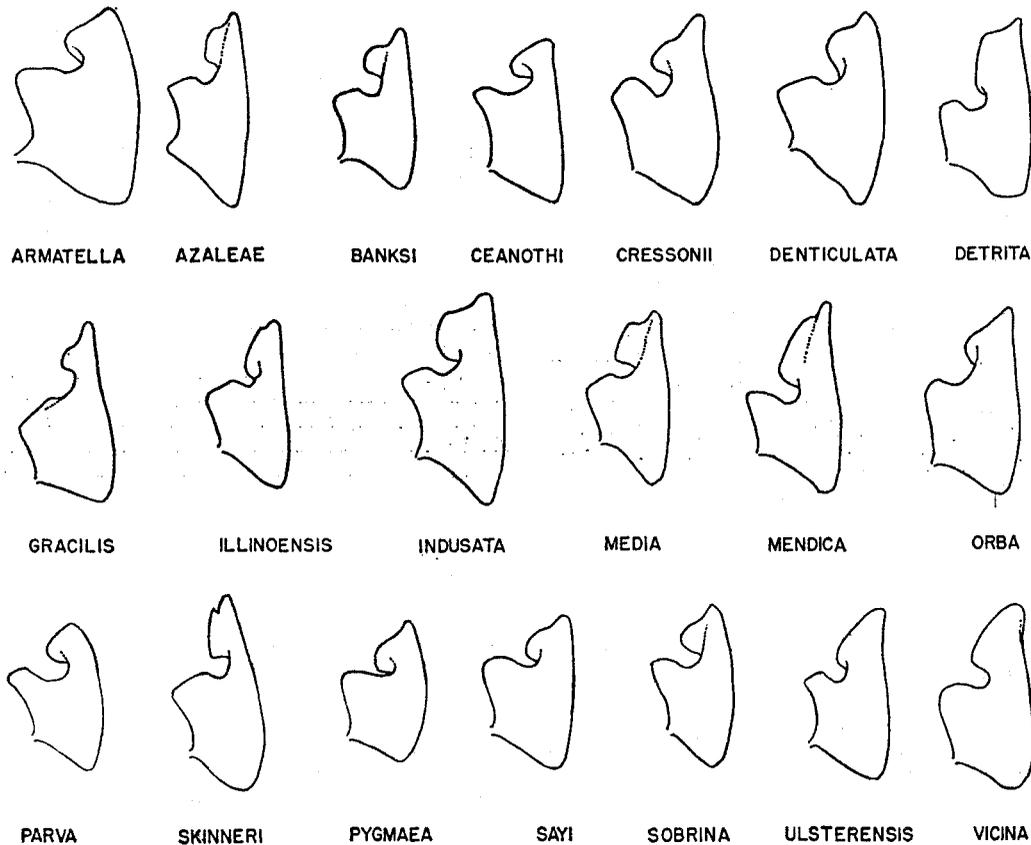


Figure 107—Right gonocoxite in males of *Nomada*.

Epeolus Latreille

(Figs. 67 & 108)

Epeolus Latreille, 1802. Hist. Nat. Fourmis, p. 427. Type: (*Nomada variegata* Fabricius) = *Apis variegata* Linnaeus. Monob.

Pyrrhomelecta Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 66. Type: *Epeolus glabratus* Cresson. Monob. and orig. desig.

Argyroselenis Robertson, 1903. Canad. Ent. 35, p. 284. Type: *Triepeolus minimus* Robertson. Monob. and orig. desig.

Epeolus Cockerell, 1928. Colo. Univ. Studies 16, pp. 104-107. (key)

This is a quite extensive group of bees, parasitic usually on *Colletes*. It is closely related to *Triepeolus* and resembles that genus in having acutely pointed axillae and in being variously ornamented with appressed pale tomentum. The marginal cell is rather short, its length not exceeding the distance from its tip to the apex of the wing. The maxillary palpi are short, 2-segmented, with a fixed basal segment and one free apical segment. The eyes are strongly convergent below; the cheeks are very narrow, one half or less the width of the eyes; and the antennal scape is short, little more than half as long as distance from the fossa to the anterior ocellus.

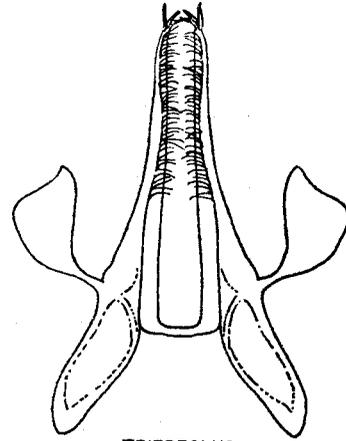
Except for the apical segments of the abdomen and genital structures, species of *Epeolus* are usually monomorphic, with little or no difference between the sexes with respect to size, color, pattern of pubescence and sculpture. The chief differences are as follows:

Females—Antennae 12-segmented; pseudo-pygidium very short or small, covered with very fine and dense, silvery tomentum; sternum 6 composed of a pair of lateral processes connected by a rather broad flattened plate, the apex of each process denticulate. (fig. 108).

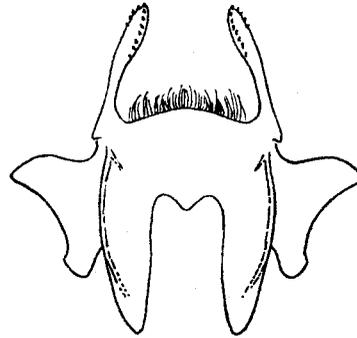
Males—Antennae 13-segmented; face usually more densely tomentose; pygidial plate usually very short, its basal width about equal to the median length; sternum 7 rather broad and flat, constricted near base and slightly expanded apically, apex broadly truncate; sternum 8 cruciform (fig. 109); genital armature as shown.

KEY TO SPECIES**Females**

1. Punctures of pleura below very coarse and well separated 2
- Pleura below closely punctate or rugose,



TRIEPEOLUS



EPEOLUS

Figure 108

Sternum 6 in females of *Epeolus* and *Triepeolus*.

- with only very narrow, intervening spaces 4
2. Abdominal terga not fasciate, 1 and 2 ferruginous, impressed apical third of each black .. *glabratus* Cresson (p. 447) Abdominal terga to some degree fasciate 3
3. Basal abdominal tergum with a broad, yellow, basal fascia, 2 with a similar but narrow apical fascia, abdomen otherwise without fasciae *bifasciatus* Cresson (p. 443) Abdominal terga 1-4 with conspicuous pale fasciae *lectoides* Robertson (p. 451)
- 4(1). Axillae robust, inner margin of each joined to side of scutellum for nearly the entire length, produced only slight-

- ly beyond, but tips fully attaining posterior, transverse line of scutellum . 5
 Axillae either small, or tips conspicuously diverging from sides of scutellum . 9
5. Much of thorax, and usually basal abdominal tergum, bright ferruginous
 floridensis new species (p. 446)
 Scutum, pleura and entire abdomen black 6
6. Slightly larger (10 mm.); axillae shorter, tips not protuberant, entirely black; spurs yellowish
 autumnalis Robertson (p. 442)
 Usually smaller; axillae usually to some degree ferruginous and quite strongly protuberant 7
7. Abdominal fasciae interrupted medially on terga 1-4; scutellum entirely red, not at all impressed medially
 howardi new species (p. 447)
 Abdominal fasciae uninterrupted except possibly on basal tergum; scutellum red or black, usually to some degree impressed or grooved medially 8
8. Pseudopygidium very narrow, its median length nearly equal to its breadth; scutellum black, with only a very slight median impression
 pusillus Cresson (p. 453)
 Pseudopygidium fully twice as broad as its median length; scutellum black or red, usually quite deeply grooved medially *scutellaris* Say (p. 454)
- 9(4). Scutellum largely or entirely red, usually in marked contrast to the generally black scutum 10
 Scutellum black, the axillae either black or red 12
10. Abdominal terga 1 and 2 bright ferruginous; axillae acute, tips widely divergent from sides of scutellum
 zonatus Smith (p. 456)
 Abdomen entirely black dorsally 11
11. Axillae carinate and much thickened laterally, with broad lateral surfaces, tips somewhat compressed; fasciae fulvous, interrupted medially
 carolinus new species (p. 445)
 Axillae carinate laterally, tips more flattened; the whitish fasciae complete
 australis new species (p. 441)
- 12(9). Tips of axillae strongly divergent from sides of scutellum, the free part nearly equalling the basal part bordering the scutellum 13
 Axillae little if any divergent from sides of scutellum, the free part much shorter than the basal portion 16
13. Pleura shining between very coarse, slightly separated punctures
 lectoides Robertson (p. 451)
 Pleura reticulate or closely punctate . . 14
14. Pleura very coarsely reticulate; scutellum more coarsely sculptured than scutum
 erigeronis new species (p. 445)
 Pleura more finely reticulate or closely and finely punctate; scutellum sculptured about as scutum 15
15. Abdominal fasciae narrower, somewhat removed from rims of terga toward mid line, those on 1-3 distinctly interrupted medially
 vernalis new species (p. 455)
 Abdominal fasciae somewhat broader, quite apical in position except at mid line, only slightly interrupted on 1 and 2, complete on 3 and 4
 ilicis new species (p. 448)
- 16(12). Scutum with an anterior, median, semi-circular patch of pale tomentum enclosing a very finely and densely rugose area; basal abdominal tergum with a triangular median black patch enclosed by the yellow, tomentose areas
 canadensis new species (p. 444)
 Scutum usually with a pair of lines or elongate patches of pale tomentum anteriorly, the punctures relatively distinct; basal abdominal tergum usually with a more quadrangular black patch 17
17. Punctures densely crowded and indistinct over lower half of pleura
 minimus Robertson (p. 452)
 Lower half of pleura with distinct punctures which are at least slightly separated 18
18. Front wings with but two submarginal cells
 lanhami new species (p. 450)
 Front wings with the usual three submarginal cells 19
19. Pseudopygidium exceedingly short and obscure, forming the very narrow, declivate, apical margin of tergum 5
 interruptus Robertson (p. 449)
 Pseudopygidium well developed, broadly subtriangular, median length considerable, but strongly narrowed laterally 20
20. Tomentose fasciae of abdominal terga conspicuously broad and complete; mandible without an inner angle or tooth
 australis new species (p. 441)
 Tomentose fasciae usually distinctly interrupted medially; mandible with a distinct, inner, submedian angle or tooth *banksi* Cockerell (p. 442)

Males

1. Punctures of pleura below coarse and well separated, with distinct, shining, intervening spaces 2
Pleura closely punctate below, with only very narrow interspaces evident 4
2. Abdominal terga not fasciate, 1 and 2 ferruginous, the impressed apical third of each black
..... *glabratus* Cresson (p. 447)
Abdominal terga fasciate to some degree 3
3. Basal abdominal tergum with a broad, yellow, basal fascia, tergum 2 with a similar but narrower apical fascia, abdomen otherwise without conspicuous fasciae .. *bifasciatus* Cresson (p. 443)
Abdominal terga 1-4 with conspicuous pale fasciae
..... *lectoides* Robertson (p. 451)
- 4(1). Axillae robust, inner margin of each joined to side of scutellum for nearly the entire length, produced only slightly beyond, but tips fully attaining posterior, transverse line of scutellum .. 5
Axillae either small, or tips conspicuously diverging from sides of scutellum .. 9
5. Much of thorax, and usually basal abdominal tergum, bright ferruginous
..... *floridensis* new species (p. 446)
Scutum, pleura and entire abdomen black 6
6. Slightly larger (10 mm.); axillae shorter, tips not protuberant, entirely black; spurs yellowish
..... *autumnalis* Robertson (p. 442)
Usually smaller; axillae usually to some degree ferruginous and quite strongly protuberant 7
7. Abdominal fasciae interrupted medially on terga 1-4; scutellum entirely red, not at all impressed medially
..... *howardi* new species (p. 447)
Abdominal fasciae uninterrupted except possibly on basal tergum; scutellum red or black, usually to some degree impressed or grooved medially 8
8. Pleura completely covered with silvery tomentum; scutellum black, with only a very slight, median impression
..... *pusillus* Cresson (p. 453)
Lower half of pleura largely bare, exposing the closely punctate or rugose surface; scutellum usually quite deeply grooved medially
..... *scutellaris* Say (p. 454)
- 9(4). Tips of axillae strongly divergent from sides of scutellum, the free part nearly equalling the basal part bordering the scutellum 10
Axillae little if any divergent from sides of scutellum, the free part much shorter than the basal portion 15
10. Abdominal terga 1 and 2 bright ferruginous; axillae acute, tips widely divergent from sides of scutellum
..... *zonatus* Smith (p. 456)
Abdomen entirely black dorsally 11
11. Pleura shining between very coarse, slightly separated punctures
..... *lectoides* Robertson (p. 451)
Pleura reticulate or closely punctate . 12
12. Axillae carinate and much thickened laterally, with broad, lateral surfaces, the tips somewhat compressed; fasciae fulvous, interrupted medially
..... *carolinus* new species (p. 445)
Outer margins of axillae more rounded, if at all thickened; fasciae white or pale ochraceous 13
13. Abdominal fasciae narrow, distinctly interrupted medially and somewhat removed from rims of terga 1-3
..... *weemsi* new species (p. 455)
Abdominal fasciae interrupted only on terga 1 and 2, entire on 3-5, not much removed from apical margins 14
14. Pleura very coarsely reticulate; scutellum more coarsely sculptured than scutum .. *erigeronis* new species (p. 445)
Pleura more finely reticulate; scutellum sculptured about as scutum
..... *ilicis* new species (p. 448)
- 15(9). Scutum with an anterior, median, semicircular patch of pale tomentum; mandible with a distinct, subacute, inner, subapical tooth
..... *canadensis* new species (p. 444)
Scutum usually with a pair of lines or elongate patches of pale tomentum anteriorly 16
16. Punctures densely crowded and indistinct over lower half of pleura 17
Lower half of pleura with distinct punctures which are at least slightly separated 20
17. Pygidial plate narrow and elongate .. 18
Pygidial plate broadly rounded and short, basal width about equal to median length 19
18. Basal segment of flagellum slightly shorter than segment 2, even if measured on its longer side; abdominal tergum 2 with a small amount of yellowish tomentum on each side; antennae, basal

- segments of legs, and spurs dark
 *oswegoensis* new species (p. 453)
 Longer side of basal flagellar segment
 longer than segment 2; tergum 2 broad-
 ly whitish tomentose on each side; an-
 tennae beneath, and legs, largely fer-
 ruginous or testaceous, spurs pale
 yellow *australis* new species (p. 441)
- 19(17). Mandibles with an acute, inner tooth
 which is slightly nearer apex than to
 base; mind and hind legs largely fer-
 ruginous *minimus* Robertson (p. 452)
 Mandible with a more obtuse, submedian,
 inner angle; legs largely dark, only the
 tarsi somewhat reddened
 *banksi* Cockerell (p. 442)
- 20(16). Front wings with but two submar-
 ginal cells
 *lanhami* new species (p. 450)
 Front wings with the usual three sub-
 marginal cells
 *interruptus* Robertson (p. 459)

Epeolus australis new species

(Fig. 110)

FEMALE—Length 7-8 mm.; black, basal segments of antennae, legs, tubercles and tegulae testaceous, segments of flagellum beyond the first more brownish; scutellum in part, and axillae entirely ferruginous, spurs pale yellow; mandibles testaceous at base, becoming piceous apically; lateral ocelli separated from margin of vertex by about their own diameter; cheeks very narrow, about one third width of eye, posterior margin subcarinate, strongly narrowed below; median length of labrum about half the width, with a pair of subapical denticles that are obscured by rather dense, pale pubescence; inner margin of mandibles with a barely perceptible submedian angle; scutellum rounded posteriorly, with a very deep, median excavation or impression (fig. 110); tips of axillae projecting only slightly from sides of scutellum, reaching slightly beyond its mid transverse line; wings with the usual three submarginal cells, hyaline, very faintly clouded apically, veins brownish; most of head covered with short, pale tomentum, quite dense between eyes below ocelli and over clypeus, somewhat thinner on vertex, cheeks and upper part of face; venter of thorax rather thinly white tomentose, not entirely obscuring the surface, upper part of pleura very densely white tomentose; pronotum quite densely whitish tomentose, the tubercles more thinly covered with pale hairs, and with a quite distinct fringe of the same color; scutum with a pair of rather broad and extensive patches of pale tomentum on each side of midline anteriorly, the latero-anterior areas more thinly tomentose, lateral and pos-

terior margins narrowly fringed with the same color; posterior face of propodeum largely covered with white tomentum, the triangular dorsal area relatively bare; metanotum and lower posterior surface of scutellum densely white tomentose; anterior face of basal abdominal tergum densely white tomentose, continuous laterally with a broad, dense, apical, transverse, tomentose band, the resulting median black patch broad and very short, covered with black tomentum, narrowed at each extreme side; terga 2-4 with similar, transverse, apical bands of white tomentum, discs covered with black tomentum, tergum 2 laterally with a basal area of white tomentum produced toward midline for a short distance, tergum 5 with an extensive area of white tomentum on each side, basal area black tomentose, this produced medially to margin of pseudopygidium; tegulae very finely and closely but quite distinctly punctate, the punctures fading out toward posterior margin; vertex, cheeks and upper part of face rather deeply and distinctly but quite coarsely punctate, the punctures becoming minute and densely crowded below, beneath the tomentum; scutum densely and rather finely rugoso-punctate throughout, scutellum and axillae somewhat more coarsely rugoso-punctate; lower portion of pleura rather finely rugoso-punctate, with a few irregular, narrow, shining spaces evident, upper surface densely and finely rugose beneath the tomentum; discs of abdominal terga very finely, closely and quite regularly punctate beneath dense black tomentum, punctures becoming progressively more minute and close toward the apical terga; median length of pseudopygidium about half the apical width.

MALE—Closely resembles female in most characters, but scutellum and axillae usually entirely black; posterior margin of scutellum less deeply grooved; silvery tomentum of face, pleura and venter of thorax more copious and dense; pygidial plate unusually narrow and elongate, median length much longer than the expanded basal width, rather narrowly rounded or subtruncate apically, margin carinate, surface shallowly pitted or punctate.

TYPES — Holotype: Female, Raleigh, N. C., May 19, 1950. Allotype: Southern Pines, N. C., May 12, 1950 (both Mitchell) [author's coll.]. Paratypes: NORTH CAROLINA: 1 ♀, Southern Pines, May 12, 1950; 2 ♀♀, Raleigh, May 19, 1950 (at nest site), and May 9, 1948 (on *Senecio*); 1 ♀, Wake Co., June 9, 1960 (on *Ceanothus*); 1 ♂, Umstead State Park, Wake Co., May 16, 1957 (on *Specularia*); 1 ♂, Aberdeen, May 9, 1958 (on *Rubus*) (all

Mitchell); 1 ♀, Taylor's Bridge, Sampson Co., May 24, 1951 (H. T. Townes); 1 ♂, 1 ♀, Raleigh, April 1 and May 4. GEORGIA: 1 ♂, 1 ♀, Augusta, Richmond Co., April 26, 1959; 1 ♀, Fort Gordon, Richmond Co., May 8, 1958 (both R. R. Snelling).

Paratypes are in collections of R. R. Snelling and the author.

Epeolus autumnalis Robertson

(Fig. 110)

Epeolus autumnalis Robertson, 1902. Ent. News 13, p. 81. ♀.

Epeolus autumnalis Robertson, 1903. Canad. Ent. 35, pp. 287, 288. ♀.

Epeolus autumnalis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9-10 mm.; black, legs testaceous to yellowish in large part, tegulae testaceous, tubercles and mandibles more ferruginous, spurs yellow; lateral ocelli separated from margin of vertex by a space about equal to their diameter; cheeks very narrow, subcarinate posteriorly, becoming still narrower below; labrum nearly as broad as the median length, deeply grooved at apex between a pair of carinae, ending in pronounced tubercles; inner margin of mandible with a distinct, median angle; posterior margin of scutellum broadly and vaguely impressed medially, axillae robust, united with lateral margins of scutellum for nearly their entire length, lateral margins carinate and slightly thickened, tips not exceeding posterior margin of scutellum (fig. 110); wings with the usual three submarginal cells, lightly infuscated, veins brownish-testaceous; face with very fine, pale tomentum below, becoming somewhat more elongate and erect above, quite dense between antennal fossae and margin of eyes; pronotum densely yellow tomentose and tubercles with a marginal fringe of yellow tomentum; scutum with a pair of narrow, longitudinal lines of yellow tomentum anteriorly; metanotum and adjacent border of scutellum densely yellow tomentose, and lateral areas of propodeum above densely tomentose; abdominal tergum 1 densely yellow tomentose basally, this continuous laterally with a transverse, subapical, yellow tomentose fascia which is slightly interrupted medially and slightly removed from margin toward the mid-line, the resulting black patch broad, transverse, slightly narrowed at each extreme side; terga 2-4 with transverse, yellow fasciae which are entire, slightly narrowed medially on 2, and slightly removed from apical rims on 2 and 3,

tergum 5 with a patch of yellow tomentum on each side of pseudopygidium; punctures close, deep and rather coarse on upper part of face, vertex and cheeks, becoming very fine and quite densely crowded on clypeus and lower portions of face below antennae; tegulae closely, deeply and rather finely punctate throughout; scutum, scutellum and axillae rather coarsely rugose, pleura more finely rugoso-punctate above, lower half with definite shining interspaces between the more distinctly separated punctures; discs of abdominal terga quite deeply, finely and closely punctate, the punctures quite uniform, to a considerable degree obscured by dark, appressed tomentum, finer and more densely crowded on tergum 5; pseudopygidium rather extensive, median length about half the apical width.

MALE—Answers quite fully to description of female, but front of face more densely pale tomentose, upper part of pleura quite densely covered with cream-colored tomentum, venter densely covered with silvery tomentum, the femora and hind tibiae darker; pygidium slightly broader at base than the median length, broadly rounded apically, margin carinate, surface rather closely and shallowly pitted.

DISTRIBUTION—Minnesota to Maine, south to North Carolina; September and October.

FLOWER RECORDS—*Aster* and *Haplopappus*. Robertson (1929) records this species on *Bidens*, *Helianthus*, *Rudbeckia* and *Solidago*.

Epeolus banksi (Cockerell)

new combination

(Fig. 110)

Triepeolus banksi Cockerell, 1907. Entomologist 40, p. 135. ♂.

FEMALE—Length 7-10 mm.; black, mandibles ferruginous, tegulae more or less testaceous with dark infusions, tarsi and spurs testaceous, the more basal segments of legs dark; segments of antennal flagellum slightly longer than broad, antennae entirely blackish; lateral ocelli separated from margin of vertex by a space about equal to their diameter; cheeks about half width of eyes, slightly narrowed below, posterior margin subcarinate; median length of labrum considerably greater than half the breadth, with a pair of small, acute, apical denticles; inner margin of mandibles with a distinct, submedian angle or tooth; scutellum outcurved posteriorly, with a very slight median impression, axillae rather broadly united to lateral margins, tips only

slightly protuberant, reaching very slightly beyond mid transverse line of scutellum (fig. 110); wings with the usual three submarginal cells, sub-hyaline basally, becoming lightly infuscated apically, veins brownish-testaceous; face with some quite dense, silvery tomentum around bases of antennae and lower part of face and clypeus, cheeks with some rather short but dense tomentum which does not hide the surface, upper part of face largely bare or with thin erect hairs; venter of thorax with some rather thin, pale tomentum which does not completely hide surface, pleura below largely bare, becoming quite densely tomentose above; margin of pronotum densely whitish tomentose, this continuing as a marginal fringe around tubercles, scutum with a pair of anterior, longitudinal and rather indefinite lines or patches of whitish tomentum on each side of mid-line, and some whitish tomentum at each extreme side anteriorly, the scutello-mesothoracic suture very finely and obscurely whitish tomentose; metanotum and adjacent areas of scutellum densely white tomentose; posterior face of propodeum rather densely white tomentose on each side of median triangle; anterior face of basal abdominal tergum densely white tomentose, apical margin with a dense and rather broad, transverse fascia which is rather widely interrupted medially, produced toward the base at least at each extreme side, but not quite attaining the more basal tomentose area, the resulting black patch more or less quadrangular, very wide, rather densely covered with very fine black tomentum; terga 2-4 with apical, transverse, fasciae which are slightly removed from rims and more or less widely interrupted medially, less so on tergum 4, slightly constricted at each side but broadened to lateral margins; tergum 5 with a broad, latero-apical patch of pale tomentum on each side, these widely separated medially; vertex and upper part of face densely and rather coarsely rugoso-punctate, with no shining interspaces evident, cheeks somewhat more finely rugoso-punctate, the clypeus and lower portions of face with very fine, densely crowded punctures; scutum closely and rather coarsely rugoso-punctate, the punctures somewhat more distinct on each side anteriorly, very densely crowded toward posterior margin, those on scutellum and axillae slightly coarser but densely crowded; punctures of pleura below rather coarse and deep, but slightly separated, with rather narrow shining interspaces evident, becoming densely crowded in tomentose area above; abdominal terga with very fine and close punctures beneath black tomentum, these becoming extremely fine and close on tergum 5; punctures of tegulae deep, distinct, quite close and very fine; pseudo-

pygidium transverse, very broadly subtriangular, its median length equal to about one-third the apical width.

MALE—Agrees with description of female in general but segments of flagellum somewhat shorter; front of face with somewhat more copious silvery tomentum; punctures of pleura below somewhat closer, subcontiguous; tomentose area of venter and pleura more extensive; tergum 5 with a transverse, apical, whitish fascia which is slightly interrupted medially; tergum 6 with a narrow apical fascia; pygidial plate rather broadly rounded, median length about equal to basal width, margin carinate, surface rather closely but shallowly punctate.

DISTRIBUTION—Minnesota to New Jersey and North Carolina; April to October.

FLOWER RECORD—*Fragaria*.

Epeolus bifasciatus Cresson

(Fig. 110)

Epeolus bifasciatus Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 38. ♂.

Epeolus bifasciatus Robertson, 1903. Canad. Ent. 33, pp. 287, 288. ♀ ♂ (key).

Epeolus bifasciatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 7-8 mm.; black, basal segments of antennae testaceous, segments 2 and beyond of flagellum more brownish-piceous; mandibles and labrum more reddish; legs testaceous, hind spurs piceous, mid spurs somewhat darker, the front spurs pale testaceous; pronotum, tubercles, tegulae, scutellum and axillae reddish-testaceous, and disc of basal abdominal tergum more or less red beneath the tomentum; lateral ocelli separated from margin of vertex by a space somewhat greater than their diameter; cheeks very narrow, hind margin carinate, strongly narrowed below; median length of labrum slightly less than basal width, apical tubercles very low and inconspicuous; inner margin of mandibles with a very low and inconspicuous, submedian angle; scutellum rather evenly rounded posteriorly, axillae robust, tips rather strongly divergent from sides of scutellum, lateral margins subcarinate (fig. 110); wings with the usual three submarginal cells, quite deeply infuscated, veins brownish-piceous; pubescence in general very short and inconspicuous, venter of thorax with a small amount of dense, white tomentum along mid-line; pronotum densely covered with bright yellow, appressed

tomentum; disc of basal abdominal tergum largely covered with dense yellow tomentum, and tergum 2 yellow tomentose across the apical impressed area, the more apical terga not fasciate; a dense, transverse band of cream-colored tomentum on metanotum just below scutellum; punctures quite fine and close but deep and quite distinct on head, densely crowded between lateral ocelli and top of each eye, but with a conspicuous, impunctate elevation just below this, adjacent to eye margin; pleural punctures very coarse, deep and well separated or sparse below, becoming quite close above, those on scutum quite regularly distributed, coarse and close, becoming somewhat coarser posteriorly, those on scutellum very coarse but rather shallow, as those on axillae; punctures of abdominal terga rather fine but very close, deep and distinct, becoming somewhat finer on impressed, apical areas, tegulae with very fine, close punctures along inner side, these disappearing toward outer margin; pseudopygidium very short but quite broad across apical margin of tergum 5.

MALE—Resembles female in all respects other than the sexual differences. The pygidium is rather broadly sub-truncate, quite coarsely and closely punctate, the margin carinate.

DISTRIBUTION — Northern Mexico, Colorado and Minnesota, to the New England states and Florida; February to April in Florida, June to September in the North.

FLOWER RECORDS — *Asclepias*, *Cirsium*, *Coreopsis*, *Erigeron*, *Helianthus*, *Melilotus*, *Nepeta*, *Rudbeckia* and *Vernonia*. Robertson (1929) records *bifasciatus* also on *Aster*, *Bidens*, *Boltonia*, *Dianthera*, *Eryngium*, *Eupatorium*, *Heliopsis*, *Lepachys*, *Lythrum*, *Petalostemum*, *Pycnanthemum*, *Solidago*, *Trifolium*, *Verbena* and *Verbesina*.

HOST—Probably *Colletes latitarsis*.

Epeolus canadensis new species
(Fig. 110)

FEMALE—Length 9 mm.; black, basal segments of antennae, mandibles, tubercles, tegulae, tibiae and tarsi brownish-testaceous, spurs yellow and femora dark, segments of flagellum beyond segment 1 slightly longer than broad, piceous in color; space separating lateral ocelli from margin of vertex about equal to their diameter; cheeks about half width of eyes,

posterior margin sub-carinate, rather strongly narrowed below; median length of labrum somewhat greater than half the breadth, tip excavated medially between a pair of apical denticles; inner margin of mandible with a distinct, subapical tooth; scutellum somewhat outcurved, rather deeply impressed medially (fig. 110); axillae joined quite broadly to sides of scutellum, tips only slightly protuberant, reaching a point slightly beyond its mid transverse line; wings with the usual three sub-marginal cells, lightly infuscated, somewhat darker in region of marginal cell and apex, veins brownish-testaceous; face rather densely whitish tomentose around bases of antennae and toward eyes, hairs on upper part of face and vertex more elongate and erect, cheeks with very short, sparse, white pubescence; venter of thorax rather densely white tomentose, pleura below bare but becoming quite densely pale tomentose above, margin of pronotum densely pale tomentose, and tubercles with a fringe of the same color; scutum with a semicircular patch of pale tomentum enclosing a median, anterior triangular area which is more finely and densely rugoso-punctate than remainder of disc, the scutello-meso-thoracic suture with a conspicuous fringe of yellowish tomentum; metanotum densely tomentose on each side, rather widely interrupted medially, and corresponding surfaces of scutellum above also tomentose; anterior face of basal, abdominal tergum densely pale yellowish tomentose, this broadly continuous with an apical, tomentose fascia, the resulting black tomentose patch triangular in form, apical band rather widely interrupted medially; terga 2-4 with apical, yellow, tomentose fasciae slightly separated from apical rims which are yellowish-hyaline, the fascia slightly interrupted on 2, discs covered with extremely short, black tomentum, tergum 5 with a transverse, broad, tomentose band which encloses the pseudopygidium; punctures coarse, deep, distinct and quite close on upper part of face just below ocelli, becoming finely and densely rugose back of ocelli and eyes, cheeks with more distinct but very close and deep punctures, lower portion of face and clypeus very finely and closely punctate; scutum rather coarsely rugoso-punctate, axillae with similar close punctures, those on scutellum somewhat more coarse and distinct; lower half of pleura with rather irregular but distinct punctures, with a few shining interspaces evident, becoming densely rugose over upper half; abdominal terga with very fine, close, evenly distributed punctures obscured by black tomentum, these becoming still finer and densely crowded on the more apical terga; pseudopygidium transverse, very short, median length less than half

the apical width; tegulae uniformly, closely, very finely and deeply punctate.

MALE—Agrees generally with description of female, but front of face more densely silvery tomentose; segments of flagellum no longer than broad, somewhat redder in color; silvery tomentum of venter of thorax somewhat more extensive; and pygidial plate somewhat broader than its median length, the margin carinate, and surface very shallowly punctate.

TYPES — Holotype: Female, Ingonish, Cape Breton Island, Nova Scotia, Aug. 7, 1928 [M.C.Z.]. Allotype: 9-Mile Creek, Ithaca, N. Y., July 10, 1937 (P. P. Babi) [Cornell Univ.]. Paratypes: 1 ♂, Gode-rich, Ont., June 28, 1906; 1 ♀, St. Annes, Que., July 21, 1931; 1 ♀, Cheboygan Co., Douglas Lake, Mich., Aug. 1928; 1 ♀, Clark Co., Ind., State Forest, Aug. 12, 1950.

Paratypes are in collections of the U. S. National Museum, Purdue University, the University of Michigan and T. H. Hubbell.

Epeolus carolinus new species

(Fig. 110)

FEMALE—Length 7-8 mm.; black, basal segments of antennae, mandibles, and legs in large part, tubercles, tegulae and margin of pronotum, testaceous; mid and hind spurs more piceous; scutellum and axillae more ferruginous; lateral ocelli separated from margin of vertex by about their own diameter; segments of flagellum quite elongate, breadth of median segments only slightly more than half the length, brownish-piceous; cheeks about half width of eyes, somewhat narrower below, hind margin subcarinate; median length of labrum somewhat more than half the breadth, with a pair of low but distinct, sub-apical denticles; mandibles very slender, with a barely perceptible, submedian angle on inner margin; posterior margin of scutellum nearly straight, not noticeably impressed (fig. 110); axillae strongly divergent from lateral margins of scutellum, acute apically, strongly carinate laterally, resulting in a distinct lateral surface that is more or less compressed; wings with the usual three sub-marginal cells, rather deeply infuscated, veins brownish-piceous; face around antennae rather densely silvery tomentose, and venter of thorax with considerable silvery tomentum, this fading out on lateral surfaces of pleura; margin of pronotum quite densely yellow tomentose, and tubercles fringed with short yellow tomentum; metanotum yellow tomentose beneath the rather strongly over-hanging

scutellum; abdominal terga 1-4 with transverse, dense, yellow tomentose fasciae, these more or less interrupted medially, quite broad on tergum 1, becoming successively narrower on 2, 3 and 4, tergum 5 with an area on each side of thin whitish and rather obscure tomentum; vertex, cheeks and upper part of face quite closely and rather coarsely rugoso-punctate, becoming very densely and minutely punctate below; pleura rather coarsely rugoso-punctate below, with some irregular, narrow, shining spaces evident, becoming densely rugose above; scutum rather coarsely and densely rugose, scutellum more coarsely rugoso-punctate, with no intervening spaces evident; tegulae very finely and closely but quite distinctly punctate throughout; abdominal terga with very fine and close, uniformly distributed punctures, these becoming slightly more minute and crowded on the more apical terga; pseudopygidium very short and obscure, median length but a fraction of the apical width.

MALE—Answers to description of female in general, but segments of antennal flagellum scarcely longer than broad, venter of thorax more densely silvery tomentose, and pleura with a thin covering of whitish, plumose hairs; scutellum and axillae often black; pygidial plate rather narrow, narrowly rounded apically, median length somewhat greater than basal width, margin carinate, surface very shallowly and obscurely punctate.

TYPES — Holotype: Male, Kill Devil Hills, Dare Co., N. C., Sept. 12, 1956 (Mitchell, on *Eupatorium*) [author's coll.]. Allotype: New River, N. C., Sept. 20-30, 1944 (G. E. Bohart). Paratypes: 3 ♂♂, 3 ♀♀, New River, N. C., Sept. 20-30, 1944 (Bohart); 13 ♂♂, Kill Devil Hills, N. C., Sept. 12 & 13, 1956 (Mitchell, on *Eupatorium*); 5 ♂♂, Kill Devil Hills, N. C., Sept. 8-14, 1956 (Krombein); 1 ♀, Gainesville, Fla., 11-6-46 (H. V. Weems, Jr.).

Paratypes are in collections of the U. S. National Museum, G. E. Bohart, the State Plant Board of Florida and the author.

Epeolus erigeronis new species

(Fig. 110)

FEMALE—Length 8-9 mm.; black, legs and tegulae testaceous, spurs yellow, tubercles more or less testaceous, mandibles more ferruginous except at tip, and basal segment of flagellum, along with base and apex of the scape, brownish-testaceous, flagellum otherwise more piceous; lateral ocelli separated from margin of vertex by about their own di-

ameter, cheeks about half width of eyes, posterior margin carinate; median length of labrum somewhat greater than half the width, more or less ferruginous, with a pair of obscure, subapical tubercles; inner margin of mandible nearly entire, without a distinct angle or tooth; posterior margin of scutellum nearly straight, not evidently grooved medially (fig. 110); axillae strongly divergent from sides of scutellum, the acute tips reaching about to its mid transverse line, lateral margins obscurely carinate, with a resulting, quite distinct, lateral surface which is rather narrow; wings with the usual three submarginal cells, sub-hyaline basally, becoming rather deeply infuscated apically, veins brownish-piceous; face around and below antennae rather densely white tomentose, cheeks somewhat more thinly so, and vertex entirely exposed, with only very fine, suberect hairs; venter of thorax rather thinly white tomentose, not obscuring surface, pleura below exposed, becoming rather densely tomentose above; margin of pronotum rather thinly white tomentose, and tubercles with a marginal fringe; scutum with a pair of obscure, anterior, longitudinal lines on each side of midline, and scutellomesothoracic suture thinly tomentose; metanotum densely white tomentose beneath the thinly tomentose, slightly overhanging scutellum; posterior face of propodeum densely white tomentose at each extreme side; anterior face of basal abdominal tergum densely white tomentose, this narrowly continuous with an apical tomentose fascia which is narrowly interrupted medially and slightly removed from apical rim, the resulting black patch transverse, very wide, the black tomentose hairs very short and inconspicuous; terga 2-4 with apical, whitish, tomentose fasciae, this slightly interrupted on 2, and lateral portion of disc on tergum 2 with a white tomentose patch, tergum 5 with a thinly white tomentose area on each side; tegulae very closely, finely, deeply and regularly punctate throughout; punctures of vertex, cheeks and upper part of face quite deep and distinct, close along vertex, back of eyes and ocelli, becoming somewhat more distinctly separated below, but very minute and densely crowded below antennae; scutum quite coarsely rugosopunctate, with some very narrow, indefinite, shining interspaces; scutellum and axillae much more coarsely reticulate; pleura coarsely reticulate below, becoming somewhat more finely and densely rugose above; punctures of abdominal terga very fine, uniform, rather close but not contiguous on the more basal terga, becoming more minute and almost crowded on the more apical terga; pseudopygidium quite extensive, median length considerably greater than half the width.

MALE—Agrees in general with description of female, but wing veins are more yellowish and venter of the thorax is more densely silvery tomentose; pygidial plate somewhat longer than basal width, rather narrowly rounded, margin carinate, surface rather smooth, with scattered, suberect hairs.

TYPES—Holotype: Female, Levy Co., Fla., Apr. 13, 1955. Allotype: topotypical (both H. V. Weems, Jr., on *Erigeron quercifolius*). Paratypes: FLORIDA: 3 ♀♀, topotypical; 1 ♀, Alachua Co., Apr. 15, 1955 (on *Melilotus alba*); 2 ♀♀, Marion Co., Apr. 6, 1956 (on *Erigeron quercifolius*); 1 ♂, Osceola National Forest, Columbia Co., Apr. 19, 1954 (all H. V. Weems, Jr.); 1 ♂, Baker Co., May 27, 1937 (O. D. Link); 1 ♂, Olga, Mar. 30, 1954 (K. V. Krombein, on sand flats); 1 ♀, Highlands Hammock State Park, Apr. 7, 1955 (Mitchell); 1 ♀, LaBelle, Apr. 18 (J. N. Knull). GEORGIA: 1 ♂, 2 ♀♀, Billy's Island, Okefenokee Swamp, June 1912; 1 ♀, Fort Gordon, Richmond Co., June 8, 1958 (R. R. Snelling). NORTH CAROLINA: 1 ♀, Southport, June 24, 1928 (Mitchell, on *Hypericum*); 1 ♂, Wake Co., June 16, 1955 (H. V. Weems, Jr.); 1 ♂, Highlands, Macon Co., July 23, 1955 (Mitchell).

Paratypes are in collections of the State Plant Board of Florida, the U. S. National Museum, Cornell University, R. R. Snelling and the author.

Epeolus floridensis new species

(Fig. 110)

FEMALE—Length 8 mm.; head chiefly black, antennae pale testaceous, labrum and mandibles more ferruginous, and clypeus somewhat infused with ferruginous; thorax ferruginous in large part, but venter blackened and propodeum entirely black; basal abdominal tergum ferruginous, following terga largely black, but more or less reddish-hyaline along apical margins; space separating lateral ocelli from margin of vertex considerably less than their diameter; cheeks extremely narrow, posterior margin subcarinate; median length of labrum only slightly less than basal width, subapical denticles small but quite distinct; mandibles simple, inner margin nearly straight; posterior margin of scutellum nearly straight, axillae robust, tips acute and extended considerably beyond margin of scutellum (fig. 110); wings with the usual three submarginal cells, subhyaline, faintly clouded apically, veins piceous; cheeks

and face around and below antennae densely silvery tomentose; venter of thorax quite densely tomentose, this becoming rather thin on pleura above, pronotum with a narrow but quite dense covering of white tomentum, scutum with a pair of narrow, anterior, longitudinal lines of white tomentum on each side of midline, and metanotum densely white tomentose below scutellum; basal abdominal tergum with a basal, densely white tomentose area, and terga 1-4 with dense, white, apical, tomentose fasciae which are rather widely interrupted medially, these slightly separated from hind margin of terga toward midline, tergum 5 with an area of rather thin white tomentum on each side; punctures quite deep and distinct but rather close in general, coarse and rather close on upper part of face, becoming minute and densely crowded below antennae, slightly separated on pleura below, becoming more or less crowded above, close and rather coarse over most of scutum, becoming crowded posteriorly and crowded on scutellum and axillae; tegulae minutely and very closely punctate; punctures fine and rather close and evenly distributed on discs of the more basal abdominal terga, becoming finer on the slightly depressed apical margins, but extending nearly to the yellowish rims, minute and close over most of tergum 5; pseudopygidium quite small and narrow, median length almost equal to apical width.

MALE—This sex agrees in most respects with description of female, but front of the face is more densely silvery tomentose, and usually there is a shining impunctate area near top of each eye on inner margin; pygidial plate rather broadly rounded, margin carinate, surface very obscurely and shallowly punctate.

TYPES—Holotype: Female, Arcadia, Desoto Co., Fla., Apr. 27, 1955. Allotype: topotypical (both M. A. & H. E. Evans) [Cornell University]. Paratypes: FLORIDA: 5 ♀♀, 4 ♂♂, topotypical; 1 ♀, 4 ♂♂, Levy Co., July 13, 1954 (H. V. Weems, Jr., on *Eriogonum tomentosum*). [Fla. Plant Board].

Epeolus glabratus Cresson
(Fig. 110)

Epeolus glabratus Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 90. ♂.

FEMALE—Length 8 mm.; black, antennae and legs testaceous, labrum, mandibles, pronotum, tubercles, tegulae, scutellum, axillae, and discs of abdominal terga 1 and 2 more ferruginous; lateral ocelli separated from

margin of vertex by about their own diameter; cheeks very narrow, less than half width of eyes, hind margin subcarinate; median length of labrum subequal to breadth, with a pair of small, subapical denticles; inner margin of mandibles nearly straight, neither dentate nor angulate; posterior margin of scutellum slightly impressed medially (fig. 110); axillae acute, strongly divergent from sides of scutellum apically, lateral surface separated from dorsal surface by a distinct carina; wings with the usual three submarginal cells, strongly infuscated, veins piceous; pubescence in general very short and inconspicuous, sub-appressed, rather dense between antennae and eyes, and back of wing bases; thoracic sternum densely white tomentose; punctures coarse, deep and irregular over most of head and thorax, becoming very fine and close on face below antennae, well separated across upper part of face just below ocelli, rather fine and close on cheeks, fine and densely crowded on pronotum, coarse and well separated on pleura, but becoming somewhat more finely rugose just below wing bases; tegulae very finely and rather closely punctate; scutum with a pair of anterior, longitudinal, shallow grooves on each side of midline, the punctures between these somewhat finer than on each side where they are somewhat more widely or definitely separated, becoming quite close across posterior margin, those on scutellum somewhat coarser and very close; punctures on ferruginous discs of abdominal terga 1 and 2 deep, distinct and well separated but not sparse, the depressed apical margins blackened and very minutely and closely punctate, the punctures obscured by fine, dense and dark, appressed tomentum, punctures of the more apical terga finer and closer; pseudopygidium quite extensive, median length nearly equalling apical width.

MALE—This agrees with the female in most characters, but mandibles are slightly angulate on inner margin. The pygidium is rather broadly rounded, median length about equal to basal width, with a distinct marginal carina.

DISTRIBUTION—Georgia and Florida; March to July.

FLOWER RECORD—*Vicia*.

Epeolus howardi new species
(Fig. 110)

FEMALE—Length 9 mm.; black, antennal bases, labrum, mandibles, legs and tegulae testaceous, flagella somewhat more brownish, mid and hind spurs somewhat darker; upper half of pleura, lateral margins of scutum, and

entire scutellum and axillae more ferruginous; lateral ocelli nearly contiguous with margin of vertex; cheeks extremely narrow, eyes in lateral view being four or five times as broad; labrum nearly twice as broad as the median length, shallowly grooved medially toward apex, with a pair of very minute, apical denticles on each side of this groove; inner margin of mandibles with a very slight median angle; posterior margin of scutellum straight, much exceeded by the extensive, triangular axillae (fig. 110); wings with the usual three submarginal cells, subhyaline basally, becoming lightly infuscated apically, veins piceous; face around base of antennae and venter of thorax densely silvery tomentose, cheeks rather densely covered with very short pale tomentum; margin of pronotum and tubercles, a pair of narrow, longitudinal, anterior lines on scutum, and metanotum, densely yellow tomentose, the lateral margins of posterior face of propodeum quite densely tomentose, with upper portion of pleura very thinly yellow tomentose; abdominal terga 1-4 with dense, yellow, apical, tomentose fasciae, these slightly interrupted at midline and slightly broader toward this interruption on 2-4, basal tergum yellow tomentose across base, median black patch of disc reaching very nearly to each extreme side, tergum 5 with a small patch of more silvery tomentum on each side of pseudopygidium; tegulae very minutely and quite closely punctate over median and posterior portions; face below ocelli shining, punctures distinctly separated and rather coarse and deep across median area, becoming sparse at margins of eyes, lower part of face and cheeks becoming very minutely and closely punctate; scutum rather finely and densely rugoso-punctate medially and across posterior half, punctures more distinct on each side anteriorly; scutellum and axillae somewhat more coarsely rugoso-punctate; pleura below with distinctly but not widely separated punctures, interspaces somewhat wider than diameter of punctures, becoming close on pleura above; punctures of abdominal terga minute and rather close, somewhat obscured by very short, dark and rather inconspicuous tomentum, punctures of the more apical segments more distinct but minute and very close; pseudopygidium rather narrow, median length nearly equal to apical width.

MALE—This answers in general to description of female, but front of face is more densely silvery tomentose, with lateral areas just below ocelli, adjacent to eyes, shining, impunctate and slightly swollen, punctures limited to the rather narrow, median area; tomentum of pleura somewhat more dense, obscuring surface; pygidium sub-triangular, with rather broadly rounded apex, margin

carinate, surface quite smooth, with some very fine, suberect hairs.

TYPES—Holotype: Female, Southern Pines, N. C., Sept. 30, 1951. Allotype: topotypical, Sept. 15, 1949 (on *Kuhnistera pinnata*) (both Mitchell).

HOST—It is suspected that *Colletes howardi* is the host of this species.

Epeolus ilicis new species

(Fig. 110)

FEMALE—Length 8-9 mm.; black, basal segments of antennae, legs, tegulae and tubercles testaceous; segments of flagellum beyond the first more brownish, mandibles reddish-testaceous, axillae ferruginous, and spurs yellowish-ferruginous; lateral ocelli separated from margin of vertex by a space about equal to their diameter; cheeks about half width of eyes, posterior margin sub-carinate; median length of labrum slightly more than half the basal width, with an obscure, subapical pair of denticles; inner margin of mandibles entire, neither dentate nor angulate; posterior margin of scutellum nearly straight, with a very narrow and obscure median impression (fig. 110); axillae rather small, widely divergent from sides of scutellum, tips barely reaching a line drawn through basal third of scutellum; wings with the usual three submarginal cells, subhyaline basally, becoming faintly clouded apically, veins pale testaceous to brownish; face with some dense, pale tomentum around bases of antennae and along sides of face, the clypeus, vertex and upper part of face largely exposed, cheeks rather thinly tomentose; venter of thorax rather thinly white tomentose, pleura below nearly bare, becoming rather densely tomentose over upper half, margin of pronotum narrowly pale yellowish tomentose, the fringe continuous around tubercles; scutum with a pair of narrow, longitudinal lines of yellowish tomentum on each side of midline anteriorly and a narrow fringe of the same color at each extreme side and across the scutello-mesothoracic suture; metanotum densely white tomentose beneath the somewhat overhanging scutellum and reaching the extreme lateral margins of posterior face of propodeum; basal abdominal tergum with a triangular, tomentose area on each side toward the anterior face, which is continuous with a transverse, apical, whitish fascia which is slightly interrupted medially, the resulting black patch very broad, strongly narrowed toward each extreme side; terga 2-4 with apical tomentose fasciae, that on 2 slightly interrupted medially, and 5 with a limited area of pale tomentum on each side

of pseudopygidium; punctures of vertex, cheeks and upper part of face quite deep and distinct, rather close except for the area just below ocelli, becoming very fine and densely crowded below antennae and over clypeus; pleura below rather coarsely rugoso-punctate, with some shining but narrow intervening spaces evident, upper part very densely and rather finely rugose; scutum rather finely rugose throughout, somewhat more coarsely so toward anterior margin, scutellum somewhat more coarsely and densely rugose, axillae very finely so; punctures of discs of abdominal terga very fine, evenly distributed, rather close but not crowded on the more basal terga, becoming progressively finer and closer to tergum 5; median length of pseudopygidium much greater than half the apical width.

MALE—This sex agrees in general with description of female, but antennae darker, quite black at base, and axillae black, with femora and coxae of hind legs dark; scutum somewhat more distinctly but still very closely punctate; pygidial plate as broad as the median length, rather narrowly rounded apically, margin carinate, surface rather smooth, with only very obscure, minute punctures and suberect, short pubescence.

TYPES—Holotype: Female, Holly Shelter, Pender Co., N. C., May 30, 1950 (T. B. Mitchell, on *Ilex glabra*). Allotype: topotypical [both author's coll.]. Paratypes: **NORTH CAROLINA**: 2 ♀♀, topotypical; 3 ♀♀, Holly Shelter, June 8, 1950 (1 ♀ on *Amorpha*); 1 ♂, Whiteside Mt., Macon Co., June 11, 1937; 1 ♀, Southern Pines, May 12, 1950; 1 ♀, Wayne Co., May 23, 1950 (on *Batodendron*); 1 ♀, Wake Co., June 16, 1955 (on *Rhus glabra*); 1 ♀, Carolina Beach, New Hanover Co., May 19, 1934 (all Mitchell); 1 ♀, Candler, July 15, 1938 (D. L. Wray). **GEORGIA**: 2 ♀♀, Indian Grave Gap, July 11, 1951 (P. W. Fattig); 1 ♀, 2 ♂♂, Fort Gordan, May 8, 1958 and Apr. 25, 1959 (R. R. Snelling). **TENNESSEE**: 1 ♀, Pine Heath, Gatlinburg, GSMNP, 3500 ft., July 8, 1947 (R. H. Whittaker, sweeping). **SOUTH CAROLINA**: 1 ♀, Dewees Is., May 29 (J. Bequaert); 3 ♂♂, McClellanville, May 10, 12 & 19 (H. & G. Townes). **RHODE ISLAND**: 1 ♂, Kingston, June 29, 1921. **MASSACHUSETTS**: 1 ♀, Sagamore (J. Bequaert). **NEW YORK**: 1 ♀, Orient, L. I., June 1, 1952 (Roy Latham).

Paratypes are in collections of the U. S. National Museum, the Museum of Comparative Zoology, R. R. Snelling, the North

Carolina Department of Agriculture, the University of Rhode Island and the author.

Epeolus interruptus Robertson

(Figs. 109 & 110)

Epeolus interruptus Robertson, 1900. Acad. Sci. St. Louis. Trans. 10, p. 55. ♀.

Epeolus interruptus Robertson, 1903. Canad. Ent. 33, pp. 287, 288, ♀ ♂ (key).

Epeolus interruptus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8 mm.; black, basal segments of antennae, mandibles, tubercles, tegulae, and legs, in large part testaceous; segments of flagellum beyond the first slightly longer than broad, more brownish below, piceous above; lateral ocelli separated from margin of vertex by a space slightly greater than their diameter; cheeks about half width of eyes, posterior margin obscurely carinate below, rounded above; median length of labrum about half the breadth, with a pair of very minute, apical denticles, with a low submedian transverse ridge which is slightly interrupted medially; inner margin of mandible with a distinct, subapical angle or tooth; scutellum somewhat outcurved, with a rather deep median impression, axillae broadly united to lateral margins, only very slightly protuberant, tips hardly reaching mid transverse line of scutellum (fig. 110); wings with the usual three submarginal cells, lightly infuscated, veins brownish-testaceous; face with some dense, whitish tomentum around bases of antennae, but clypeus and other areas of head largely bare; venter of thorax with some dense, white tomentum, but lateral surfaces of pleura largely bare below, upper part quite densely whitish tomentose; margin of pronotum quite densely pale yellowish tomentose, continuing as a fringe of short hairs around tubercles; scutum with a pair of very narrow, longitudinal lines of yellowish tomentum on each side of mid-line anteriorly, the scutello-mesothracic suture very narrowly yellowish tomentose; metanotum with a rather dense tuft of pale tomentum near mid-line, bare on each side, adjacent margin of scutellum narrowly whitish fasciate from one extreme side to the other, lateral, dorsal areas of posterior face of propodeum with a dense, whitish tomentose patch; anterior face of basal abdominal tergum with a triangular, yellowish, tomentose patch on each side, this distinctly separated from an apical tomentose fascia which is rather widely interrupted medially and quite strongly constricted on each side, becoming broadened laterally, the resulting

dark patch more or less triangular, covered with thin but dense black tomentum; terga 2-4 with apical tomentose fasciae which are interrupted medially, slightly constricted on each side and broadened again toward extreme lateral margins, slightly separated from rims; tergum 5 with a rather large patch of whitish tomentum on each side toward apical margin; punctures of head deep and distinct, rather close in general but somewhat separated and rather coarse below antennae toward eyes, becoming closer on vertex and cheeks, fine and distinct on clypeus, more minute on lateral areas of face below; scutum and scutellum rather uniformly densely rugoso-punctate throughout, punctures of axillae somewhat more coarse and distinct; pleura very densely rugose above, with rather coarse punctures over lower half which are to some degree separated, interspaces shining; discs of abdominal terga very finely, closely and uniformly punctate throughout; tegulae very finely, closely and distinctly punctate anteriorly, punctures becoming more minute and obscure posteriorly; pseudopygidium transverse and extremely short, barely evident.

MALE—Agrees with description of female in general, but segments of flagellum slightly broader than long, tegulae more fully punctate posteriorly, thoracic punctures in general somewhat coarser; pygidial plate about as long as basal width, marginal carina distinct, broadly rounded apically, surface with rather obscure but close punctures, bearing suberect, short hairs.

DISTRIBUTION — Texas, Illinois and Michigan to Georgia and New Jersey; April to July.

FLOWER RECORDS—*Chrysanthemum* and *Trifolium*. Recorded by Robertson (1929) on *Coreopsis*, *Krigia*, *Psoralea* and *Rudbeckia*.

Epeolus lanhami new species

(Fig. 110)

FEMALE—Length 7-9 mm.; black, mandibles ferruginous except for the darkened base and apex, tegulae bright testaceous, tarsi brownish-testaceous, tibiae testaceous, with varying amounts of black infusion, spurs piceous to black and femora black; lateral ocelli separated from margin of vertex by about their own diameter; cheeks about half width of eyes, posterior margin obscurely carinate below, but more rounded above; median length of labrum about half the breadth, with a pair of rather obscure, subapical denticles; inner margin of mandible with a distinct subapical tooth; scutellum rather strongly out-curved, broadly impressed medially, axillae broadly united to sides of scutellum, but very short, tips only very slightly protuberant, not attaining mid transverse line of scutellum (fig. 110); wings with but two submarginal cells, second receiving both recurrent veins, subhyaline basally, becoming very lightly infuscated apically, veins brownish-testaceous; pubescence greyish-white, very thin and inconspicuous over most of head; margin of pronotum rather densely tomentose on each side, marginal fringe of tubercles extremely short and inconspicuous; scutum with a pair of longitudinal, narrow lines of pale tomentum anteriorly on each side of midline, and antero-lateral angles of plate rather densely

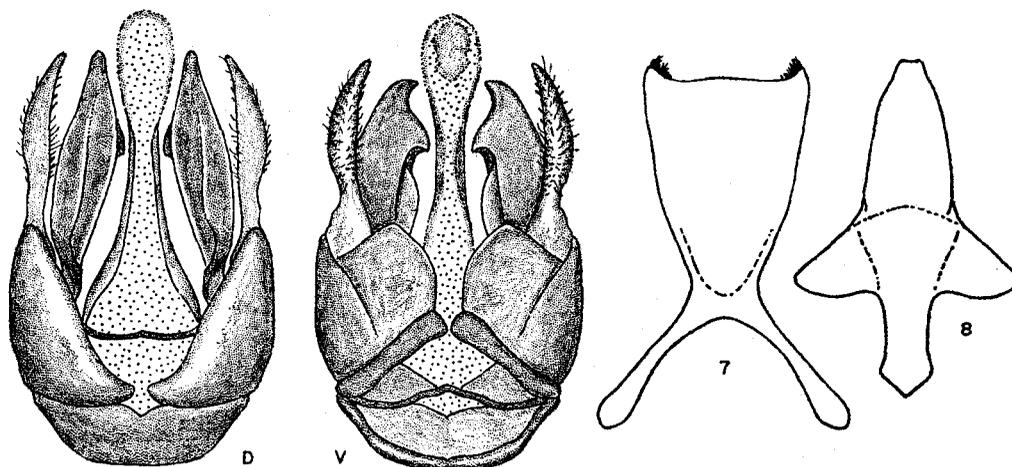


Figure 109—Sterna 7 and 8, and dorsal and ventral views of genital armature in male of *Epeolus interruptus*

pale tomentose, the scutello-mesothoracic suture with a thin pale fringe; metanotum nearly bare but adjacent margin of scutellum rather densely tomentose, especially on each side; pleura and venter of thorax nearly bare; basal abdominal tergum densely whitish tomentose across anterior face, broadly joining the apical fascia which is broadly interrupted medially, the resulting dark patch rather limited in area, thinly covered with dark tomentum; tergum 2 with an apical pale fascia which is interrupted medially and diverging from posterior rim; terga 3 and 4 with quite broad, apical fasciae which do not reach lateral margins and are slightly interrupted medially, each one more or less ovate in form, tergum 3 with a small, whitish patch on each extreme side that is separated from the fascia; tergum 5 without pale tomentum; punctures of tegulae deep and distinct, very close and fine throughout; punctures deep, distinct, close and rather coarse over vertex, cheeks and upper part of face, becoming very fine and close below antennae and over clypeus; scutum, scutellum and axillae quite deeply, distinctly, rather coarsely and very closely punctate throughout, punctures becoming contiguous laterally and posteriorly; punctures of lower portion of pleura deep, distinct, rather coarse, quite close, with only very narrow, shining interspaces at all evident, becoming densely crowded above; punctures of abdominal terga very fine, quite close, evenly distributed, becoming somewhat more crowded on the more apical terga; pseudopygidium transverse and very short.

MALE—Answers to description of female in general, but tegulae dark and tarsi more or less darkened; head without appressed tomentum, the pubescence thin but rather copious and erect; abdominal fasciae more nearly complete on terga 3 and 4, quite strongly narrowed toward each side but not interrupted, tergum 5 with a short, subapical fascia on each side of midline which does not continue to lateral margin; pygidial plate rather short, broadly rounded or subtruncate, the marginal carina obscure, surface somewhat convex and rather coarsely but shallowly punctate.

TYPES—Holotype: Female, near Salsline, Mich., June 26, 1954. Allotype: topotypical (both U. N. Lanham). Paratypes: 1 ♂, Kalbaska Co., Mich., June 19, 1944; 1 ♀, Midland Co., Mich., June 24, 1944 (both R. R. Dreisbach); 1 ♀, Me. Agr. Exp. Sta., Oreno, Me., June 26, 1929; 1 ♀, Inglenook, Pa., June 27, 1923 (H. B. Kirk).

Paratypes are in collections of the U. S. National Museum and R. R. Dreisbach.

Epeolus lectoides Robertson

(Fig. 110)

Epeolus lectoides Robertson, 1901. Canad. Ent. 33, p. 231. ♀.

Epeolus lectoides Robertson, 1903. Canad. Ent. 35, pp. 287, 288. ♀ ♂ (key).

Epeolus semilectus Cockerell, 1907. Entomologist 40, p. 136. ♂. New synonymy.

Epeolus lectoides Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8-10 mm.; black, scape and basal segment of flagellum more testaceous, antennae otherwise brownish-piceous; mandibles and tubercles more or less reddened, tegulae and legs testaceous, axillae sometimes reddened; lateral ocelli separated from margin of vertex by about their own diameter; cheeks very narrow, subcarinate posteriorly; labrum considerably broader than median length, the subapical tubercles quite distinct; mandibles simple, inner margin not angulate; scutellum quite deeply impressed medially on posterior margin (fig. 110), axillae robust, acute, tips strongly divergent from sides of scutellum, subcarinate laterally; wings with the usual three submarginal cells, hyaline basally, becoming rather deeply infuscated apically, veins brownish; pubescence very short, either very thin or appressed, front of face densely silvery tomentose, and venter of thorax covered with dense, silvery tomentum, the scale-like hairs becoming sparse on pleura above; pronotum quite densely covered with pale yellowish tomentum, scutum with a pair of anterior, longitudinal patches of yellowish tomentum on each side of midline; abdominal terga 1-4 with transverse, subapical, pale yellowish fasciae that are narrowly interrupted medially, that on tergum 1 rather broad but quite narrow, somewhat separated from margin of plate on 2-4, 5 with a broad patch of dense, greyish tomentum on each side; punctures quite deep and distinct in general, rather sparse between ocelli and eyes and below ocelli, becoming fine and close on lower portion of face and on cheeks; punctures deep and distinct, quite sparse or well separated on pleura below, becoming rather close above, rather close along mid-line of scutum but becoming quite sparse on each side, scutum quite deeply impressed medially on posterior margin, punctures coarse and subcontiguous, those on axillae coarse and irregular; tegulae very finely and rather closely punctate; punctures of the more basal abdominal terga rather fine but quite deep and distinct, slightly separated in general, but variable, usually bearing very short, dark, plumose setae, apical margins of the terga

slightly and rather broadly depressed, becoming yellowish-hyaline along rims, punctures fading out apically, those on tergum 5 minute and very close; pseudopygidium quite extensive, median length much more than half its apical width.

MALE—Agrees in most respects with description of female, but pygidium broadly rounded, median length about equal to basal width, surface rather smooth and only very obscurely punctate.

DISTRIBUTION—Illinois to the New England states, south to Georgia; June to September.

FLOWER RECORDS—*Ceanothus*, *Cephalanthus*, *Helenium*, *Hypericum* and *Rhus*. Recorded by Robertson (1929) on *Pycnanthemum*.

Epeolus minimus (Robertson)

Triepeolus minimus Robertson, 1902. Ent. News 13, p. 81.

Argyroselenis minima Robertson, 1903. Canad. Ent. 35, p. 284.

Argyroselenis minimus Graenicher, 1906. Wis. Nat. Hist. Soc. Bul. 4, p. 138.

Argyroselenis minimus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press.

FEMALE—Length 8 mm.; black, mandibles except tips, mid and hind legs, tarsi, front tibiae in part, tubercles and tegulae, testaceous; antennal scape testaceous at apex, somewhat less so at base, dark medially, pedicel and basal segment of flagellum rather bright testaceous, following segments of flagellum slightly longer than broad, piceous to black; lateral ocelli separated from margin of vertex by somewhat less than their own diameter; cheeks about half width of eyes, not noticeably carinate posteriorly, somewhat narrowed below; median length of labrum somewhat more than half the breadth, with a pair of distinct, acute, apical tubercles, more or less testaceous apically, dark basally; inner margin of mandible with a more or less acute angle or tooth slightly beyond mid point; scutellum rather broadly outcurved, shallowly and rather narrowly impressed medially; axillae rather broadly joined to sides of scutellum, tips acute and only slightly protuberant, about attaining mid transverse line of scutellum (similar to *banksi*, fig. 110); wings with the usual three submarginal cells, hyaline basally, very faintly clouded apically, veins piceous; face and cheeks rather densely silvery

tomentose, the vertex and upper part of face more thinly covered with longer, erect hairs; venter of thorax densely white tomentose, hiding the surface, pleura largely bare medially, densely pale tomentose above; margin of pronotum densely tomentose, and tubercles with a dense fringe; scutum with an elongate, longitudinal patch of pale tomentum anteriorly on each side of mid-line and a similar patch at each extreme side anteriorly, continuing narrowly around tegulae to posterior margin and more thinly across the scutello-mesothoracic suture; metanotum rather thinly pale tomentose, adjacent surface of scutellum above more extensively tomentose, and lateral surfaces of propodeum with much pale tomentum; basal abdominal tergum pale tomentose anteriorly, abruptly broadened on each side to meet the apical, tomentose fascia, the resulting dark patch quadrangular, covered with very short but dense, black tomentum, apical fascia rather broadly interrupted medially; tergum 2 with a similar apical fascia which is somewhat interrupted medially and abruptly and rather broadly extended at each side to the basal margin; terga 3 and 4 with broad, dense, apical fasciae which are very slightly narrowed on each side but again broadened to the lateral margin; tergum 5 more extensively but rather thinly pale tomentose over posterior half or more of disc, partially surrounding the pseudopygidium; tegulae very finely, closely and evenly punctured; punctures coarse, deep, distinct and quite close on face above antennae, becoming slightly finer and densely crowded on vertex, especially back of eyes, fine and densely crowded beneath tomentum of cheeks and face below antennae, clypeus very minutely and densely punctate beneath dense tomentum; scutum, scutellum and axillae quite densely rugoso-punctate throughout, punctures somewhat more distinct toward each side of scutum anteriorly, those on scutellum slightly coarser; pleura rather finely rugoso-punctate, becoming very densely rugose above; punctures on discs of abdominal terga very fine and close, evenly distributed, becoming somewhat more crowded on the more apical terga; pseudopygidium transverse, median length somewhat less than half the apical width.

MALE—Answers to description of female in general, but tomentum of face somewhat more copious; tubercles and base of antennae entirely black; tegulae blackened in part; and thorax laterally and beneath more copiously tomentose; pygidial plate somewhat broader than median length, rather broadly rounded, marginal carina quite distinct, surface somewhat convex and very shallowly and obscurely punctate.

DISTRIBUTION—Minnesota, Wisconsin, Michigan and Illinois; May to August.

HOST—*Colletes eulophi*.

Epeolus oswegoensis new species

MALE—Length 7 mm.; black, including basal segments of antennae and legs, and tubercles; tegulae and segments of flagellum beyond the first more piceous; tibiae and tarsi testaceous, spurs piceous; mandibles black at base, becoming piceous apically; head, thorax and most of abdomen black, the terga narrowly yellowish along rims; lateral ocelli separated from margin of vertex by about their own diameter; cheeks very narrow, about one half width of eye, posterior margin subcarinate, strongly narrowed below; median length of labrum about half the width, with a pair of subapical denticles that are obscured by rather dense, pale pubescence; inner margin of mandibles with a barely perceptible submedian angle; scutellum rounded posteriorly, with a rather deep, median impression, tips of axillae projecting only slightly from sides of scutellum, reaching slightly beyond mid transverse line (similar to *banksi*, fig. 110); wings with the usual three submarginal cells, lightly infuscated, veins brownish; face medially covered with appressed silvery tomentum, quite dense between eyes and over most of clypeus, thinner and suberect on vertex and upper part of face; venter of thorax with dense, silvery tomentum obscuring the surface, and upper part of pleura densely white tomentose; pronotum quite densely whitish tomentose, the tubercles fringed with pale tomentum; scutum with a pair of narrow, submedian lines of pale tomentum on each side of mid-line anteriorly, the latero-anterior areas more thinly tomentose, posterior margin narrowly fringed with the same color; posterior face of propodeum largely bare, triangular dorsal area quite bare; metanotum and lower, posterior surface of scutellum densely white tomentose; anterior face of basal abdominal tergum densely white tomentose, continuous laterally with a broad, dense, apical, transverse, tomentose band, the resulting median black patch broad and very short, covered with black tomentum, narrowed at each extreme side; terga 2-6 with similar, transverse, apical bands of whitish tomentum, discs covered with black tomentum, tergum 2 with a small patch on each extreme side; tegulae very finely and closely but quite distinctly punctate, the punctures fading out toward posterior margin; upper part of face deeply and quite coarsely punctate, the punctures becoming minute and densely crowded below beneath the tomentum and on vertex and cheeks; scu-

tum coarsely and rather closely rugoso-punctate throughout, the scutellum and axillae somewhat more finely punctate; pleura below finely and densely rugoso-punctate, hypoepimeral area more coarsely so; propodeum quite smooth, with fine but distinct punctures, triangle impunctate; discs of abdominal terga very finely, closely and quite regularly punctate beneath dense, black tomentum.

TYPE—Holotype: Male, Oswego, N. Y., Aug. 26, 1936 (K. V. Krombein) [U.S. N.M.].

Epeolus pusillus Cresson

(Fig. 110)

Epeolus pusillus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 393. ♀.

Epeolus pusillus Robertson, 1903. Canad. Ent. 35, pp. 287, 288, ♀ ♂ (key).

Epeolus pusillus Brues, 1903. Ent. News 14, pp. 80, 82. (key).

Epeolus pusillus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9 mm.; black, antennal scape brownish-testaceous anteriorly, mandibles testaceous, becoming reddened at tips; tegulae and legs testaceous, mid and hind spurs piceous, tubercles and axillae more or less infused with ferruginous; lateral ocelli separated from margin of vertex by a space somewhat less than their diameter; cheeks very narrow, subcarinate posteriorly, becoming still narrower below; labrum nearly twice as broad as median length, with a pair of distinct, subapical tubercles; inner margin of mandibles with a quite distinct submedian angle; hind margin of scutellum very slightly outcurved, much exceeded by the robust, subtriangular axillae which are very broadly joined to lateral margins of scutellum and subcarinate laterally (fig. 110); wings with the usual three submarginal cells, subhyaline basally, becoming faintly infuscated apically, veins brownish; face quite densely pale tomentose around bases of antennae, over clypeus and cheeks, more thinly so above where it is more yellowish; margin of pronotum and tubercles, a pair of anterior longitudinal lines and extreme lateral margins of scutum, metanotum, and adjacent margin of scutellum, quite densely, pale yellow tomentose; lateral portions of posterior face of propodeum rather thinly pale tomentose, becoming more densely so beneath wing bases above; abdominal terga 1-4 with entire, transverse, yellow tomentose fasciae, these only sub-interrupted medially, somewhat separated from apical margin of discs except on 4, anterior face of tergum

1 densely yellow tomentose, median area black, basal and apical tomentose areas narrowly connected at each extreme side; tergum 5 with a subapical area of pale tomentum which encloses the small pseudopygidium; punctures deep, close and rather coarse on upper part of face, becoming very minute and densely crowded on clypeus and lower part of face, and on cheeks; pleura closely punctate below but with some definite, irregular, shining interspaces evident, very densely crowded above; scutum closely and quite coarsely punctate throughout, punctures more distinct anteriorly, densely crowded posteriorly and over entire scutellum and axillae; tegulae with very fine and close punctures throughout; abdominal terga with minute and very close, uniformly distributed punctures, these obscured by black, plumose tomentum; pseudopygidium very narrow, median length about equal to apical width.

MALE—Answers in general to description of female, but face around and below antennae very densely silvery tomentose, and entire ventral and lateral surfaces of mesothorax, as well as hind coxae, very densely silvery tomentose; pygidium subtriangular, rather narrowly rounded apically, margin carinate, basal width about equal to median length, surface rather sparsely and minutely punctate, with a few very short, suberect hairs.

DISTRIBUTION—Wyoming and Texas to Maine and Florida; April and May in Florida, August to October in the North.

FLOWER RECORDS—*Aster*, *Erigeron*, *Eupatorium*, *Haplopappus*, *Helenium*, *Melilotus* and *Solidago*. This is recorded by Robertson (1929) on *Bidens*, *Boltonia*, *Coreopsis*, *Helianthus* and *Polygoneum*.

Epeolus scutellaris Say

(Fig. 110)

Epeolus scutellaris Say, 1824. In Keating, Narr. Long's 2nd Exped., v. 2, p. 355. ♀.

Epeolus scutellaris Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 397. ♀.

Epeolus scutellaris Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 343. ♀ ♂.

Epeolus vernoniae Cockerell, 1907. Entomologist 40, p. 137. ♂. New synonymy

FEMALE—Length 9-10 mm.; black, antennal scape, legs and tegulae testaceous, mandibles, tubercles, narrow margin of the pronotum, lateral margins of scutum, and entire scutellum and axillae, ferruginous, mid and hind spurs rather dark; space between

margin of vertex and lateral ocelli slightly less than their diameter; cheeks about half width of eyes, subcarinate posteriorly, somewhat more narrowed below; median length of labrum somewhat more than half the breadth, with a pair of small, subapical tubercles; inner margin of mandibles with a low, median angle; posterior margin of scutellum nearly straight, very shallowly impressed medially, axillae extensive, subtriangular, broadly joined to lateral margins of scutellum, subcarinate laterally, tips protruding somewhat beyond its posterior margin (fig. 110); wings with the usual three submarginal cells, subhyaline basally, becoming lightly infuscated apically, veins brownish-testaceous; face pale tomentose around bases of antennae, otherwise very thinly pubescent; venter of thorax and anterior face of mesopleura densely tomentose, posterior margin of pronotum, a pair of narrow longitudinal lines on scutum anteriorly, metanotum and adjacent margin of scutellum, all pale yellowish tomentose, tubercles fringed with the same color; abdominal terga 1-4 with transverse, apical, yellow tomentose fasciae, very slightly interrupted medially on 1 and 2, entire on 3 and 4, slightly separated from apical margin on 1-3; tergum 1 with yellow tomentum basally, interrupted medially, intervening black patch very broad, extending nearly from one extreme side to the other, basal and apical yellow tomentose areas very narrowly joined at each extreme side; tegulae with quite deep and slightly separated punctures anteriorly, these becoming much more minute and close posteriorly; vertex and upper part of face rather coarsely and very closely and deeply punctate, the punctures becoming minute and densely crowded over clypeus and lower half of face, those on cheeks close but distinct, not crowded; scutum, scutellum and axillae densely and rather coarsely rugoso-punctate throughout, somewhat more coarsely so on latero-anterior areas; pleura closely punctate below but with a few irregular, shining, intervening spaces evident, becoming densely rugose above; punctures of abdominal terga very fine and uniformly close throughout, finer and more densely crowded on tergum 5, this with a transverse, apical band of pale tomentum covering about half of disc and completely enclosing the pseudopygidium which is broad and quite short, median length slightly less than half the apical width.

MALE—Answers quite fully to description of female, but scutellum either red or black; pygidial plate quite broadly rounded, margin carinate, median length about equal to basal width, surface rather smooth but with some inconspicuous, suberect pubescence.

DISTRIBUTION—Minnesota to Nova Scotia, south to Texas and North Carolina; June (in Texas) to September.

FLOWER RECORDS—*Baccharis*, *Bidens* and *Solidago*.

Epeolus vernalis new species

FEMALE—Length 10 mm.; black, legs, tegulae, tubercles and basal segments of antennae testaceous, spurs yellow, mandibles more ferruginous, and axillae ferruginous in part; segments of the flagellum beyond 1st considerably longer than broad, brownish beneath, piceous above; space between margin of vertex and lateral ocelli subequal to their diameter; cheeks about half width of eyes, much narrower below; posterior margin carinate; median length of labrum somewhat greater than half the breadth, with a pair of very low, acute, apical tubercles; mandibles entirely simple and rather slender, without an inner angle or tooth; posterior margin of scutellum nearly straight, not at all impressed medially, axillae strongly divergent from its side, the acute tips reaching about to mid transverse line of scutellum (similar to *ilicis*, fig. 110); wings with the usual three submarginal cells, hyaline basally, becoming lightly infuscated apically, veins testaceous to piceous; face with some dense, silvery, appressed tomentum around bases of antennae, clypeus nearly bare, and cheeks only thinly tomentose; venter of thorax rather thinly, silvery tomentose, pleura nearly bare below, becoming rather densely tomentose above; margin of pronotum densely yellowish tomentose, this continuing as a short fringe around tubercles; scutum with a pair of narrow, yellowish, longitudinal lines anteriorly on each side of midline, and margin adjacent to tegulae very narrowly fringed, a quite dense, yellowish fringe in the scutello-meso-thoracic suture; metanotum quite densely whitish tomentose, adjacent lower margin of scutellum thinly tomentose medially but becoming very densely so from each extreme side to base of wings; anterior face of basal abdominal tergum densely white tomentose on each side, separated medially, nearly meeting the apical, transverse, more yellowish fascia which is rather widely interrupted medially, the resulting black patch transverse, narrowed nearly to a point at each extreme side, covered with very short, inconspicuous, black tomentum; terga 2-4 with yellowish, apical fasciae, these becoming somewhat more whitish at each extreme side, and slightly interrupted medially, slightly removed from rims on 2 and 3, tergum 5 with a small patch of white tomentum on each side of pseudopygi-

dium; tegulae uniformly very finely, closely and deeply punctate throughout; face below ocelli rather coarsely, closely and deeply punctate, but punctures distinctly separated, becoming somewhat finer and densely crowded on vertex posteriorly and on cheeks, those below antennae and on clypeus very fine and densely crowded; scutum, scutellum and axillae very densely rugose, finely so at sides of scutum, more coarsely so medially and on scutellum; pleura below rather coarsely rugosopunctate, with a few narrow, indefinite, intervening spaces evident, upper part beneath the tomentum very densely and rather finely rugose; discs of abdominal terga beneath dense black tomentum very finely, uniformly and rather closely punctate, the punctures becoming more minute and crowded on the more apical terga; pseudopygidium about half as long medially as the apical width.

TYPE—Holotype: Female, Holly Shelter, Pender Co., N. C., May 18, 1950 (Mitchell) [author's coll.].

Epeolus weemsi new species

MALE—Length 8 mm.; black, mandibles, tubercles, tegulae and legs in large part testaceous, spurs yellow; basal segment of flagellum somewhat more brownish, following segments more piceous, median segments fully as broad as long; lateral ocelli separated from margin of vertex by a space slightly exceeding their diameter; cheeks about half width of eyes, narrowed below, hind margin subcarinate; median length of labrum nearly half the breadth, with a very small and inconspicuous pair of tubercles apically; mandibles slender and simple, without an inner angle or tooth; posterior margin of scutellum nearly straight, with a very slight and narrow, median impression, axillae widely divergent from sides of scutellum, tips acute, reaching about to mid transverse line of scutellum (similar to *ilicis*, fig. 110); wings with the usual three submarginal cells, very lightly infuscated basally, becoming somewhat more deeply so apically, veins brownish to piceous; face with some dense silvery tomentum between clypeus and antennae and along sides of face, pubescence of head otherwise very thin, short and suberect; venter of thorax densely silvery tomentose over a limited area, pleura otherwise largely bare; pronotum with a marginal fringe of very short greyish-white tomentum, this continuing as a short fringe around tubercles; scutum with a pair of barely visible, longitudinal lines of pale tomentum on each side of midline anteriorly; metanotum densely whitish tomentose, adjacent areas of scutellum not distinctly tomentose; anterior face of basal

abdominal tergum only very thinly whitish tomentose on each side, but apical margins of terga 1-5 more or less whitish fasciate, the fasciae very narrow, slightly removed from rims on 1-3 or 4, distinctly interrupted medially, discs not noticeably black tomentose; tegulae uniformly, very closely, finely and deeply punctate throughout; punctures across upper part of face deep, distinct, rather coarse, close in general, somewhat more widely separated just below ocelli, becoming very fine and densely crowded on lower part of face and clypeus, rather coarse and subcontiguous across vertex, cheeks rugoso-punctate; scutum dull, quite uniformly rugoso-punctate throughout, scutellum and axillae somewhat more coarsely rugoso-punctate; pleura dull, rather coarsely reticulate, becoming densely rugose above; discs of the more basal abdominal terga shining, punctures fine but deep and distinct, well separated on the more basal terga, becoming increasingly close on the more apical terga, median length of pygidial area about equal to the breadth, rather narrowly rounded apically, margins carinate, surface dull but rather smooth.

TYPE — Holotype: Male, Alachua Co., Fla., Feb. 23, 1957 (H. V. Weems, Jr., on *Prunus angustifolia*) [Florida Plant Board].

It seems possible that this is the male of *vernalis*, although there are some differences in the sculpture, and the relationship remains to be proven.

Epeolus zonatus Smith

(Fig. 110)

Epeolus zonatus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 257. ♂ ♀.

Epeolus zonatus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 397.

FEMALE—Length 9 mm.; black, antennae, mandibles, legs, tegulae, pronotum and tubercles testaceous, the scutellum, axillae, lateral margins of scutum, and abdominal terga 1 and 2, in large part more ferruginous, spurs yellowish; lateral ocelli separated from margin of vertex by about their own diameter; cheeks less than half width of eyes, posterior margin quite distinctly carinate; labrum nearly twice as broad as its median length, with a pair of median, acute, apical denticles; inner margin of mandibles entire, not at all angulate; scutellum broadly rounded, median impression very faint if at all evident (fig. 110); axillae quite robust, broadly divergent from sides of scutellum, the acute tips reaching about to mid transverse line of scutellum; wings with the usual three submarginal cells,

lightly infuscated, somewhat more deeply so apically, veins piceous; face with a limited area of white tomentum between antennae and eyes, margin of pronotum thinly white tomentose, and tubercles with a marginal fringe of

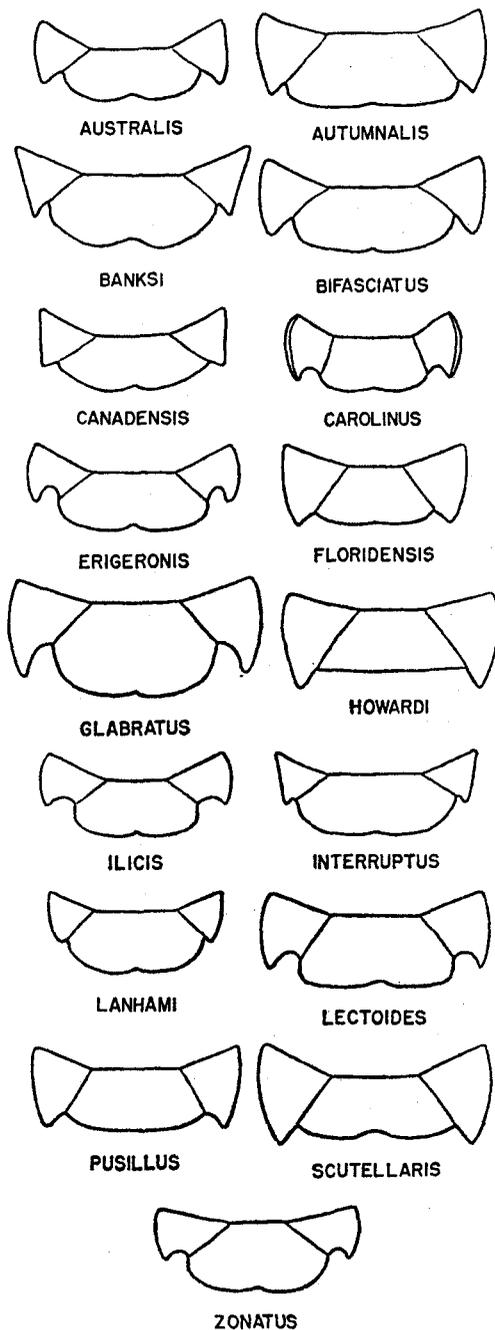


Figure 110

Scutellum and axillae in species of *Epeolus*.

short, white hairs; metanotum quite densely white tomentose beneath the somewhat overhanging scutellum, and extreme lateral margins of propodeum narrowly white tomentose; abdominal terga 1-4 with narrow, subapical, whitish fasciae that are rather widely interrupted medially, tergum 5 without pale tomentum; tegulae uniformly, finely and very closely and distinctly punctate throughout; vertex, cheeks and upper part of face deeply, regularly and rather coarsely and closely punctate, punctures becoming very fine and subcontiguous below antennae and over clypeus; scutum finely and densely rugose throughout, scutellum somewhat more coarsely and distinctly punctate, axillae very finely rugose; pleura rather coarsely rugose below, becoming rather finely so above; abdominal terga shining, punctures very fine and rather close but not crowded, evenly distributed on each tergum, becoming closer and finer on the more apical terga, without the usual black tomentum; pseudopygidium quite extensive, median length somewhat greater than apical width, the silvery tomentose surface rather sharply delimited from the otherwise dark surface of tergum 5.

MALE—Resembles female in general, but pleura somewhat more coarsely and irregularly rugoso-striate or reticulate; pygidial plate

subtriangular, rather narrowly rounded at apex, margin carinate, surface rather smooth.

DISTRIBUTION—Georgia and Florida; March to May.

FLOWER RECORDS — *Crataegus* and *Prunus*.

Epeolus mercatus Fabricius

Epeolus mercatus Fabricius, 1804. Systema Piezatorum, p. 389.

Epeolus mercantus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 395.

? *Epeolus mercatus* Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 88.

Cresson (1878) described what he interpreted to be *mercatus*, and some specimens in the U. S. National Museum were probably determined by reference to his description. No specimens indicated as type, nor any apparently identified by Fabricius, have been seen. The very brief description by Fabricius could apply equally well to *Triepeolus pectoralis* or to *Epeolus pusillus*. Therefore, it seems inadvisable to use the name until a more positive identification can be made.

Table 14—Distribution of species of *Epeolus* by states.

<i>Epeolus</i>	New England					North Central						Mid Atlantic						South-eastern									
	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
<i>australis</i>																						X					X
<i>autumnalis</i>	X			X	X	X		X	X	X												X					
<i>banksi</i>																X			X			X					
<i>bifasciatus</i>					X		X	X	X	X	X	X	X	X	X						X	X				X	X
<i>canadensis</i>							X	X				X															
<i>carolinus</i>																						X					X
<i>erigeronis</i>																						X				X	X
<i>floridensis</i>																											X
<i>glabratus</i>																									X	X	
<i>howardi</i>																						X					
<i>ilicis</i>				X	X							X									X	X	X			X	
<i>interruptus</i>							X	X					X									X				X	
<i>lanhami</i>	X						X								X												
<i>lectoides</i>				X			X	X							X			X				X				X	
<i>minus</i>						X	X	X																			
<i>oswegoensis</i>												X															
<i>pusillus</i>	X			X	X	X	X	X	X										X			X	X				X
<i>scutellaris</i>	X	X	X	X	X	X	X					X	X	X					X			X					
<i>vernalis</i>																						X					
<i>weemsi</i>																											X
<i>zonatus</i>																									X	X	

***Triepeolus* Robertson**

(Figs. 67, 108, 111 & 118)

Triepeolus Robertson, 1901. Canad. Ent. 33, p. 231. Type: *Epeolus concavus* Cresson. Orig. desig.

Triepeolus subg. *Synepeolus* Cockerell, 1921. Amer. Mus. Novitates 23, p. 6. Type: *Triepeolus* (*Synepeolus*) *insolitus* Cockerell. Monob.

Triepeolus Cockerell, 1928. Colo. Univ. Stud. 16. pp. 107-111. (key)

As the name suggests, *Triepeolus* is closely related to *Epeolus*, with the body ornamented with spots or bands of pale. appressed tomentum giving them a wasp-like appearance, and the axillae usually well developed, more or less acutely pointed posteriorly. *Triepeolus* differs from *Epeolus* in having 3-segmented maxillary palpi and the marginal cell in the front wing is narrower and more elongate, its length usually exceeding the distance from its tip to the apex of the wing. In the females tergum 5 is modified to form a quite extensive pseudopygidium which is short-setose or pubescent, its length usually equal to its breadth. Sternum 6 is composed of a pair of slender, parallel rods joined at the base by a transverse sclerite, these rods multispinose apically (fig. 108). Males are more difficult to separate from those of *Epeolus* but may be recognized by the difference in the maxillary palpi and marginal cell. Also the average size in *Triepeolus* is greater.

So far as present knowledge indicates, these are parasitic on *Melissodes* and possibly some of the other related eucerine genera.

KEY TO SPECIES

Females

1. Fifth sternum of abdomen concave, slightly downcurved apically
..... *concavus* (Cresson) (p. 464)
Fifth sternum not concave 2
2. Clypeus bright ferruginous
..... *rufithorax* Graenicher (p. 481)
Clypeus black 3
3. Abdominal punctures coarse, close, deep and very distinct; axillae long and slender. *distinctus* (Cresson) (p. 467)
Abdominal punctures usually minute and close, obscured by short, appressed, black tomentum; if relatively distinct and deep, then the axillae are quite short, only slightly exceeding the mid transverse line of the scutellum 4
4. Pseudopygidium short, apical margin straight, median length only about half the apical width 5
Length and breadth of pseudopygidium about equal, apical margin broadly rounded 7
5. With but two submarginal cells, the 2nd transverse cubital vein missing or incomplete
..... *obliteratus* Graenicher (p. 477)
With the usual three submarginal cells 6
6. Pleura closely and rather coarsely punctate, interspaces hardly evident; usually larger (12 mm.)
..... *simplex* Robertson (p. 483)
Pleura more finely and sparsely punctate, interspaces equalling or exceeding diameter of punctures; usually smaller (10 mm.)
..... *junctus* new species (p. 471)
- 7(4). Pleura below densely and finely punctate, interspaces very narrow and irregular, if at all evident 8
Pleura below either more coarsely sculptured, or the punctures to some degree separated 13
8. Axillae extremely short, posterior angles narrowly rounded, closely applied to sides of scutellum; clypeus shining, with very minute, evenly distributed punctures and much larger and more sparse punctures
..... *nevadensis* (Cresson) (p. 475)
Axillae with acute posterior angles that project considerably from sides of scutellum 9
9. Legs black; basal tergum largely covered with yellow tomentum, with only a small, triangular, median, black patch
..... *remigatus* (Fabricius) (p. 480)
Basal tergum with a very broad, median, black patch 10
10. Basal half of pseudopygidium covered with fine, dense, pale yellowish tomentum, hiding the surface, apical half with more coarse and suberect setae, the surface not completely obscured .11
Pseudopygidium uniformly covered with suberect setae, the surface visible .12
11. Legs bright ferruginous
..... *micropygius micropygius* Robertson (p. 474)
Legs entirely black
..... *micropygius atripes* new subspecies (p. 474)

- 12(10). Legs and tegulae bright ferruginous *helianthi* (Robertson) (p. 470)
 Legs and tegulae blackish
 *coquilletti* Cockerell (p. 465)
- 13(7). Basal abdominal tergum with a very broad, median, black patch, leaving lateral yellow-tomentose margins which are little if any wider than the apical, tomentose band 14
 Basal tergum with a more restricted, subtriangular, black patch, the lateral yellow-tomentose areas much broader than the apical bands 20
14. Pleura below and mesosternum polished and very sparsely punctate; basal tergum with a very broad, quadrangular, median, black patch
 *pectoralis* (Robertson) (p. 478)
 At least the mesosternum closely punctate 15
15. Pleura very coarsely reticulate
 *rugosus* new species (p. 482)
 Pleura distinctly and much more finely punctate 16
16. Tegulae, tibiae and tarsi ferruginous 17
 Legs and tegulae black 18
17. Smaller (8 mm.); pale tomentum greyish-white; abdominal tomentose bands entire
 *michiganensis* new species (p. 473)
 Larger (10 mm.); pale tomentum yellowish; abdominal bands to some degree interrupted
 *ressonii* (Robertson) (p. 466)
- 18(16). Smaller (9-10 mm.); axillae extremely short, not reaching mid transverse line of scutellum
 *charlottensis* new species (p. 462)
 Larger (11-12 mm.); axillae more elongate, tips reaching somewhat beyond mid transverse line of scutellum 19
19. Mesosternum more coarsely and closely punctate, interspaces not exceeding width of punctures, the sparse tomentum fuscous
 *donatus* (Smith) (p. 467)
 Mesosternum more finely and sparsely punctate, interspaces considerably greater than diameter of punctures, the sparse tomentum silvery
 *georgicus* new species (p. 469)
- 20(13). Apical pubescent band of basal tergum very narrow and very broadly interrupted, those on 2-4 also very narrow, considerably removed from apical margin and narrowly interrupted medially .. *alachuensis* new species (p. 462)
 Apical pubescent bands of terga 1-4 much broader, entire or only very slightly interrupted 21
21. Axillae long and slender, slightly curved, tips about reaching posterior transverse line of scutellum; legs, tegulae, mandibles, labrum and scape ferruginous ..
 *4-fasciatus atlanticus* new subspecies (p. 479)
 Axillae not so long and slender, not reaching posterior transverse line of scutellum 22
22. Labrum, scape, tubercles, trochanters and all following leg segments bright ferruginous
 *lunatus lunatus* (Say) (p. 472)
 Labrum, scape, tubercles and legs entirely black
 *lunatus concolor* (Robertson) (p. 472)

Males

1. Clypeus bright ferruginous
 *rufithorax* Graenicher (p. 481)
 Clypeus black 2
2. Median black patch of basal tergum of abdomen very broad, quadrangular, the lateral tomentose areas little if any broader than the apical band 3
 Median black patch of basal tergum narrower, more or less triangular, the lateral tomentose areas extensive, very much broader than the apical band 15
3. With but two submarginal cells, the 2nd transverse cubitus reduced or absent
 *obliteratus* Graenicher (p. 477)
 With the usual three submarginal cells 4
4. Pleura, mesosternum, face and clypeus with a dense covering of silvery tomentum, entirely hiding the surface; axillae triangular, posterior angle almost reaching posterior transverse line of scutellum 5
 Pleura and clypeus bare in part 6
5. Tegulae, labrum and scape ferruginous; pygidial plate more narrow and elongate, tip narrowly rounded
 *ressonii* (Robertson) (p. 466)
 Tegulae, labrum and scape dark; pygidial plate broadly rounded, not much longer than width of sub-basal transverse ridge .. *pectoralis* (Robertson) (p. 478)
- 6(4). Apical tomentose band of basal tergum complete, without a median interruption 7
 Apical band of basal tergum distinctly interrupted medially 9
7. Axillae very short, projecting but slightly from sides of scutellum; disc of scutum with erect, blackish pubescence over posterior half
 *nigrihirtus* new species (p. 476)

- Axillae slender and elongate apically, scutum without evident black pubescence; autumnal 8
8. Tegulae, legs and apical, depressed areas of abdominal terga ferruginous
 *junctus* new species (p. 471)
 Tegulae and legs black
 *floridanus* new species (p. 468)
- 9(6). Large (15-16 mm.); axillae long and slender, nearly reaching the posterior, transverse line of scutellum; legs, tegulae, mandibles and labrum black
 *monardae* new species (p. 475)
 Smaller (13 mm. or less); axillae usually short 10
10. Axillae robust, the free apex diverging conspicuously from sides of scutellum, and nearly equalling the basal part in length *micropygius atripes* new subspecies (p. 474)
 Axillae less robust, diverging but little from sides of scutellum, the free part much shorter than the more basal part united to scutellum 11
11. Scutellum shining, punctures deep, distinct, rather small but well separated *donatus* (Smith) (p. 467)
 Scutellum dull, densely punctate or rugose 12
12. Size large (13 mm.); or tomentose bands of terga 1 and 2 distinctly interrupted medially 13
 Smaller; tomentose bands of tergum 2 entire, that on basal tergum only very narrowly interrupted medially 14
13. Larger (13 mm.); tomentose bands on terga 1 and 2 only very slightly interrupted medially, that on 2 subentire
 *cirsianus* new species (p. 463)
 Smaller (8 mm.); tomentose bands on terga 1 and 2 rather widely interrupted medially
 *michiganensis* new species (p. 473)
- 14(12). Legs and tegulae pale ferruginous; scutellum rather broadly and deeply impressed medially; axillae triangular, slightly larger; scutum with a marginal band of yellowish tomentum, wider at antero-lateral angles
 *helianthi* (Robertson) (p. 470)
 Legs and tegulae somewhat darker; scutellum but very slightly impressed medially; scutum nearly bare; axillae very small
 *pectoralis* (Robertson) (p. 478)
- 15(2). Sternum 5 with a subapical fringe of very short hairs; fringe on sternum 4 dense, hairs long and only slightly flexed apically
 *simplex* Robertson (p. 483)
- Subapical fringes of sterna 4 and 5 similar, composed of elongate hairs which are quite strongly flexed apically .. 16
16. Axillae joined to sides of scutellum for almost entire length, the free apical angle very short 17
 Axillae more elongate, with apical angle acute, diverging considerably from sides of scutellum 20
17. Tomentose fascia on tergum 2 gradually widened laterally, to occupy most of the plate at each extreme side 18
 Fascia on tergum 2 abruptly widened at each extreme side, or not at all 19
18. Scutum broadly yellow tomentose anteriorly, without a median interruption, remainder of disc black, without yellow tomentum laterally
 *concausus* (Cresson) (p. 464)
 Scutum somewhat less broadly yellow tomentose anteriorly, the yellow band narrowly interrupted, with black medially, the lateral and posterior margins also quite broadly yellow tomentose .. *remigatus* (Fabricius) (p. 480)
- 19(17). Larger (15 mm.); scutum with a broad, anterior band of yellowish tomentum
 *nevadensis* (Cresson) (p. 475)
 Smaller (10 mm.); scutum not yellow tomentose anteriorly 24
- 20(16). Punctures of abdominal terga coarse, close, deep and very distinct
 *distinctus* (Cresson) (p. 467)
 Punctures of terga minute and close, obscured by dense, black tomentum .. 21
21. Scutum anteriorly with dense yellowish tomentum; tergum 2 with fascia gradually broadened on each side, to completely cover lateral areas of disc
 *remigatus* (Fabricius) (p. 480)
 Scutum without conspicuous pale tomentum anteriorly; band on tergum 2 of nearly uniform width across plate .. 22
22. Axillae exceptionally long and slender apically; legs, tubercles, tegulae, mandibles, labrum and scape bright ferruginous; black patch of basal tergum very narrow .. *4-fasciatus atlanticus* new subspecies (p. 479)
 Axillae of ordinary length; black patch of basal tergum broader, or legs, tegulae, etc., black 23
23. Labrum, base of mandibles, scape, tegulae, tubercles and all legs bright ferruginous, spurs testaceous
 *lunatus lunatus* (Say) (p. 472)
 Mandibles, labrum, scape and tubercles entirely black; spurs black 24

24. Tomentum of thorax and base of abdomen more yellowish; scutum dull, rugoso-punctate; pleural punctures irregular, rather coarse and deep, only slightly separated
lunatus concolor (Robertson) (p. 472)
 Tomentum of thorax and abdomen more greyish-white not at all tinged with yellow; scutum shining between distinctly separated punctures; pleura polished, punctures rather widely separated
 *sublunatus* new species (p. 483)

Triepeolus alachuensis new species

FEMALE—Length 10 mm.; black, labrum, basal half of mandibles, tubercles, tegulae, and all legs ferruginous, mid and hind spurs piceous; scape, pedicel and basal segment of flagellum ferruginous, the flagellum otherwise more piceous beneath, blackish above, median segments somewhat longer than broad; space between margin of vertex and lateral ocelli much narrower than their diameter; cheeks somewhat less than half width of eyes, still narrower below, hind margin carinate; median length of labrum somewhat greater than half the breadth, apical margin with a pair of very minute denticles; posterior margin of scutellum rather strongly outcurved, slightly depressed medially, free part of axillae diverging somewhat from sides of scutellum, but rather short, reaching slightly beyond mid transverse line of scutellum (similar to *lunatus*, fig. 112); wings quite deeply infuscated, especially apically, with the usual three submarginal cells, veins blackish; face with a small amount of appressed, yellowish tomentum around bases of antennae, and some elongate, erect, pale hairs above toward ocelli; cheeks thinly pale tomentose, otherwise head largely bare; margin of pronotum, narrow fringe around tubercles, an indefinite patch on upper part of pleura, a pair of small antero-median spots on scutum, and narrow lateral margins of scutum around tegulae, all quite densely yellow tomentose; metanotum and adjacent margin of scutellum quite densely pale tomentose, with some more elongate hairs at each end posterior to wing bases; posterior face of propodeum with some pale tomentum on extreme lateral margins above; anterior face of basal abdominal tergum with an oblique patch of yellow tomentum on each side which is continuous with an abbreviated, very narrow, subapical fascia that is widely interrupted medially, surface otherwise densely black tomentose; tergum 2 with a very narrow, transverse, yellow tomentose fascia which is interrupted and rather widely removed from rim medially; terga 3 and 4 with transverse, very

narrow, more whitish fasciae, to some degree removed from rims; tergum 5 with a small, greyish tomentose area on each side of pseudopygidium; tegulae extremely minutely and closely punctate, posterior and lateral margins becoming impunctate; punctures of face below ocelli coarse, deep, distinct and slightly separated, becoming somewhat finer and much closer across vertex and on cheeks, those below antennae very fine and quite densely crowded, clypeus with a narrow, indefinite, median, impunctate line and with scattered, shallow, rather coarse punctures superimposed on the finely and closely punctate field; scutum, scutellum and axillae quite densely and not very coarsely rugoso-punctate, axillae to some degree reddened; pleura shining between deep, distinct, rather coarse and slightly separated punctures, these becoming densely crowded above; punctures of abdominal terga beneath the dense black tomentum minute and close, largely obscured, becoming somewhat deeper and more distinct on the more apical terga; pseudopygidium rather broadly rounded or subtruncate apically, median length about equal to apical width, covered with very fine, short, suberect, dark setae; sternum 5 broadly convex as seen from beneath.

TYPE—Holotype: Female, Alachua Co., Fla., May 12, 1959 (H. V. Weems, Jr., on *Melilotus alba*) [Fla. Plant Board].

Triepeolus charlottensis new species

(Fig. 112)

FEMALE—Length 9 mm.; entirely black, including antennae, tubercles, tegulae and legs; basal segment of flagellum considerably shorter than segment 2, median segments only slightly longer than broad; space between margin of vertex and lateral ocelli considerably less than their diameter; cheeks somewhat more than half as wide as eyes, somewhat narrower below, posterior margin carinate; median length of labrum somewhat greater than half the breadth, apical margin with a pair of very minute, submedian denticles; posterior margin of scutellum strongly outcurved, axillae extremely small, the free part very short, not nearly reaching mid transverse line of scutellum (fig. 112); wings lightly infuscated, with the usual three submarginal cells, veins piceous; face with a very small amount of appressed, silvery tomentum around antennae and toward eyes, and with some more erect, longer, pale hairs above; pronotum very narrowly whitish tomentose, tubercles with a narrow fringe of tomentum, adjacent area of pleura rather thinly pale tomentose; scutum largely black, but with a small tomentose spot at each lat-

eral posterior angle and a very narrow line of tomentum in the scutello-mesothoracic suture; metanotum and adjacent margin of scutellum thinly whitish tomentose, with a tuft of elongate pale hairs at each end posterior to wing bases; basal abdominal tergum with anterior face greyish-white tomentose, and with a distinctly separated, subapical, transverse fascia of the same color which is interrupted medially, the intervening area black tomentose; terga 2-4 with transverse, whitish tomentose fasciae, that on 2 constricted or nearly interrupted medially and slightly removed from rim, that on 3 also removed from rim but continuous, that on 4 completely apical and uninterrupted; tergum 5 broadly pale tomentose on each side of the small pseudopygidium; tegulae very minutely and obscurely punctate along inner margin, becoming quite broadly impunctate along outer and posterior margins; punctures above antennae quite deep, distinct, coarse and rather close but not crowded, becoming quite sparse between lateral ocelli and eyes, somewhat finer across vertex, and rather fine and distinctly separated on the shining cheeks; scutum shining between deep, distinct, slightly separated and not very coarse punctures, those on scutellum somewhat finer but quite distinct, slightly separated and very fine on axillae; pleura below shining between deep, distinct, rather coarse and well separated punctures, becoming densely crowded above; punctures of abdominal terga beneath the black tomentum minute, close and quite uniform throughout; pseudopygidium relatively small, median length less than the apical width, covered with very short, suberect and very fine, pale setae; sternum 5 broadly rounded apically, strongly convex as seen from beneath.

TYPES—Holotype: Female, Charlotte Co., New Brunswick, Sept. 10, 1956 (W. T. A. Neilson). Paratypes: 2 ♀♀, topotypical, Sept. 6 & 10.

Although positive records of this species south of the Canadian border are lacking, it seems probable that it does occur.

Triepeolus cirsiianus new species

MALE—Length 13 mm.; entirely black, with only the more apical tarsal segments somewhat reddened; basal segment of flagellum considerably shorter than segment 2, median segments slightly longer than broad; space between margin of vertex and lateral ocelli subequal to their diameter; cheeks about half width of eyes, somewhat narrower below, posterior margin distinctly carinate; median length of labrum somewhat greater

than half the breadth, apical margin with a pair of minute, submedian denticles; posterior margin of scutellum broadly outcurved, slightly impressed medially, free part of axillae short, tips about reaching mid transverse line of scutellum (similar to *pectoralis*, fig. 112); wings subhyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, veins testaceous to piceous; face around and below antennae quite densely whitish tomentose, more thinly so on clypeus, area above antennae with more elongate, suberect, thin, white pubescence; margin of pronotum narrowly whitish tomentose, continuing as a narrow fringe around tubercles, pleura rather thinly pale tomentose above; scutum with a pair of rather elongate but somewhat indefinite anterior patches of pale tomentum, the lateral anterior margins quite broadly pale tomentose, reaching the posterior lateral angles; metanotum and adjacent margin of scutellum whitish tomentose, with a dense tuft of elongate, whitish hairs at each end posterior to wings bases; posterior face of propodeum very thinly and obscurely tomentose, triangle entirely bare; basal abdominal tergum whitish tomentose on anterior face and across posterior margin as a broad, slightly interrupted, subapical fascia, these broadly united at each side, the resulting black tomentose patch transverse, very wide, slightly narrowed toward each end; tergum 2 with a transverse, subapical white, tomentose fascia and a rather small patch of white tomentum at each extreme side, that does not quite reach basal margin; terga 3-6 with transverse, whitish tomentose fasciae, these subapical in position on 3 and 4, more nearly apical on 5 and 6; pygidial plate strongly elevated above disc of tergum 7, with an inconspicuous transverse ridge, area beyond this rather narrow and elongate, narrowly rounded apically, margin carinate, surface rather smooth; sterna 4 and 5 with subapical fringes of rather elongate or curved hairs, those on 4 pale, fuscous on 5; tegulae minutely and rather closely punctate but with some evident spaces near center; punctures of face below ocelli coarse, deep, distinct and quite close, somewhat more sparse between ocelli and eyes, somewhat finer and very close across vertex, those on cheeks slightly separated; punctures of scutum quite deep and distinct, slightly separated on each side of midline, becoming quite densely crowded on each side and toward posterior margin. scutellum and axillae more finely and quite densely punctate; pleura rather coarsely and irregularly punctate below, with a few shining interspaces evident, becoming quite densely rugoso-punctate above, beneath the tomentum; punctures of abdominal terga beneath

the black tomentum very fine and uniformly close throughout.

TYPE — Holotype: Male, Warren Co., Indiana, Aug. 11, 1953 (Montgomery, on thistle) [Purdue].

Triepeolus concavus (Cresson)

(Figs. 111 & 112)

Epeolus concavus Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 85. ♀.

Epeolus concavus Brues, 1903. Ent. News 14, p. 81. ♀ ♂.

Triepeolus concavus, Robertson, 1903. Canad. Ent. 33, pp. 284, 285. ♀ ♂ (key)

Triepeolus concavus Cockerell, 1921. Amer. Mus. Novitates 23, p. 13. (key)

Triepeolus concavus Custer, 1928. Canad. Ent. 60, p. 28. (biology)

Triepeolus concavus Custer, 1929. Psyche 36, p. 293. (biology)

Triepeolus concavus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 16 mm.; black, including tegulae and legs, antennal flagellum more piceous beneath, the basal segment dull ferruginous; space separating lateral ocelli from margin of vertex about equal to their diameter; cheeks about half width of eyes, somewhat narrower below, posterior margin carinate; median length of labrum about two-thirds the breadth; hind margin of scutellum quite strongly outcurved but with a broad and deep median impression, free part of axillae short, reaching slightly beyond mid-transverse line of scutellum (fig. 112); wings fuliginous, with the usual three submarginal cells, veins piceous; face below antennae largely bare, with short, erect, largely dark hairs above, pubescence of legs and ventral portion of thorax entirely black and largely appressed where evident; pronotum, tubercles, adjacent dorsal area of pleura, anterior half of scutum, a narrow line in scutello-mesothoracic suture, upper portion of posterior face of propodeum, metanotum and adjacent margin of scutellum covered with dense, appressed, yellow tomentum; basal abdominal tergum almost entirely yellow tomentose above, with a very small, median area and anterior face black, apical rim very narrowly black; tergum 2 yellow tomentose except for a semicircular, median, basal, black area, the rim narrowly black; tergum 3 with a broad transverse band of yellow tomentum that occupies nearly the entire plate on each side, but is broadly incurved, basal half medially black tomentose; tergum 4 black tomentose basally, with a relatively narrow, transverse, yellow tomen-

tose band, the narrow rim black; tergum 5 quite strongly narrowed apically, the pseudopygidium forming the abruptly truncate tip, disc of plate somewhat shining, with rather coarse and sparse punctures, these becoming extremely minute and densely crowded laterally and basally; sternum 5 somewhat protuberant beyond tip of tergum, lower surface broadly concave; pleura, scutellum and axillae

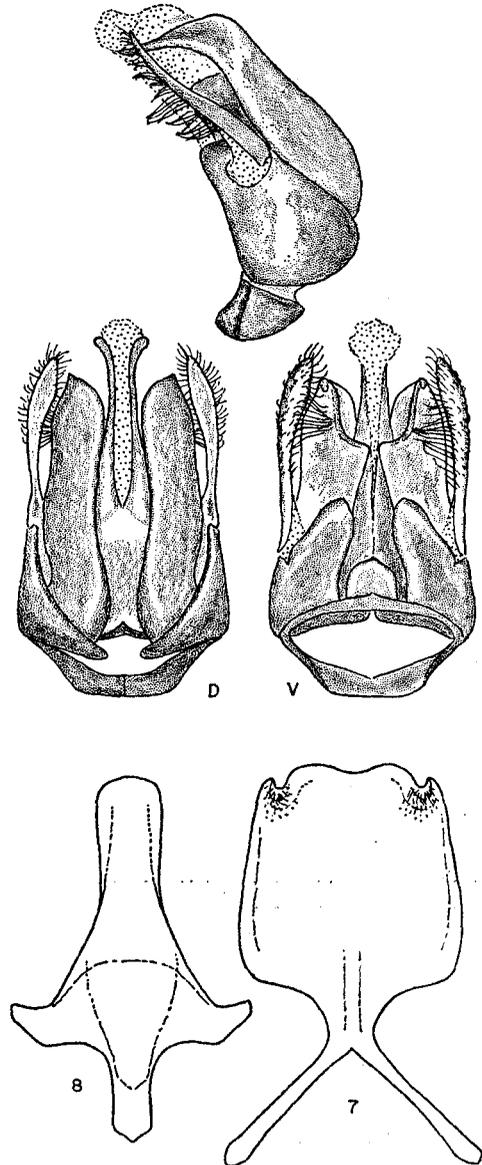


Figure 111
Sterna 7 and 8, and dorsal, ventral and lateral views of genital armature in male of *Triepeolus concavus*.

densely and finely punctate, scutum with somewhat more distinct and slightly coarser but very close punctures posteriorly, clypeus and lower part of face doubly punctate, with scattered, rather coarse but shallow punctures on a minutely, densely punctate field; outer surface of front and hind tibiae quite coarsely tuberculate.

MALE—Answers in general to description of female; sterna 4 and 5 with apical fringes of robust, black, apically curved bristles; pygidial plate strongly elevated above disc of tergum 7, rather elongate, narrowly rounded apically, margin carinate, with a median transverse ridge beyond which the surface is quite smooth, the more basal area very densely and minutely punctate and with fine, subappressed pubescence.

DISTRIBUTION—In the East, Wisconsin and Illinois to North Carolina and Florida; June to September.

FLOWER RECORDS—*Cosmos* and *Helianthemum*. This is recorded by Robertson (1929) on *Bidens*, *Blephilia*, *Brauneria*, *Cephalanthus*, *Cirsium*, *Coreopsis*, *Helianthus*, *Heliopsis*, *Lepachys*, *Lespedeza*, *Liatris*, *Lythrum*, *Monarda*, *Nepeta*, *Petalostemum*, *Pycnanthemum*, *Silphium*, *Teucrium*, *Verbena* and *Vernonia*.

HOST—*Svastra obliqua*.

Triepeolus coquilletti Cockerell

Triepeolus coquilletti Cockerell, 1905. South. Calif. Acad. Sci. Bul. 4, p. 106. ♀.

FEMALE—Length 10.5 mm.; black, the mandibles apically, basal segment of flagellum, hind basitarsi and the more distal segments of all tarsi, reddened; flagellum beyond basal segment, outer margin of tegulae, hind tibiae apically, mid basitarsi, hind spurs, all sterna, and lateral margins of abdominal terga, obscurely ferruginous; space between margin of vertex and lateral ocelli less than their diameter; cheeks less than half width of eyes, hind margin subcarinate below; labrum with a pair of small teeth at apex, its median length about two-thirds the breadth; length of segment 2 of flagellum nearly twice the breadth, following segments longer than broad; axillae short, acute, not reaching beyond mid transverse line of scutellum, not carinate laterally; hind margin of scutellum broadly rounded, slightly impressed medially; sternum 5 straight in profile; length of pseudopygidium equal to its breadth; face below antennae dull, densely and finely rugoso-punctate, with scattered coarser punctures, area

above antennae more shining between slightly coarser, oblique punctures, vertex densely and finely punctate laterally; scutum and hypopleural area densely rugoso-punctate throughout, the mesopleura more finely and regularly punctate, the punctures becoming somewhat separated below; tegulae finely and rather sparsely and obscurely punctate, outer margins broadly impunctate; abdominal terga densely, finely and regularly punctate, the sterna more shining, punctures less dense, those on sternum 5 very dense and fine; pubescence very fine and inconspicuous, not concealing surface, with dense, plumose, appressed, pale yellowish tomentum forming a well-defined pattern, paler on face, on tergum 5 and on sterna; dense and appressed around antennal fossae, thinner and erect on vertex and occiput; dorsal surface of pronotum densely yellow tomentose, continuous with a fringe surrounding tubercles, these thinly clothed, a narrow tomentose band beneath tegulae and tubercles joining a transverse band on pleura, extending back beneath hypopleural area which is nearly bare; scutum with a pair of narrow and elongate, submedian, discal marks, lateral margins with anterior and posterior marks narrowly joined above tegulae, scutellomesonotal suture with a narrow line of tomentum; metanotum and posterior face of scutellum with dense tomentum, a tuft of long, erect pubescence on each side of metanotum above; mid and hind coxae with densely tomentose areas, the propodeum more thinly pale pubescent outside triangle; basal abdominal tergum with anterior triangular marks, the apices of which just meet medially, the subapical fascia rather broad, narrowly interrupted medially, broadly joined to anterior marks laterally, resulting in a parallel-sided, blackened area that is nearly twice as broad as the apical fascia; terga 2-4 with similar but entire subapical fasciae, that on 2 laterally with anterior extensions of rather thin tomentum, that on 3 only slightly encroaching on disc laterally, and that on 4 entirely confined to marginal area, those on 1-3 gradually diverging from posterior margin toward mid line; tergum 5 with subtriangular marks laterad of pseudopygidium; sternum 2 with a few pale hairs postero-laterally, 3 and 4 with distinct though thin, lateral, apical, transverse markings; pubescence of sterna 2-4 in general very fine and obscure, that on 5 more evident; setae of pseudopygidium fine, moderately long, subdecumbent, regular and pale.

DISTRIBUTION—California to Mississippi, October.

Two females of this species were collected by C. D. Michener in the vicinity

of Hattiesburg, Mississippi, but efforts to locate them have been fruitless. The type, from California, is in the U. S. National Museum, and the description above has been paraphrased from one by Major Donald B. Baker which he wrote and sent this writer while engaged in some studies at the Museum.

Triepeolus cressonii cressonii
(Robertson)

(Fig. 112)

Epeolus cressonii Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 344. ♂ ♀.

Triepeolus cressonii Robertson, 1903. Canad. Ent. 33, pp. 286 & 287. ♂ ♀. (key)

Triepeolus cressonii Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10 mm.; black, labrum, mandibles, tibiae, tarsi and tegulae testaceous, basal portions of legs testaceous, with darkened areas, spurs piceous, tubercles only faintly reddened along outer margin; space between margin of vertex and lateral ocelli somewhat less than their diameter; cheeks about half width of eyes, narrower below, posterior margin carinate; segments of flagellum beyond the first somewhat longer than broad, piceous below, more blackish above; median length of labrum nearly two-thirds the breadth, apical margin medially with a pair of very small denticles; posterior margin of scutellum broadly outcurved, faintly impressed medially, free part of axillae quite short, tips about reaching mid transverse line of scutellum (fig. 112); wings lightly infuscated, somewhat more deeply so apically, with the usual three submarginal cells, veins piceous; face with some rather dense, pale, appressed tomentum around bases of antennae; margin of pronotum quite densely but narrowly pale tomentose, tubercles with a similar narrow fringe, and pleura with a small transverse tomentose patch near upper third; scutum with a pair of narrow, longitudinal bands of pale tomentum anteriorly on each side of mid-line and a small patch at each extreme side posteriorly; metanotum and adjacent margin of scutellum rather thinly pale tomentose, posterior face of propodeum, except the triangle, thinly pale tomentose on each side; basal abdominal tergum with a transverse, median patch of black tomentum, with dense yellow tomentum both anteriorly and posteriorly, these about equal and slightly interrupted medially, rather narrowly joined at extreme side; tergum 2 with a subapical

tomentose fascia which is slightly interrupted medially, disc with a rather small patch of tomentum on each extreme side; terga 3 and 4 with subapical, tomentose bands, more or less separated from rims of terga toward mid-line; tergum 5 very thinly greyish tomentose on each side of pseudopygidium; punctures of face above quite coarse, deep and distinct, somewhat separated, interspaces shining, these becoming somewhat finer and quite closely crowded on margin of vertex and on cheeks below, face below with densely crowded, fine punctures, but clypeus with a few very shallow, coarse punctures; scutum rather coarsely and quite closely punctate throughout, the punctures somewhat more distinct on median, anterior area, more densely crowded and indefinite laterally and on scutellum and axillae; pleura below shining between rather coarse and deep punctures, these well separated in part but not sparse, becoming densely crowded and somewhat finer above; punctures of abdominal terga very fine and close but relatively deep and distinct, especially on the more apical terga; pseudopygidium nearly as long medially as the apical breadth, rather closely set with fine setae; sternum 5 broadly convex as seen from beneath.

MALE—Answers in general to description of female; face somewhat more densely, silvery tomentose, this extending over the clypeus; segments of flagellum somewhat shorter, being scarcely longer than broad; venter of thorax densely silvery tomentose, this continuing more thinly over the pleura; terga 5 and 6 with transverse, pale tomentose fasciae; sterna 4 and 5 with apical fringes of curved setae; pygidial plate strongly elevated above disc of tergum 7, apical part beyond the transverse ridge not much longer than broad, rather broadly rounded, surface smooth, margin subcarinate, area basal to the ridge with dense but rather shallow punctures and short fine pubescence.

DISTRIBUTION — Minnesota to the New England states, south to Tennessee and North Carolina; June to September.

FLOWER RECORDS — *Eupatorium*, *Helianthus*, *Polygala*, *Pycnanthemum* and *Vernonia*. Robertson (1929) records *cressonii* on *Aster*, *Bidens*, *Blephilia*, *Boltonia*, *Helenium*, *Heliopsis*, *Lepachys*, *Rudbeckia*, *Solidago* and *Verbena*.

This subspecific designation of *cressonii* is made necessary by the recognition of another form occurring in the Southwest.

Triepeolus distinctus (Cresson) new combination

(Fig. 112)

Epeolus distinctus Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 84. ♂ ♀.

FEMALE—Length 13.5 mm.; black, labrum and mandibles slightly reddened, tibiae dark red at base and apex on front and mid legs, tubercles and tegulae dark red; lateral ocelli separated from margin of vertex by about their own diameter; cheeks about half width of eyes, slightly narrower below, posterior margin carinate; basal segment of flagellum about equalling segment 2, following segments considerably longer than broad; median length of labrum about half the breadth, apical margin with a pair of quite distinct, acute denticles; scutellum slightly outcurved posteriorly, with a quite deep, median impression, free part of axillae slender and elongate, reaching posterior transverse line of scutellum (fig. 112); wings deeply infuscated, with the usual three submarginal cells, veins black; pubescence on face very thin and sparse, somewhat more dense and elongate around bases of antennae; margin of pronotum quite densely whitish tomentose, a similar short fringe around tubercles; scutum with a pair of anterior, very narrow, longitudinal lines of whitish tomentum, the lateral margins and scutello-mesothoracic suture very narrowly white tomentose; metanotum and adjacent margin of scutellum thinly greyish tomentose medially, becoming somewhat more densely so at each side; lateral areas of posterior face of propodeum rather densely greyish tomentose; basal abdominal tergum yellow tomentose in large part, with a small, median, sub-basal black patch which is slightly broader than its median length; terga 3-5 with rather dense, transverse, pale yellowish fasciae, these slightly separated from the somewhat yellowish, rather deeply depressed, apical rims of the terga; tergum 5 without conspicuous pale tomentum; inner margins of tegulae very finely and densely punctate, outer rims becoming broadly polished and impunctate; punctures of face above quite coarse, deep and distinct, rather widely separated between ocelli and eyes, becoming close across vertex, back of ocelli and on cheeks, somewhat finer and closer but still deep and distinct below antennae, slightly separated on upper part of clypeus, becoming somewhat finer and closer toward apical margin; punctures coarse, deep and quite close over most of scutum, but with shining interspaces evident on each side of median area anteriorly, much finer and quite densely crowded on scutellum, but axillae with coarse, scattered, well separated punctures; punctures of pleura deep and quite coarse,

well separated below, becoming quite densely rugoso-punctate above; basal abdominal tergum very finely and closely punctate throughout, punctures on discs of 2-4 becoming somewhat coarser and less close, rather well separated on 4, and somewhat finer but well separated on 5; pseudopygidium abruptly truncate apically, median length about equal to apical width, covered with very fine, pale tomentum (somewhat as on *Epeolus*); sternum 5 strongly convex as seen from beneath, quite strongly narrowed apically.

MALE—Answers in general to description of female; apical tomentose areas of abdominal terga somewhat more abruptly and deeply depressed; terga 5 and 6 quite densely whitish fasciate apically; apical fringes of sterna 4 and 5 composed of elongate, relatively fine and straight hairs; pygidial plate strongly elevated above disc of tergum 7, transverse ridge very low and obscure, margin carinate and rather evenly rounded apically, basal width about equal to median length.

DISTRIBUTION—Georgia and Florida; September.

Triepeolus donatus (Smith)

- Epeolus donatus* Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 256. ♀ ♂.
Epeolus donatus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 396. ♀ ♂.
Triepeolus donatus Robertson, 1903. Canad. Ent. 35, pp. 285, 286. ♀ ♂. (key)
Triepeolus donatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 11 mm.; entirely black, including antennae, legs and tegulae; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks about half width of eyes, slightly narrower below, posterior margin carinate; median length of labrum about two-thirds the breadth, apical margin with a pair of very minute denticles; basal segment of flagellum only slightly shorter than segment 2, median segments considerably longer than broad; posterior margin of scutellum broadly outcurved, very faintly impressed medially, free part of axillae very short, tips barely attaining mid transverse line of scutellum (similar to *cressonii*, fig. 112); wings lightly and rather uniformly infuscated, with the usual three submarginal cells, veins piceous to black; face with a small amount of appressed silvery tomentum between bases of antennae and eyes, with somewhat thinner but more elongate and erect pubescence above antennae; margin of pronotum rather narrowly whitish tomentose,

tubercles with a fringe of short, whitish hairs; scutum with a pair of elongate patches of pale pubescence on each side of mid-line and just anterior to transverse mid-line, lateral margins and scutello-mesothoracic suture thinly tomentose; metanotum and adjacent margin of scutellum rather densely whitish tomentose, with some elongate, whitish hairs at each end, back of wings, the adjacent lateral areas of propodeum more or less densely whitish tomentose; pleura above with a rather small patch of white tomentum adjacent to tubercles and tegulae; basal abdominal tergum with a very broad, transverse, black tomentose patch anterior face largely whitish tomentose, and apical impressed area with a dense, transverse, whitish fascia, these rather narrowly connected at each extreme side, the fascia slightly interrupted medially; terga 2-4 with rather broad, transverse apical fasciae, these slightly separated from rims on 2 and 3 and tergum 2 with a very small, lateral patch toward each side projecting from anterior margin of the fascia; tergum 5 with a rather extensive, lateral patch of greyish-white tomentum on each side; tegulae with minute, densely crowded punctures on inner side, becoming more sparsely punctate to the outer impunctate rims; punctures of face above antennae rather irregular, very close, coarse and deep, becoming somewhat more regular but also finer and crowded on cheeks below, very fine and densely crowded below antennae, clypeus with scattered, shallow, coarse punctures on a more finely punctate field; scutum rather coarsely and closely punctate throughout, punctures somewhat more distinctly separated along mid-line toward anterior third, those on scutellum somewhat finer and only slightly separated, those on axillae slightly coarser; pleura below shining, punctures quite deep and distinct, well separated but not sparse, becoming quite densely crowded over upper half; punctures of abdominal terga beneath the dense, black tomentum rather minute and close throughout, those on tergum 5 somewhat more distinct but still very close; pseudopygidium about as broad as its median length, evenly rounded apically, covered with fine, erect but quite short setae; sternum 5 broadly convex in ventral view.

MALE—Answers in general to description of female; segments of antennae somewhat shorter, very slightly longer than broad; lower part of face more densely pale tomentose, and upper part more copiously pubescent; punctures of scutum and scutellum somewhat less densely crowded, median impression of scutellum somewhat more distinct; terga 5 and 6 with rather dense and entire, whitish, apical fasciae; sterna 4 and 5 with rather

thin, subapical fringes of elongate, slightly curved setae; pygidial plate strongly elevated above disc of tergum 7, apical portion beyond the transverse ridge slightly longer than broad, rather narrowly rounded, margin carinate, with a few scattered, shallow punctures, the more basal area very densely and finely punctate and thinly tomentose.

DISTRIBUTION—Wisconsin to the New England states, south to Georgia; July to October.

FLOWER RECORDS—*Aster*, *Chrysopsis*, *Cirsium* and *Helianthus*. Robertson (1929) records this species on *Bidens*, *Coreopsis*, *Eupatorium*, *Polygonum*, *Rudbeckia* and *Verbena*.

Triepeolus floridanus new species

MALE—Length 9.5 mm.; entirely black, only mandibles and tegulae somewhat reddened; basal segment of flagellum considerably shorter than segment 2, median segments very slightly longer than broad; space between margin of vertex and lateral ocelli equal to about half their diameter; cheeks about half width of eyes, slightly narrowed below, posterior margin carinate; median length of labrum slightly greater than half the breadth, apical margin with a pair of very small, submedian denticles; posterior margin of scutellum broadly outcurved, quite deeply impressed medially, free part of axillae quite strongly divergent from sides of scutellum, tips reaching considerably beyond transverse median line (similar to *lunatus*, fig. 112); wings subhyaline, with the usual three submarginal cells, veins piceous; face medially with considerable dense, silvery tomentum, reaching slightly above eyes and to upper margin of clypeus below, upper part of face with rather sparse but more elongate and erect, whitish hairs; margin of pronotum quite densely whitish tomentose, this continuing as a narrow fringe around tubercles, and pleura above with a rather narrow, transverse, whitish, tomentose band; scutum with a pair of elongate anterior, rather indefinite lines of white tomentum, and with some white tomentum at each extreme angle anteriorly, adjacent to tubercles, the scutello-mesothoracic suture very narrowly and obscurely whitish tomentose; metanotum and adjacent margin of scutellum densely pale tomentose, with a dense tuft of elongate, whitish hairs at each end, posterior to wing bases; posterior face of propodeum thinly whitish tomentose, becoming more densely so at each lateral margin, triangle completely bare; basal abdominal tergum whitish tomentose anteriorly, with

a subapical, transverse, whitish tomentose fascia which is slightly interrupted medially, these rather narrowly united at each extreme side, the resulting black patch broadly transverse; tergum 2 with a transverse, subapical fascia and a tomentose patch at each extreme side, impressed, apical portion of disc beneath the fascia yellowish-hyaline; terga 3-6 yellowish-hyaline apically, the impressed areas whitish tomentose, reaching nearly to apical rims; tegulae minutely and very closely punctate along inner and anterior borders, becoming rather broadly impunctate laterally and posteriorly; punctures below ocelli coarse, deep, distinct and slightly separated, interspaces shining, rather sparse between eyes and ocelli, becoming relatively fine and close across vertex, cheeks shining between rather fine, deep and distinct, slightly separated punctures; face below antennae very finely and densely punctate, surface hidden beneath pale tomentum, exposed over most of clypeus; punctures of scutum rather deep and coarse, slightly separated in general over anterior half, becoming rather densely crowded at each extreme side and across posterior border; scutellum and axillae with punctures much as on scutum; pleura below shining between quite coarse, deep, distinct and well separated punctures, these becoming densely crowded above; discs of abdominal terga beneath the black tomentum with very fine, very close, uniformly distributed punctures throughout; pygidial plate strongly elevated above disc of tergum 7, triangular in outline, very narrowly rounded at tip, with a very vague, sub-basal, transverse ridge, margin carinate, surface shallowly and closely pitted; sterna 4 and 5 with subapical fringes of elongate, apically flexed, brownish setae.

TYPE — Holotype: Male, Gainesville, Fla., Oct. 28, 1956 (H. V. Weems, Jr.) [Fla. Plant Board].

Triepeolus georgicus new species

(Fig. 112)

FEMALE—Length 11.5 mm.; entirely black, including labrum, mandibles, tubercles, tegulae and legs; basal segment of flagellum ferruginous in part, considerably shorter than segment 2, median segments somewhat longer than broad, piceous beneath, black above, the scape and pedicel black; space between margin of vertex and lateral ocelli less than half their diameter; cheeks very narrow, little more than one third width of eye, carinate posteriorly; median length of labrum slightly more than half the breadth, apical margin with a submedian pair of very minute denticles; posterior margin of scutellum broadly

outcurved, slightly impressed medially, free part of axillae short, but reaching mid transverse line of scutellum (fig. 112); wings subhyaline basally, becoming very faintly infuscated apically, with the usual three submarginal cells, veins piceous; face above clypeus and around bases of antennae quite densely silvery tomentose, cheeks rather thinly tomentose, area just below ocelli with more elongate, erect, thin, whitish pubescence; margin of pronotum with a narrow, white tomentose band that continues as a marginal fringe around tubercles; pleura above rather densely whitish tomentose; scutum with a submedian pair of elongate, tomentose patches anteriorly, lateral margins thinly tomentose, and scutello-mesothoracic suture with a very fine line of whitish tomentum; metanotum and adjacent margin of scutellum whitish tomentose, with a tuft of elongate, whitish hairs at each end posterior to wing bases; posterior face of propodeum rather thinly white tomentose, becoming more densely so at extreme sides, triangle completely bare; basal abdominal tergum whitish tomentose on anterior face, and with a subapical tomentose band which is slightly interrupted medially, these rather narrowly united at each extreme side, the resulting black tomentose patch very broad; tergum 2 with a subapical, tomentose fascia which is subinterrupted medially, and a somewhat oblique patch at extreme side which unites with the fascia and reaches the basal margin; terga 3 and 4 with transverse, whitish tomentose fasciae that on 3 slightly removed from rim, that on 4 nearly apical; tergum 5 with a whitish tomentose patch on each side of pseudopygidium; tegulae very minutely and closely punctate along inner margin, becoming rather narrowly impunctate laterally, more broadly so posteriorly; punctures of face below ocelli deep, distinct, quite coarse and well separated but hardly sparse, becoming more sparse between ocelli and eyes above, minute and slightly separated on the shining cheeks; anterior and median areas of scutum with deep, distinct, slightly separated punctures which are not very coarse, becoming somewhat more finely and densely punctate posteriorly, the scutellum rather finely rugosopunctate, axillae with fine, slightly separated punctures; pleura below shining between rather fine but distinct punctures, interspaces slightly greater than diameter of punctures in general, but becoming densely and finely rugosopunctate above; discs of abdominal terga beneath the black tomentum with fine and regular but quite distinct, slightly separated punctures throughout; pseudopygidium about as broad as the median length, broadly outcurved apically, covered with short, fine, suberect, fuscous setae, but lateral basal areas

becoming more densely fuscous tomentose; sternum 5 broadly convex as seen from beneath.

TYPE—Holotype: Female, Fort Gordan, Richmond Co., Ga., Sept. 24, 1958 (R. R. Snelling). [author's coll.].

Triepeolus helianthi helianthi
(Robertson)

Epeolus helianthi Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 344. ♀.

Triepeolus helianthi Robertson, 1903. Canad. Ent. 33, pp. 286, 287. ♂ ♀. (key)

Triepeolus helianthi Graenicher, 1905. Wis. Nat. Hist. Soc. Bul. 3, pp. 164-166. (biology)

Triepeolus helianthi Cockerell, 1907. Ann. Mag. Nat. Hist. (7) 20, p. 62. ♀. (key)

Triepeolus helianthi Cockerell, 1921. Amer. Mus. Novitates 23, pp. 3, 15. (key)

Triepeolus helianthi Robertson, 1929. Flower and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10 mm.; black, mandibles somewhat yellowish apically, basal segment of flagellum dark ferruginous, following segments somewhat longer than broad, piceous below, black above; mid and hind legs largely testaceous, with blackish spurs, the front legs dark, becoming somewhat yellowish on the more apical tarsal segments; tubercles and tegulae black; lateral ocelli separated from margin of vertex by about half their diameter; cheeks less than half width of eyes, slightly narrower below, hind margin subcarinate; median length of labrum about two-thirds the breadth, apical margin with a pair of very minute denticles; posterior margin of scutellum broadly outcurved, faintly impressed medially, free part of axillae short, reaching mid transverse line of scutellum (similar to *cressonii*, fig. 112); wings subhyaline, with the usual three submarginal cells, veins brownish-piceous; face with a small amount of appressed, whitish tomentum around bases of antennae, with scattered, more erect hairs above; margin of pronotum densely pale yellowish tomentose, tubercles with a narrow fringe of the same color, and adjacent area of pleura narrowly tomentose, this continuous with a transverse elongate patch of tomentum at upper third of pleura; scutum with a pair of rather elongate patches of pale tomentum toward anterior margin, lateral margins with a small patch of pale hairs anterior to the tegulae, and a small,

more dense patch at postero-lateral angle, the scutello-mesothoracic suture narrowly pale tomentose; metanotum and adjacent margin of scutellum densely pale tomentose, with a tuft of elongate, whitish hairs at each side back of wing bases; basal abdominal tergum with a broad, transverse, black tomentose patch, an area anterior to this yellow tomentose, slightly interrupted medially, and apical margin with a transverse fascia which is interrupted medially, these rather broadly connected at each extreme side; terga 2-4 with transverse, apical, tomentose fasciae, these slightly separated from rims on 2 and 3, tergum 2 with a lateral tomentose patch anterior to the fascia; lateral areas of tergum 5 densely pale tomentose on each side of pseudopygidium; tegulae finely and densely punctate along inner margins and over much of surface, outer rims becoming rather narrowly impunctate; punctures of face above antennae coarse, deep, distinct and somewhat separated, the interspaces shining, punctures becoming finer and crowded along margin of vertex and on cheeks; face below antennae densely and very finely punctate, clypeus with scattered, shallow, somewhat coarser punctures superimposed on the more finely punctate field; scutum densely rugoso-punctate throughout, scutellum and axillae somewhat more finely so, venter of thorax with quite deep, distinct, but very close punctures, these becoming densely crowded above, sometimes with a few shining narrow interspaces evident anterior to mid coxae; discs of abdominal terga beneath the black tomentum very fine and close, regularly distributed, becoming more densely crowded on the more apical terga; median length of pseudopygidium about equal to the apical width, apical margin with broadly rounded surface, covered with very short, suberect, pale setae; sternum 5 broadly concave as viewed from beneath.

MALE—Similar to female in most respects; face with more extensive, pale, appressed tomentum, extending down onto clypeus; scutum with much pale yellowish tomentum over anterior half, the scutello-mesothoracic suture more densely fringed with yellowish tomentum; venter of thorax densely silvery tomentose, this extending somewhat more thinly on pleura above, becoming very dense on the upper portion; apical margins of terga 5 and 6 densely whitish fasciate; sterna 4 and 5 with subapical fringes of elongate, somewhat curved setae; pygidial plate strongly elevated above disc of tergum 7, apical por-

tion beyond transverse ridge about as long as breadth, evenly rounded, margin carinate, surface quite smooth, the more basal area very finely and closely punctate and with rather dense, short pubescence.

DISTRIBUTION—Wyoming to Wisconsin, Illinois and Indiana; August and September.

FLOWER RECORDS — *Grindelia* and *Helianthus*. Recorded by Robertson (1929) on *Rudbeckia* and *Verbena*.

The recognition of three other subspecies in the West necessitates this subspecific designation of the typical form of *helianthi*.

Triepeolus junctus new species

FEMALE—Length 10 mm.; black, mandibles dull ferruginous toward base, tegulae, tibiae and tarsi testaceous, femora testaceous in part but with blackened areas, mid and hind spurs blackish; median segments of flagellum somewhat longer than broad, piceous beneath, blackish above, basal segment reddened, slightly shorter than segment 2; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks about one third width of eyes, considerably narrower below, hind margin carinate; median length of labrum about half the breadth, apical margin with a pair of acute denticles and a more minute median denticle; posterior margin of scutellum quite strongly outcurved, rather broadly and deeply impressed medially, free part of axillae quite strongly diverging from sides of scutellum, narrowly produced and acute, tips reaching slightly beyond mid transverse line of scutellum (similar to *4-fasciatus*, fig. 112); wings subhyaline basally, becoming faintly infuscated along outer margin, with the usual three submarginal cells, veins piceous; median area of face around antennae rather extensively whitish tomentose, clypeus covered with very short and thin but evident pale tomentum, cheeks also whitish tomentose, face above covered with more erect, pale hairs, vertex largely bare; margin of pronotum quite densely pale yellowish tomentose, tubercles with a narrow fringe; scutum with a pair of submedian, elongate, tomentose patches that are broad anteriorly, acuminate posteriorly, reaching slightly beyond the mid transverse line, lateral margins and scutello-mesothoracic suture also yellowish tomentose; metanotum and adjacent margin of scutellum densely pale tomentose, with a tuft of elongate pale hairs on each side just back of wing bases; posterior surface of propodeum thinly pale tomentose except in

region of triangle, becoming quite dense at lateral margins; pleura anteriorly and above densely pale tomentose; basal abdominal tergum with a broad, transverse, black tomentose patch delimited basally by extensive yellow tomentose areas on each side of midline, and apically by a complete, yellowish tomentose fascia which is constricted but not interrupted medially, these rather broadly united at extreme sides; tergum 2 with a subapical, pale tomentose fascia and oblique lateral patches of tomentum extending from fascia to the basal margin; terga 3 and 4 with apical tomentose fasciae, that on 3 slightly separated from rim, and tergum 5 densely pale tomentose on each side of pseudopygidium; tegulae very finely and closely punctate on inner side, becoming rather narrowly impunctate on outer rim; punctures of face above antennae coarse, deep and distinct, quite close except in a limited area between eyes and ocelli where there are some shining interspaces evident, vertex and cheeks otherwise closely and more finely but distinctly punctate; face below antennae with very fine, uniformly close punctures; scutum quite coarsely and closely punctate throughout, with a few irregular and very narrow shining interspaces evident; scutellum somewhat more closely punctate, punctures of axillae somewhat finer and irregular; those of pleura below quite coarse, deep and distinct, with some shining interspaces evident, becoming somewhat closer but still distinct below, fine and rather densely crowded above where they are largely obscured by tomentum; punctures of abdominal terga beneath the black tomentum very fine and close throughout, becoming somewhat more deep and distinct but still fine and close on the more apical terga; pseudopygidium abruptly truncate apically, median length about two thirds the breadth, quite densely covered with short, suberect, pale setae; sternum 5 broadly convex as seen from beneath.

MALE—Similar to female in most characters, but depressed, apical, tomentose margins of terga 3-6 quite strongly yellowish, sterna 4 and 5 with subapical fringes of elongate, slightly curved, pale setae; pygidial plate strongly elevated above disc of tergum 7, transverse ridge very indefinite, apical portion beyond this rather narrowly rounded, slightly longer than broad, margin carinate.

TYPES—Holotype: Female, Lakeview, Moore Co., N. C., Sept. 23, 1933. Allotype: Raleigh, N. C., Late Sept., 1921 (both Mitchell) [author's coll.]. Paratypes: 1 ♀, savanna at Burgaw, N. C., Oct. 13, 1954 (Mitchell); 1 ♀, Fayetteville, N. C., Oct. 2, 1941 (H. E. Evans); 1 ♀, Riverhead,

Long Is., N. Y., Oct. 2, 1953 (Roy Latham).

Paratypes are in collections of the U. S. National Museum, Cornell University and the author.

Triepeolus lunatus lunatus (Say)

(Fig. 112)

Epeolus lunatus Say, 1824. In Keating, Narr.

Long's 2nd Exped., v. 2, p. 354. ♀ ♂.

Epeolus lunatus Cresson, 1864. Ent. Soc. Phila.

Proc. 2, p. 394. ♀ ♂.

Epeolus lunatus Brues, 1903. Ent. News 14,

pp. 79, 80. ♀ ♂. (key)

Triepeolus lunatus Robertson, 1903. Canad.

Ent. 35, pp. 284, 286. ♀ ♂. (key)

Triepeolus lunatus Cockerell, 1907. Ann. Mag.

Nat. Hist. (7) 20, p. 62. ♀. (key)

Triepeolus lunatus Cockerell, 1921. Amer. Mus.

Novitates 23, pp. 2, 14. (key)

Triepeolus lunatus Robertson, 1929. Flowers

and Insects, Lancaster, Pa., Science Press.

(flower records)

FEMALE—Length 12 mm.; black, labrum, mandibles, legs, tubercles, tegulae and basal segments of antennae ferruginous; segments of flagellum beyond first considerably longer than broad, piceous below, more blackish above; spurs brownish-testaceous; cheeks about one-third width of eye, becoming somewhat narrower below, posterior margin carinate; space between margin of vertex and lateral ocelli somewhat less than their diameter; median length of labrum slightly less than two-thirds the breadth; posterior margin of scutellum strongly outcurved, shallowly depressed medially, free part of axillae quite short, tips barely reaching mid transverse line of scutellum (fig. 112); wings lightly infuscated, somewhat darker apically, with the usual three submarginal cells, veins piceous; face with some yellowish, appressed pubescence around bases of antennae, and some more erect and elongate hairs below ocelli; otherwise pubescence of head very thin and inconspicuous; dorsal surface of pronotum densely yellowish tomentose, tubercles with a quite dense fringe, pleura with a transverse, elongate patch at upper third, and margin adjacent to tubercles yellowish tomentose; scutum with a pair of small, elongate spots just anterior to mid transverse line, and with a small spot of yellowish tomentum on each extreme side adjacent to tegulae, the metanotum and adjacent margin of scutellum densely yellowish tomentose, and triangular dorsal area of propodeum with a narrow fringe of more whitish tomentum; basal abdominal tergum with a median, triangular patch of black tomentum which separates the rather extensive lateral areas of

yellow tomentum, apical band rather widely interrupted medially and somewhat separated from rim of the plate; terga 2-4 with apical tomentose fasciae which are slightly separated from rims, that on 2 slightly interrupted medially; tergum 5 with greyish-white tomentum on each side of the extensive pseudopygidium which is about as long medially as the apical width, rather sparsely set with fine setae; sternum 5 convex; punctures of face above antennae and on cheeks, deep and distinct but rather fine and close, becoming minute and densely crowded below antennae, clypeus doubly punctate, with some scattered, coarse but rather shallow punctures on the minutely, densely punctate field; scutum densely but rather shallowly rugosopunctate; punctures of scutellum and axillae somewhat finer; pleura below shining between rather deep and distinct, slightly separated punctures; abdominal terga extremely minutely and densely punctate beneath dense, black tomentum of discs.

MALE—Answers in general to description of female; sterna 4 and 5 with apical fringes of curved setae; pygidial plate strongly elevated above surface of tergum 7, apical portion beyond transverse ridge slightly longer than broad, quite smooth, margin carinate; terga 2-6 with subapical fasciae, slightly interrupted on 2 and 3 and rather widely separated from rims, more nearly apical on the following terga and more whitish in color.

DISTRIBUTION—Minnesota to the New England states, south to Texas and Florida; May to September.

FLOWER RECORDS—*Helianthus*, *Melilotus*, *Phaseolus* and *Pycnanthemum*. Recorded by Robertson (1929) on *Bidens*, *Cephalanthus*, *Coreopsis*, *Eryngium*, *Eupatorium*, *Heliopsis*, *Lepachys*, *Lippia*, *Petalostemum*, *Silphium* and *Verbena*.

Triepeolus lunatus concolor
(Robertson)

Epeolus lunatus var. *concolor* Robertson, 1898. Acad. Sci. St. Louis, Trans. 8, p. 52.

Triepeolus concolor Robertson, 1903. Canad. Ent. 35, pp. 285, 286. ♀ ♂. (key)

Triepeolus concolor Cockerell, 1921. Amer. Mus. Novitates 23, p. 14. (key)

Triepeolus concolor Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

This form is separable from typical *lunatus* only in color, and the fact that a relatively high proportion of specimens shows

an intermediate condition in this regard indicates that the two are only subspecifically distinct if at all. In both sexes of typical *concolor* the antennae, labrum, mandibles, legs and tubercles are entirely black, and the tegulae only slightly reddened along outer margin. Intermediates have varying degrees of redness on these parts.

DISTRIBUTION—Minnesota to Pennsylvania, south to Texas and Florida; May to September.

FLOWER RECORDS—*Helenium*, *Melilotus*, *Paspalum*, *Phaseolus*, *Pycnanthemum* and *Solidago*. This subspecies is recorded by Robertson (1929) on *Asclepias*, *Aster*, *Bidens*, *Blephilia*, *Cephalanthus*, *Cirsium*, *Helianthus*, *Heliopsis*, *Lepachys*, *Liatris*, *Lippia*, *Lycopus*, *Lythrum*, *Monarda*, *Nepeta*, *Petalostemum*, *Rudbeckia*, *Silphium*, *Teucrium* and *Verbena*.

HOST—Leland Chandler at Purdue University states in correspondence that *Melissodes bimaculata* is the host of *concolor*.

Triepeolus michiganensis new species

FEMALE—Length 8 mm.; black, mandibles ferruginous, blackened at tips, tegulae testaceous, tarsi brownish-testaceous, tibiae testaceous with piceous infusions, femora and mid and hind spurs largely piceous, tubercles black; basal segment of flagellum much shorter than segment 2 which is considerably longer than broad, following segments piceous beneath, black above; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks about half width of eyes, somewhat narrower below, hind margin subcarinate; median length of labrum slightly greater than half the breadth, with a pair of small, apical, submedian denticles; posterior margin of scutellum strongly outcurved, with a rather deep median impression, free part of axillae quite short, tips just reaching mid transverse line of scutellum (similar to *cresonii*, fig. 112); wings very lightly infuscated basally, becoming somewhat more deeply so apically, with the usual three submarginal cells, veins testaceous to piceous; face with a small amount of appressed silvery tomentum around bases of antennae, with more erect but quite thin, pale pubescence above; margin of pronotum quite densely whitish tomentose, tubercles with a marginal fringe, scutum with a pair of narrow, elongate lines of pale tomentum anteriorly, sparsely fringed

with the same laterally and in scutello-mesothoracic suture; anterior face of pleura above quite densely pale tomentose, and with a narrow, transverse, tomentose line to the mid coxae; metanotum and adjacent margin of scutellum quite densely whitish tomentose, terminating laterally in a tuft of elongate, whitish hairs back of wing bases; basal abdominal tergum whitish tomentose across anterior face, this slightly interrupted medially, with an apical tomentose fascia, median black tomentose patch broadly quadrangular, the basal and apical tomentose areas narrowly united at extreme sides, the apical fascia narrowly interrupted medially and slightly separated from rim of the tergum; terga 2-4 with transverse, apical, tomentose fasciae, but slightly interrupted, if at all on 2, slightly separated from the yellowish rims on 2 and 3, tergum 2 with a narrow whitish tomentose patch on each extreme side reaching from the fascia nearly to the base; tergum 5 with a triangular patch of whitish tomentum on each side of pseudopygidium; punctures of tegulae fine and quite close on inner margin, becoming narrowly impunctate on outer rims; punctures of face above antennae very coarse, deep and quite close but not crowded, becoming somewhat finer and more densely crowded across vertex and on cheeks, densely and finely punctate below antennae, clypeus with a median, impunctate line from base to center, surface with scattered, shallow, rather coarse punctures superimposed on the finely punctate field; scutum, scutellum and axillae quite coarsely, closely, deeply and evenly punctate, the punctures almost crowded; pleura below with some irregular shining spaces, the punctures becoming densely crowded toward the tomentose patch above, the area above this patch and below wing bases very coarsely, deeply and distinctly punctate; discs of abdominal terga beneath the black tomentum with close, fine, evenly distributed punctures, becoming slightly finer, closer and deeper on tergum 5; pseudopygidium about as long as its apical width, broadly rounded apically, covered with short, fine, suberect, brownish setae; sternum 5 broadly convex as seen from beneath.

MALE—Similar to female in most respects, but segments of flagellum shorter, length about equal to breadth; legs somewhat darker, with only the tarsi definitely testaceous; terga 5 and 6 with transverse, apical, pale tomentose fasciae, that on 6 rather short; pygidial area strongly elevated above disc of tergum 7, carinate laterally, apical area beyond transverse ridge slightly longer than broad, surface with a few shallow, irregular and obscure pits.

TYPES—Holotype: Female, Shiwassee Co., Mich., Sept. 3, 1950 (R. R. Dreisbach) [author's coll.]. Allotype: Colebrook, Conn., July 28, 1921 (W. M. Wheeler) [M.C.Z.]. Paratypes: 1 ♂, Colebrook, Aug. 8, 1922 (Wheeler) [M.C.Z.]; 1 ♂, Wild Flower Preserve, Slaterville, N. Y., July 26, 1931 [Cornell Univ.].

Triepeolus micropygius atripes new
subspecies
(Fig. 112)

FEMALE—Length 10 mm.; entirely black, including antennae, tubercles, tegulae, legs and spurs; space between margin of vertex and lateral ocelli considerably less than their diameter; basal segment of flagellum considerably shorter than segment 2, median segments considerably longer than broad; cheeks very narrow, little more than one-third width of eye, somewhat more narrowed below, posterior margin carinate; median length of labrum nearly two-thirds the breadth, apical margin with a pair of minute, submedian denticles; posterior margin of scutellum quite strongly outcurved, broadly impressed medially, free part of axillae extending considerably from sides of scutellum, reaching somewhat beyond mid transverse line (fig. 112); wings lightly infuscated, with the usual three submarginal cells, veins piceous; face with a small amount of silvery tomentum between bases of antennae and eyes, pubescence otherwise rather short, thin and erect, but practically absent from lower part of face; margin of pronotum with rather dense whitish tomentum, and tubercles with a similar fringe; pleura with a narrow, transverse patch of white tomentum above; scutum with a pair of narrow, longitudinal lines of white tomentum toward anterior margin medially, lateral margins narrowly fringed, and scutello-mesothoracic suture with some very short, inconspicuous, whitish hairs; metanotum and adjacent margin of scutellum rather densely whitish fasciate, with a tuft of elongate, white hairs on each end behind wing bases; propodeum rather thinly white fasciate along margins of basal triangle and at extreme sides above; basal abdominal tergum with a median, transverse patch of black tomentum, this bordered basally by whitish tomentum, and apical margin with a whitish fascia which is slightly interrupted medially and narrowly joined to the basal tomentum on each extreme side; terga 2-4 with apical, transverse, tomentose fasciae, and tergum 2 with a quadrangular patch of pale tomentum on each extreme side, joining the apical fascia which is sub-interrupted medially; tergum 5 with a triangular patch of short pale tomentum on

each side of pseudopygidium; tegulae minutely and closely punctate on inner margins, becoming impunctate along outer rim; punctures of face above antennae quite deep and distinct but rather fine and close, becoming somewhat finer and quite regular on cheeks below, face below antennae very densely and minutely rugoso-punctate, clypeus with an indefinite, median, shining line; scutum rather coarsely rugoso-punctate, with only scattered, indefinite, shining interspaces evident between punctures, scutellum and axillae somewhat more rugose; pleura below shining between rather coarse, deep and distinct punctures which are slightly but not widely separated, becoming quite densely rugoso-punctate above; discs of abdominal terga very finely, closely and regularly punctate beneath the black tomentum; median length of pseudopygidium about equal to the width, very broadly rounded or subtruncate apically, apical half covered with short, erect bristles, basal half with dense, pale yellowish tomentum, the two areas in sharp contrast; sternum 5 broadly convex as seen from beneath.

MALE—Resembles female in most details; venter of thorax with considerable dense, appressed, whitish tomentum; outer surface of tibiae quite densely white tomentose; segments of flagellum somewhat shorter, not much longer than broad; abdominal terga 5 and 6 with dense, whitish, apical fasciae; sterna 4 and 5 with subapical fringes of long, curved setae; pygidial plate strongly elevated above disc of tergum 7, apical part beyond transverse ridge somewhat triangular, with narrowly rounded apex, margin subcarinate, surface with a few shallow, obscure pits, the more basal area densely fine tomentose.

TYPES—Holotype: Female, Holly Shelter, Pender Co., N. C., Oct. 18, 1952. Allotype: Savanna at Burgaw, N. C., Oct. 23, 1957, on *Helianthus* (both Mitchell). Paratypes: 2 ♀♀, topotypical; 1 ♀, Sampson Co., N. C., Nov. 4, 1957 (on *Aster*); 1 ♀, Clayton, N. C., Oct. 4, 1959; 1 ♂, Southern Pines, N. C., Sep. 30, 1951 (on *Aster*) (all Mitchell) [all author's coll.]; 1 ♀, Demarrest, Ga., Sep. 20, 1921 [Cornell Univ.]; 1 ♀, Colerain Park, Pa., Sep. 5, 1954 (S. W. Frost).

Triepeolus micropygius micropygius
Robertson

Triepeolus micropygius Robertson, 1903.
Canad. Ent. 35, p. 286. ♀.
Triepeolus micropygius Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—This agrees in all essential details of structure with the subspecies *atripes*, differing only in color and pubescence as follows: All coxae black, but trochanters and following segments of legs bright ferruginous; tomentose bands and spots of thorax and abdomen yellowish, the transverse, abdominal bands nearly twice as broad; and tegulae more reddish; wings and pseudopygidium similar to *atripes*.

DISTRIBUTION—Illinois.

FLOWER RECORDS — Robertson (1929) records this species only on *Aster ericoides villosus*.

There is some evidence of intergradation between these two forms, with one specimen from Pennsylvania at hand in which the legs, mandibles, and to a lesser degree the antennal scape are somewhat reddened.

Triepeolus monardae new species

(Fig. 112)

MALE—Length 16 mm.; mandibles and apical tarsal segments somewhat reddish, otherwise entirely black; basal segment of flagellum considerably shorter than segment 2, median segments slightly longer than broad; space between margin of vertex and lateral ocelli much less than their diameter; cheeks very narrow, little more than one third width of eyes, still narrower below, posterior margin subcarinate; median length of labrum about half the breadth, with a pair of minute, subapical denticles medially; posterior margin of scutellum broadly outcurved, deeply impressed medially, free part of axillae robust and elongate, nearly attaining posterior transverse line of scutellum (fig. 112); wings lightly infuscated, with the usual three submarginal cells, veins piceous; face below antennae quite densely silvery tomentose, more thinly so across apical half of clypeus, face above with more elongate, erect and rather thin pubescence; cheeks very finely and rather thinly whitish tomentose; margin of pronotum densely pale yellowish tomentose, this continuing around tubercles, upper half of pleura quite densely yellowish tomentose; scutum with a pair of anterior, elongate patches of yellowish tomentum reaching slightly beyond mid point on each side of midline; lateral margins of scutum, scutellomesothoracic suture, metanotum and adjacent posterior face of scutellum densely pale yellowish tomentose, with a quite dense tuft of elongate pale hairs on each side posterior to wing bases; posterior face of propodeum quite densely pale tomentose, especially above and laterally, triangle largely bare; anterior face

of basal abdominal tergum largely pale yellowish tomentose, and with a subapical fascia, these rather broadly united laterally, the fascia slightly interrupted medially and slightly removed from apical rim, the resulting black tomentose patch very broadly transverse; tergum 2 with a broad, subapical, yellowish fascia and with a quite large patch of yellowish tomentum on each extreme side that extends from the fascia to the base; terga 3-5 with subapical, transverse fasciae which are rather widely removed from apical rims, 6 with an apical fascia; tegulae minutely and very closely but distinctly punctate throughout; punctures of face below ocelli deep, distinct and rather coarse but quite close, rather sparse laterad of each lateral ocellus, finer and quite close across vertex, fine and slightly separated on cheeks; punctures of scutum deep and distinct but rather fine and close, slightly separated near midline over posterior half; scutellum and axillae densely and finely rugoso-punctate, quite dull; pleura below rather irregularly and closely punctate, but with a few narrow, shining interspaces evident, becoming densely and more finely rugose above, beneath pale tomentum; punctures of discs of abdominal terga beneath the black tomentum very minute and close, quite uniform; sterna 2 and 3 quite conspicuously whitish fasciate apically, 4 and 5 with subapical fringes of elongate, apically curved, brownish hairs; pygidial plate strongly elevated above disc of tergum 7, with a rather conspicuous, submedian, transverse ridge, apical part beyond ridge about as broad as long, broadly rounded, margin carinate, surface rather smooth, the more basal area densely and finely rugose.

TYPES — Holotype: Male, Wilmington, N. C., Sept. 12, 1932 (Mitchell) [author's collection]. Paratypes: 2 ♂♂, Bogue, Cartaret Co., N. C., Aug. 30 & 31, 1933 (Mitchell, on *Monarda punctata*).

Triepeolus nevadensis (Cresson)

(Fig. 112)

Epeolus nevadensis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 86. ♀.

Triepeolus Nevadensis Robertson, 1903. Canad. Ent. 35, pp. 285, 286. ♀ ♂. (key)

Triepeolus nevadensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 13-15 mm.; entirely black, including legs, tubercles, tegulae and labrum, the mandibles slightly reddened; basal segment of flagellum somewhat reddened, median segments somewhat longer than broad; space separating lateral ocelli from margin

of vertex slightly less than their diameter; cheeks very narrow, less than half width of eyes, still narrower below, posterior margin carinate; median length of labrum about two-thirds the breadth, with a pair of minute and obscure apical denticles; posterior margin of scutellum broadly outcurved, very slightly depressed medially, free part of axillae hardly evident, joined for nearly entire length to sides of scutellum, tips not reaching mid transverse line (fig. 112); wings subhyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, veins brownish to piceous; face with no appressed pale tomentum but with some suberect, rather copious black pubescence just above antennae, which is in part yellowish; margin of pronotum, entire tubercles, adjacent upper part of pleura, and narrow margin encircling central disc of scutum, yellow tomentose; metanotum and adjacent margin of scutellum densely pale yellow tomentose, with tufts of elongate yellowish pubescence at each extreme side just back of wing bases; posterior face of propodeum with a pale tomentose area on each side above; pleura below densely black tomentose, partially obscuring the surface; basal abdominal tergum with a rather narrow, quadrangular, black tomentose patch which is bordered on each side and apically with dense yellow tomentum, apical band rather narrow, somewhat removed from rim of tergum, lateral areas very broad, the basal tomentum widely interrupted medially; tergum 2 with a transverse, subapical, yellow tomentose band which is abruptly broadened on each extreme side, nearly attaining basal margin; terga 3 and 4 with transverse, tomentose bands, that on 3 somewhat removed from margin, that on 4 somewhat less so, 5 with rather restricted, oblique, pale tomentose areas on each side of pseudopygidium; face between antennae and ocelli with deep, distinct, rather sparse punctures in part, these becoming close toward antennae, very fine and close across vertex and on cheeks; face below antennae shining, only microscopically punctate, but with scattered, rather coarse and deep punctures over clypeus and supraclypeal area; scutum shining beneath blackish tomentum, punctures minute and slightly but not widely separated; scutellum very closely and finely punctate, surface densely black tomentose, and axillae minutely and closely punctate; pleura very finely and densely punctate throughout; punctures of abdominal terga minute and densely crowded throughout, largely obscured by black tomentum; pseudopygidium rather broadly rounded apically, basal margin indefinite, median length only slightly more than half the breadth, surface somewhat shining, covered with suberect, fine, blackish

bristles; sternum 5 broadly convex as seen from beneath.

MALE—Answers in general to description of female, but with a small patch of conspicuous yellowish tomentum on each side of face between antennae and eyes; scutellum more deeply grooved medially; tergum 5 with an apical, transverse, tomentose fascia, but tergum 6 completely black; sternum 3 with a quite conspicuous, transverse, white fascia which is slightly interrupted medially, sterna 4 and 5 with subapical fringes of elongate, apically flexed, black setae; pygidial plate strongly elevated above disc of tergum 7, median length beyond transverse ridge somewhat greater than breadth at that point, margin carinate, rather narrowly rounded, surface with a few shallow and obscure pits, the more basal area minutely punctate and with subappressed tomentum.

DISTRIBUTION—Nebraska and Texas to North Carolina and Georgia; June to September. Flower records by Robertson suggest the probability that he collected *nevadensis* in Illinois.

FLOWER RECORDS — *Vernonia*. Robertson's (1929) list includes *Cirsium*, *Helianthus*, *Monarda*, *Pycnanthemum* and *Verbena*.

Tripeolus nigrihirtus new species

MALE—Length 9 mm.; legs and mandibles slightly reddened, otherwise entirely black; (segments of flagella beyond basal segment missing); space between margin of vertex and lateral ocelli considerably greater than their diameter; cheeks about half width of eyes, somewhat narrower below, posterior margin carinate; median length of labrum about equal to half the breadth, median apical denticles exceedingly minute, barely evident; posterior margin of scutellum broadly outcurved, quite deeply impressed medially, free part of axillae short but rather strongly divergent from sides of scutellum, tips not reaching mid transverse line (similar to *cressonii*, fig. 112); wings rather lightly infuscated, with the usual three submarginal cells, veins testaceous to piceous; head entirely without appressed tomentum, but face around and above antennae with considerable elongate and erect pale pubescence; pronotum with considerable erect pale pubescence, margin very narrowly bordered with sub-appressed tomentum, and a quite dense fringe of tomentum around tubercles; pleura above partially covered with subappressed tomentum; anterior half of scutum covered with rather thin, short, erect, pale pubescence, posterior half with

somewhat shorter and more dense black pubescence, lateral and posterior margins fringed with subappressed, whitish tomentum; metanotum thinly pubescent, but not at all tomentose, and adjacent surface of scutellum with suberect, pale pubescence; posterior face of propodeum rather densely whitish tomentose on each side of the shining triangle; anterior face of basal abdominal tergum densely whitish tomentose, apical margin with a complete, quite dense, transverse fascia, these narrowly united at each extreme side, the resulting black tomentose patch broadly transverse, narrowed at each side; tergum 2 with a broad, transverse, apical fascia and a somewhat triangular patch at each side, apex of triangle uniting narrowly with the fascia; terga 3-6 with broad, dense fasciae occupying the depressed apical margins which are yellowish-hyaline on the more apical terga; tegulae minutely, closely and uniformly punctate throughout; punctures of face below ocelli quite coarse, deep and distinct, quite close but with very narrow shining spaces evident, becoming quite sparse between ocelli and eyes, closer back of ocelli, and quite close, deep and distinct on cheeks and on face below antennae, becoming somewhat finer and closer toward apical margin of clypeus; scutum quite deeply, coarsely and uniformly closely punctate throughout, punctures almost crowded, those on scutellum somewhat finer but distinct and deep, those on axillae very fine and rather indefinite; pleura below with rather coarse, irregular punctures, with some irregular shining interspaces evident, becoming densely rugose above beneath the loose tomentum; discs of abdominal terga very minutely, closely and uniformly punctate throughout beneath dense black tomentum; pygidial plate rather narrow and elongate, somewhat triangular, with narrowly rounded apex, the transverse ridge obscure, margin carinate, surface quite smooth; sterna 4 and 5 with subapical fringes of curved, rather elongate, pale hairs.

TYPE—Holotype: Male, Merry Oaks, Chatham Co., N. C., May 27, 1926 (Mitchell) [author's coll.].

Triepeolus obliteratus Graenicher

Triepeolus obliteratus Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1. p. 242. ♀ ♂.

FEMALE—Length 9 mm.; black, tegulae and tarsal segments testaceous, tibiae and femora testaceous in part, with dark infusions, mandibles dull ferruginous, antennal scape somewhat reddened apically, the tubercles entirely black; lateral ocelli separated from margin of vertex by about half their diameter;

cheeks about half width of eyes, rather strongly narrowed below, posterior margin carinate; segments of antennae only slightly longer than broad, segment 2 slightly longer than 1; median length of labrum slightly more than half the breadth, with a pair of subapical, carinate denticles; posterior margin of scutellum rather strongly rounded, quite deeply impressed medially, free part of axillae quite short, acute, reaching slightly beyond mid transverse line of scutellum (similar to *lunatus*, fig. 112); wings hyaline basally, lightly infuscated apically, veins brownish-testaceous, transverse cubitus incomplete, thus with only two submarginal cells; face with considerable pale tomentum, rather dense between antennae and eyes, very short but evident on clypeus, largely hiding surface, and rather dense on cheeks; margin of pronotum quite densely pale tomentose, tubercles with a similar fringe, and upper adjacent area of pleura quite densely whitish tomentose; scutum with a pair of elongate patches of pale tomentum on each side of mid-line anteriorly, lateral margins narrowly tomentose, continuing around the scutellomesothoracic suture; metanotum and adjacent margin of scutellum rather thinly whitish tomentose, with a tuft of elongate white hairs at each end, posterior face of propodeum on each side of triangle rather thinly white tomentose; basal abdominal tergum with a broad, transverse, black tomentose area which is bordered anteriorly and posteriorly with dense whitish tomentum, these rather broadly joining at each extreme side; terga 2-4 with transverse, apical, tomentose fasciae, with oblique patches of pale tomentum on each extreme side of tergum 2 that join the apical fascia; tergum 5 with rather extensive areas of dense, whitish tomentum on each side of pseudopygidium; tegulae minutely and closely punctate on inner side, becoming impunctate along outer rim; upper part of face rather coarsely, deeply and closely punctate, the punctures somewhat finer and partially obscured on cheeks, very fine and largely obscured on lower part of face; scutum, scutellum and axillae densely rugoso-punctate; lower portion of pleura coarsely and rather irregularly punctate, with a few shining interspaces evident, punctures becoming densely crowded above; discs of abdominal terga very finely, closely and quite regularly punctate beneath the black tomentose areas; pseudopygidium abruptly truncate apically, apical width somewhat greater than median length, covered with very short, fine, suberect bristles; sternum 5 strongly convex as seen in ventral view, somewhat narrowed apically.

MALE—Answers in general to description of female, but labrum, mandibles, tubercles

tegulae and legs rather bright testaceous; scutellum somewhat more deeply grooved medially; terga 5 and 6 with conspicuous, whitish, apical, tomentose fasciae; sterna 4 and 5 with subapical fringes of elongate, somewhat curved bristles; pygidial plate strongly elevated above disc of tergum 7, apical part somewhat narrowed and elongate, rather broadly rounded, margins carinate, and surface with a few shallow, obscure punctures.

DISTRIBUTION—Wisconsin.

Triepeolus pectoralis (Robertson)

(Fig. 112)

- Epeolus pectoralis* Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 345. ♀.
Triepeolus pectoralis Robertson, 1903. Canad. Ent. 35, p. 285. ♀. (key)
Triepeolus pectoralis Lovell and Cockerell, 1905. Psyche 12, p. 42. ♂.
Epeolus virginianensis Cockerell, 1907. Entomologist 40, p. 137. ♂. New synonymy
Triepeolus pectoralis Cockerell, 1921. Amer. Mus. Novitates 23, p. 15. (key)
Triepeolus pectoralis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10 mm.; black, including tubercles, tegulae and labrum, the legs bright testaceous, mid and hind spurs piceous, mandibles somewhat reddened; median segments of flagellum somewhat longer than broad, basal segment more ferruginous, distinctly shorter than segment 2, following segments piceous beneath, blackish above; space between margin of vertex and lateral ocelli much narrower than their diameter; cheeks slightly less than half width of eyes, still narrower below, hind margin subcarinate; median length of labrum about half the breadth, apical margin with a pair of quite distinct, submedian tentacles; posterior margin of scutellum broadly outcurved, shallowly impressed medially, free part of axillae somewhat divergent from sides of scutellum but rather short, reaching slightly beyond mid transverse line (fig. 112); wings subhyaline basally, becoming faintly infuscated apically, with the usual three submarginal cells, veins brownish to piceous; face with some dense, appressed, whitish tomentum around bases of antennae, over supra-clypeal area, and more thinly on clypeus and cheeks, face above with more erect, elongate, pale hairs, vertex largely bare; margin of pronotum, a pair of narrow, parallel, anterior lines on scutum, and lateral margins and scutello-mesothoracic suture of scutum, with dense yellowish tomentum; tubercles somewhat more whitish tomentose and

with a quite dense marginal fringe, pleura with some dense pale tomentum above, but area just below tegulae somewhat more thinly tomentose; metanotum and adjacent margin of scutellum densely pale yellowish tomentose, with tufts of elongate pale hairs on each extreme side behind wing bases; upper lateral areas of posterior face of propodeum densely whitish tomentose; basal abdominal tergum with a broad, transverse patch of black tomentum, anterior face and posterior margin densely yellow tomentose, these areas rather narrowly joined at each extreme side and slightly interrupted medially; tergum 2 with a transverse fascia which is slightly removed from rim near mid point, and with a pair of slightly oblique patches of pale tomentum on each extreme side, reaching from fascia to basal margin; terga 3 and 4 with dense, appressed, pale yellowish, apical fasciae; tergum 5 more greyish tomentose on each side of pseudopygidium; punctures of tegulae deep and distinct but fine and close, becoming narrowly impunctate along outer rim; punctures of face above antennae coarse, deep, distinct and quite close, becoming finer and densely crowded across vertex and on cheeks, face below antennae minutely and very closely punctate, and clypeus with scattered, shallow, somewhat coarser punctures; scutum rather finely rugoso-punctate throughout, the scutellum and axillae more finely and densely rugoso-punctate; pleura below shining, with rather fine, scattered, widely separated punctures, becoming densely rugoso-punctate above; punctures of abdominal terga very fine, uniform, densely crowded throughout beneath black tomentum; pseudopygidium rather narrow, slightly longer than broad, apical margin rather broadly rounded, covered with short, suberect, rather fine, pale setae; sternum 5 broadly convex as seen from beneath.

MALE—Similar to female in many characters, but face more densely and completely silvery tomentose, mesopleura laterally and beneath densely silvery tomentose, completely hiding the surface; sterna 2 and 3 with broad, white, apical, tomentose fasciae, 4 with a submarginal fringe of elongate, apically curved but rather fine setae, the much narrower fringe on 5 of shorter hairs; tergum 5 with an apical, dense, pale yellowish fascia, that on 6 hardly evident; pygidial plate strongly elevated above disc of tergum 7, apical part beyond transverse ridge slightly longer than broad, evenly rounded, margin carinate, surface quite smooth.

DISTRIBUTION — Minnesota to the New England states, south to Georgia; August to November.

FLOWER RECORDS—*Aster*, *Haplopappus* and *Polygala*. Robertson (1929) records *pectoralis* on *Bidens*, *Boltonia*, *Eupatorium*, *Rudbeckia*, *Solidago* and *Verbena*.

HOST—This species has been collected at nesting sites of *Melissodes rustica*.

Triepeolus 4-fasciatus atlanticus new subspecies

(Fig. 112)

FEMALE—Length 13 mm.; black, labrum, mandibles except tips, tegulae, tubercles in large part, and entire legs, ferruginous, mid and hind spurs black; scape, pedicel, and segment 1 of flagellum ferruginous, flagellum otherwise piceous beneath, black above, segments considerably longer than broad; space between margin of vertex and lateral ocelli somewhat less than their diameter; cheeks slightly less than half width of eyes, somewhat narrower below, posterior margin subcarinate; median length of labrum fully two thirds the breadth, apical margin with a pair of minute, submedian denticles; posterior margin of scutellum strongly outcurved, quite deeply impressed medially, free part of axillae strongly divergent from sides of scutellum, narrow and elongate, tips nearly attaining posterior transverse line of scutellum (fig. 112); wings rather uniformly lightly infuscated, with the usual three submarginal cells, veins piceous; face with a small amount of short, appressed, pale tomentum around bases of antennae, with more erect and elongate hairs above and between antennae, surface otherwise largely bare; dorsal surface of pronotum quite broadly and densely yellow tomentose, tubercles with a slightly more whitish marginal fringe, adjacent area of pleura quite densely pale yellowish tomentose; scutum with a small patch of yellowish tomentum on each lateral posterior angle and a small amount in the scutello-mesothoracic suture, otherwise entirely black; metanotum and adjacent margin of scutellum pale yellowish tomentose, with some elongate, yellowish hairs at extreme lateral angles posterior to wings bases; posterior face of propodeum above, laterad of triangle, quite densely whitish tomentose; basal abdominal tergum largely yellowish tomentose, but with a narrow, median area of black, and apical margin narrowly black, with the black tomentose patch quite strongly, triangularly broadened medially; terga 2-4 with dense, transverse, pale yellowish to whitish fasciae, the discs black tomentose, and rims narrowly black; tergum 5 with a rather broad, oblique area of whitish tomentum on each side of pseudopygidium; tegulae minutely and very closely punctate in large part, becoming nar-

rowly impunctate along lateral and posterior margins; punctures of face below ocelli deep and distinct, but rather fine and close, becoming somewhat more widely separated between ocelli and eyes, slightly separated and distinct on cheeks, rather close, fine and irregular across vertex; face below antennae more minutely punctate, punctures very close on supra-clypeal area, slightly separated on shining clypeus which has scattered, shallow but coarse punctures in addition; scutum somewhat shining between rather fine, slightly separated punctures over most of disc, becoming densely punctate along anterior margin; scutellum dull, finely and densely punctate except for some rather indefinite interspaces evident on each side of median depression, axillae very minutely and closely punctate apically, but punctures more distinct toward base; pleura shining between deep, distinct, moderately coarse and slightly separated punctures, these becoming finer and densely crowded above; discs of abdominal terga minutely and very closely and regularly punctate throughout, punctures becoming somewhat more distinct but still very close on terga 4 and 5; pseudopygidium very broadly rounded, almost truncate apically, median length about equal to apical width, covered with short, suberect, dark setae; sternum 5 broadly convex as seen from beneath.

MALE—Similar to female in most characters; pleura somewhat more closely punctate and tubercles more definitely ferruginous; abdominal terga 5 and 6 with dense, apical, transverse, white fasciae; sterna 4 and 5 with subapical fringes of elongate, apically curved, brownish or piceous hairs; pygidial plate strongly elevated above disc of tergum 7, the transverse ridge inevident, margin carinate, rather narrowly rounded apically, nearly parallel-sided, surface with shallow, obscure and irregular punctures, rather coarse across median area, minute on basal area which is black tomentose.

TYPES—Holotype: Female, Bogue, Carteret Co., N. C., Aug. 31, 1933. Allotype; topotypical (both Mitchell, on *Monarda punctata*). Paratypes: NORTH CAROLINA: 3 ♀♀, 1 ♂, topotypical; 4 ♀♀, 1 ♂ Bogue, Aug. 30, 1945; 2 ♀♀, Wilmington, Sept. 12, 1932; 3 ♀♀, 2 ♂♂, Southern Pines, Sept. 10 & 23, 1950. (on *Kuhnistera pinnata*); 2 ♂♂, Southern Pines, Aug. 24, 1951 and Sept. 11, 1959 (on *Kuhnistera pinnata*); 1 ♀, Holly Shelter Game Refuge, Pender Co., Sept. 5, 1958 (on *Chrysopsis*) (all Mitchell). GEORGIA: 1 ♂, Rome, Aug. 28, 1958 (Mitchell, on *Koellia*); 1 ♀, Albany, Sept. 1910; 1 ♀, Lavender, Floyd

Co., Aug. 23, 1910; 1 ♂, Bainbridge, Sept. 17-Oct. 19, 1910 (both J. C. Bradley); 2 ♂♂, Spring Creek, Decatur Co., Aug. 9-12, 1931 (Bradley & Knott); 1 ♀, Waynesville, Sept. 10, 1909. MARYLAND: 1 ♀ (J. Waugh). MISSOURI: 1 ♀, St. Louis, Sept. 7, 1937 (U.S.D.A. Traps—W. M. Gordon). FLORIDA: 3 ♀♀, Gainesville, Aug. 4 & 6, & Oct. 11, 1918 (P. W. Fattig); 3 ♂♂, Monticello, Aug. 16 (G. Fairchild); 1 ♀, Cocoa, July 1946 (G. E. Bohart); 2 ♂♂, Indian River, Wittfeld (Allen Eddy).

Paratypes are in collections of the Museum of Comparative Zoology, Cornell University, G. E. Bohart and the author.

Tripeolus remigatus (Fabricius)

(Fig. 112)

Melecta remigata Fabricius, 1804. Systema Piezatorum, p. 387.

Epeolus remigatus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 393. ♀ ♂.

Epeolus remigatus Brues, 1903. Ent. News 14, p. 79. (key)

Tripeolus remigatus Robertson, 1903. Canad. Ent. 35, pp. 285, 286. ♀ ♂. (key)

Tripeolus remigatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12-13 mm.; black, including tubercles, tegulae and legs, but tibiae and tarsi more or less brownish; basal segment of flagellum somewhat reddish, slightly shorter than segment 2, median segments somewhat longer than broad, piceous below, black above; space separating lateral ocelli from margin of vertex slightly less than their diameter; cheeks slightly less than half width of eyes, slightly narrower below, posterior margin subcarinate; median length of labrum somewhat greater than half the breadth, with a pair of apical, submedian denticles; posterior margin of scutellum strongly outcurved, broadly and shallowly impressed medially, free part of axillae rather strongly divergent from sides of scutellum, tips slightly exceeding mid transverse line of scutellum (fig. 112); wings subhyaline basally, becoming rather strongly infuscated apically, with the usual three submarginal cells, veins brownish to piceous; face with a few pale hairs intermixed with some fuscous pubescence just above antennae, head otherwise entirely black; pronotum dorsally, tubercles, adjacent L-shaped area of pleura, metanotum and adjacent margin of scutellum, and anterior, lateral and posterior margins of scutum, densely yellow tomentose; anterior band of scutum narrowly interrupted medially, quite broad on each side, lateral margins quite

broadly tomentose, with the scutello-mesothoracic suture very narrowly tomentose, a pair of small tomentose spots on anterior margin of scutellum adjacent to the suture; disc of basal abdominal tergum largely yellowish tomentose, interrupted medially, forming a rounded or subtriangular median black tomentose area, anterior face black tomentose, and apical rim narrowly black; tergum 2 with a broad, dense, yellowish tomentose band which is very slightly interrupted medially, gradually broadened on each side to occupy nearly the entire lateral areas of the plate; terga 3 and 4 with entire, yellowish tomentose, subapical fasciae; tergum 5 with a small patch of greyish-white tomentum on each side of pseudopygidium; tegulae very minutely and closely punctate throughout; face above antennae with deep and distinct but rather fine and close punctures, these becoming fine and densely crowded on vertex, slightly more coarse and distinct, but still very fine on cheeks, face below antennae very finely and densely punctate, clypeus with shallow, scattered, somewhat coarser punctures superimposed on the finely punctate field; scutum with uniformly fine and very close punctures throughout, those on median portion of scutellum very minute and obscure, densely crowded, scutellum laterally and axillae more distinctly but very finely and closely punctate; punctures of pleura very fine and densely crowded; punctures of abdominal terga beneath the yellow or black tomentum extremely minute and densely crowded; median length of pseudopygidium barely equal to the breadth, very broadly rounded or subtruncate apically, covered with very fine, short and suberect, pale setae; sternum 5 broadly convex as seen from beneath.

MALE—Similar to female; terga 5 and 6 pale fasciate apically, that on 6 quite short; sterna 2 and 3 with apical, transverse, silvery tomentose fasciae that are quite narrow, 4 and 5 with rather dense, subapical fringes of elongate, apically curved setae; pygidial plate strongly elevated above disc of tergum 7, with a rather distinct, basal, transverse ridge, apical part slightly longer than broad, evenly rounded, margins carinate, surface with some very fine, obscure reticulations.

DISTRIBUTION — In the East, from Minnesota to New Jersey, south to Texas and Florida; May to September.

FLOWER RECORDS — *Helianthus* and *Pontederia*, as well as cultivated cucurbits (Cantaloup, Cucumber and Squash). It is recorded by Robertson (1929) on the following: *Asclepias*, *Actinomeris*, *Bidens*, *Blephilia*, *Cirsium*, *Ipomoea*, *Lepachys*,

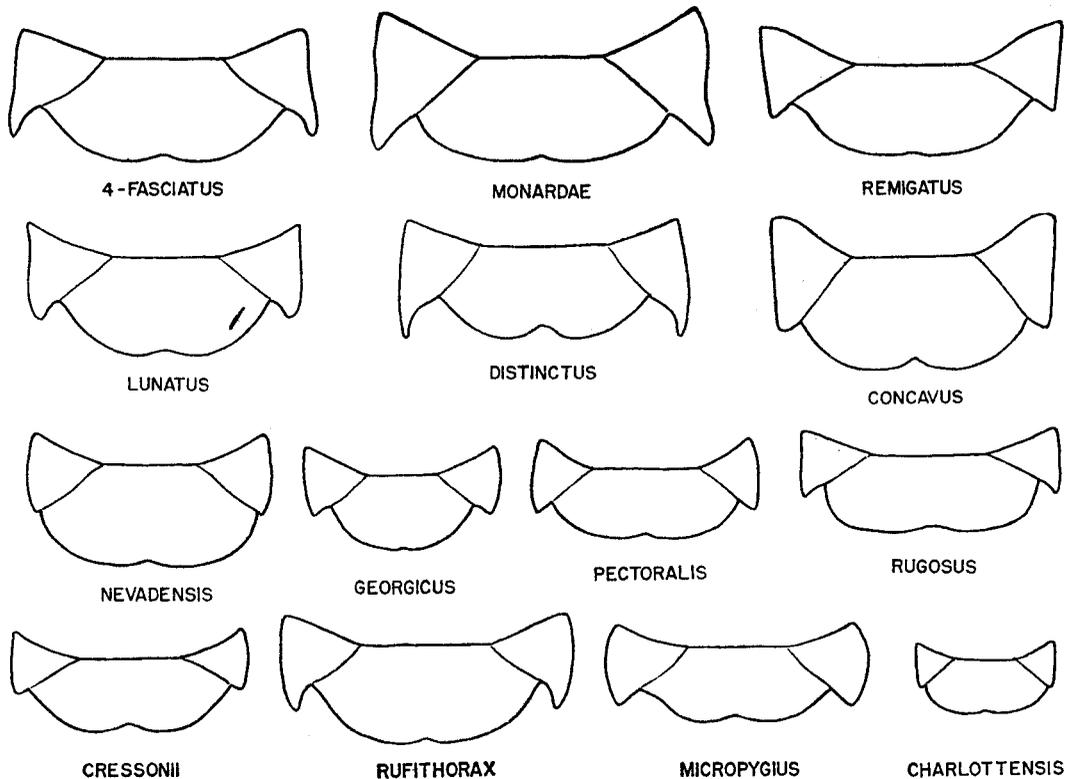


Figure 112—Scutellum and axillae in species of *Triepeolus*.

Liatrix, *Monarda*, *Nepeta*, *Petalostemum*, *Pycnanthemum*, *Silphium*, *Trifolium*, *Verbena* and *Vernonia*.

HOST—Collection records suggest the possibility that *Peponapis pruinosa* or *Xenoglossa strenua* may be the host of this species.

***Triepeolus rufithorax* Graenicher**
(Fig. 112)

Triepeolus rufithorax Graenicher, 1928. Ent. News 39, p. 279. ♀ ♂.

FEMALE—Length 11 mm.; black, thorax and basal tergum chiefly ferruginous, clypeus, labrum, mandibles, legs and tegulae more testaceous, spurs yellowish to testaceous; basal segment of flagellum much shorter than segment 2, these largely testaceous, following segments slightly longer than broad, brownish below, black above; space between margin of vertex and lateral ocelli considerably less than their diameter; cheeks very narrow, about one-third width of eyes, and narrower below, posterior margin carinate; median

length of labrum slightly greater than half the breadth; posterior margin of scutum quite strongly outcurved, shallowly depressed medially, free part of axillae rather strongly divergent from sides of scutellum but quite short, reaching slightly beyond mid transverse line of scutellum (fig. 112); wings rather strongly fuliginous, with the usual three sub-marginal cells, veins piceous; face with a small amount of appressed, pale tomentum around bases of antennae and some sparse, more erect, rather elongate hairs toward ocelli; margin of pronotum densely yellow tomentose, tubercles bare but with a marginal fringe of short yellowish hairs; scutum largely bare, but often with a pair of very short and narrow lines of yellowish tomentum on each side of mid-line, anterior to mid transverse line; metanotum and adjacent margin of scutellum rather densely yellowish tomentose, with a rather dense tuft of elongate, yellowish hairs at each extreme side, back of wing bases; basal abdominal tergum with a median, triangular patch of dark tomentum, the more basal areas on each side broadly yellow tomentose, and a subapical, transverse fascia of yellow tomentum which is rather

widely interrupted medially; terga 2-4 conspicuously yellowish-hyaline apically, with transverse, yellow tomentose fasciae, tergum 5 largely covered with greyish tomentum on each side of pseudopygidium; tegulae very minutely and closely punctate anteriorly and along inner margin, largely impunctate posteriorly; punctures of face above antennae quite coarse, deep and close, but not crowded, becoming somewhat finer and irregular across vertex and on cheeks, surface below antennae very finely and closely punctate, clypeus with a very narrow, median, impunctate line, and with scattered, rather large, shallow punctures superimposed on the more finely punctate field; scutum rather coarsely rugoso-punctate throughout, scutellum somewhat more finely so, and axillae with a few shining interspaces evident; pleura with scattered, rather coarse and deep punctures that are rather widely separated, interspaces shining, becoming densely and more finely rugoso-punctate above; discs of abdominal terga beneath the dark tomentum very finely, closely and regularly punctate throughout; median length of pseudopygidium about equal to apical width, broadly rounded or subtruncate apically, covered with short, suberect, very fine, dark setae; sternum 5 broadly convex as seen from beneath.

MALE—Resembles female in general; scutum sometimes darkened; abdominal terga 5 and 6 with rather broad, apical, tomentose fasciae; sterna 2 and 3 rather broadly but thinly white fasciate apically, 4 and 5 with conspicuous, subapical fringes of elongate, more or less curved setae; pygidial plate strongly elevated above disc of tergum 7, with a distinct, transverse, submedian ridge, this part slightly longer than broad, rather narrowly rounded apically, margin carinate, surface with only a few minute and obscure punctures.

DISTRIBUTION — Florida; April to October.

FLOWER RECORDS — *Bidens*, *Borrichia* and *Melilotus*.

Triepeolus rugosus new species

(Fig. 112)

FEMALE—Length 10 mm.; entirely black, with only the tegulae and apical segments of legs somewhat tinged with red; basal segment of flagellum slightly shorter than segment 2, median segments only very slightly longer than broad; space between margin of vertex and lateral ocelli subequal to their diameter; cheeks about half width of eyes, slightly nar-

rower below, hind margin carinate; median length of labrum equal to half the breadth, apical margin with a pair of submedian, very minute denticles; posterior margin of scutellum broadly outcurved, broadly and shallowly impressed medially, free part of axillae short but rather widely divergent from sides of scutellum, tips hardly reaching mid transverse line (fig. 112); wings rather deeply infuscated, with the usual three submarginal cells, veins piceous to black; median area of face with considerable whitish pubescence, this more elongate and more erect above antennae, appressed and rather dense below, extending thinly over clypeus, cheeks with rather thin, appressed tomentum; margin of pronotum whitish tomentose, this continuing as a fringe around margin of tubercles, pleura rather thinly whitish tomentose above; scutum with a pair of very narrow, anterior lines of pale tomentum on each side of midline, and with a very slight amount along lateral margins and in scutello-mesothoracic suture; metanotum and adjacent margin of scutellum rather densely pale tomentose, with a quite dense tuft of elongate, whitish hairs at each extreme side, posterior to wing bases; posterior face of propodeum quite densely white tomentose, dorsal triangle largely bare; anterior face of basal abdominal tergum densely white tomentose, this continuous at each extreme side with a rather broad, subapical tomentose fascia which is slightly interrupted medially, the resulting median, black, tomentose patch very broad and quite short; terga 2-4 with transverse, apical fasciae, these very slightly removed from rims on 2 and 3, tergum 2 with a broad patch of white tomentum on each extreme side; tergum 5 densely white tomentose on each side of pseudopygidium; tegulae very minutely and closely punctate throughout, only the very narrow outer rim impunctate punctures of face below ocelli deep, distinct, rather coarse, with some rather irregular shining interspaces evident, otherwise rather close, and close across vertex and on cheeks; face below antennae very minutely and densely punctate to apical margin of clypeus; scutum, scutellum and axillae quite deeply and distinctly punctate, the punctures slightly separated in large part, interspaces shining; pleura very coarsely rugoso-punctate below, becoming more finely and densely so above, beneath the tomentum; discs of abdominal terga beneath the black tomentum very minutely and quite closely punctate throughout; median length of pseudopygidium about equal to breadth, apical margin quite broadly curved, surface covered with rather short, suberect, fuscous setae, these becoming very fine around basal margin; sternum 5 very broadly convex as seen from beneath.

TYPE — Holotype: Female, Highland Hammock State Park, Fla., Mar. 31, 1956 (H. V. Weems, Jr.) [Fla. Plant Board]. Paratypes: 2 ♀♀, topotypical; 1 ♀, Lake Co., Fla., May 10, 1956 (Weems, on *Pontederia*).

The three females from Highland Hammock were collected hovering around a colony of *Bembex texana*.

Triepeolus simplex Robertson

Triepeolus simplex Robertson, 1903. Canad. Ent. 35, pp. 285, 286. ♀ ♂.

Triepeolus simplex Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12 mm.; black, labrum, tegulae and more apical segments of legs suffused with ferruginous; basal segment of flagellum ferruginous, considerably shorter than segment 2, flagellum otherwise piceous below, black above, scape dark, but suffused with ferruginous at base and apex; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks slightly less than half width of eyes, somewhat narrower below, posterior margin carinate; median length of labrum slightly greater than half the breadth, apical margin with a pair of minute, median denticles; posterior margin of scutellum strongly outcurved, rather deeply impressed medially, free part of axillae rather slender and elongate, reaching slightly beyond mid transverse line of scutellum (similar to *rufithorax*, fig. 112); wings uniformly and rather lightly infuscated, with the usual three submarginal cells, veins piceous; face with considerable appressed, yellowish tomentum around bases of antennae, with some very thin, appressed tomentum below, and rather short but more erect hairs above; margin of pronotum, a transverse patch across upper part of pleura, a pair of elongate patches on scutum anteriorly, posterior lateral angles of scutum adjacent to tegulae, and a very narrow line along anterior margin of scutellum, densely yellowish tomentose, tubercles with a yellowish marginal fringe; metanotum and adjacent margin of scutellum rather densely yellow tomentose, with a tuft of elongate, yellowish hairs at each extreme side posterior to wing bases; posterior face of propodeum on each side of basal triangle quite densely, pale yellowish tomentose; basal abdominal tergum largely yellow tomentose, but with a transverse, median, quadrangular, black tomentose area, which is narrowly connected to the blackened anterior face, and the narrow apical rim blackened; terga 2 and 3 with subapical, broad, dense, yellow tomentose fasciae,

2 with a lateral, quadrangular, yellowish patch; tergum 4 with an apical, whitish tomentose fascia; tergum 5 with only scattered, appressed, greyish-white hairs; tegulae very finely, closely and quite deeply punctate throughout; punctures of face below ocelli deep, distinct, rather close and quite coarse, becoming rather sparse laterad of ocelli, but fine and very close across vertex posteriorly and on cheeks, lower half of face below antennae very finely and densely punctate throughout, with only very obscure, scattered, larger punctures evident on clypeus; scutum and scutellum rather finely and very closely punctate, with only scattered, very narrow, shining spaces at all evident, axillae with somewhat finer and irregular punctures; pleura rather coarsely and very closely rugosopunctate, punctures becoming finer and densely crowded above in region of the tomentose area; abdominal terga very finely and closely punctate beneath dense, black tomentum of discs, punctures becoming somewhat more evident and distinct on tergum 4, rather sparse on each side of tergum 5; pseudopygidium abruptly truncate apically, margin indefinite, median length about equal to half the apical breadth; sternum 5 strongly convex as seen from beneath.

MALE—Similar to female in most characteristics; tergum 5 with a narrow, subapical, greyish-white fascia, tergum 6 not fasciate; sternum 4 with a subapical fringe of elongate, apically curved setae, but sternum 5 rather uniformly short pubescent, lacking this apical fringe; pygidial plate strongly elevated above disc of tergum 7, transverse ridge obscure, hardly evident, margin strongly carinate, somewhat narrowed apically and narrowly rounded.

DISTRIBUTION — Wisconsin, Illinois and Michigan, to North Carolina and Georgia; July and August.

FLOWER RECORDS — *Helenium* and *Helianthus*. Robertson (1929) records *simplex* on *Lespedeza*, *Pycnanthemum*, *Silphium*, *Teucrium* and *Verbena*.

Triepeolus sublunatus new species

MALE—Length 11 mm.; apical tarsal segments somewhat reddened, otherwise entirely black; basal segment of flagellum much shorter than segment 2, median segments very slightly longer than broad, somewhat more piceous beneath; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks very narrow, less than half width of eyes and narrower below, posterior margin carinate; median length of la-

brum somewhat greater than half the breadth, the submedian, apical denticles very minute; posterior margin of scutellum broadly rounded, rather deeply impressed medially, free part of axillae somewhat divergent from sides of scutellum, tips reaching the mid transverse line (similar to *lunatus*, fig. 112); wings rather lightly infuscated, with the usual three submarginal cells, veins brownish-piceous; face rather broadly silvery tomentose around antennae and below, more thinly so on clypeus, upper half with thin, more erect and elongate whitish hairs, cheeks very thinly tomentose; margin of pronotum densely whitish tomentose, tubercles narrowly fringed with short whitish tomentum, and pleura above thinly pale tomentose in part; scutum with a pair of obscure, elongate patches of pale tomentum on each side of midline anteriorly, lateral margins narrowly and thinly whitish tomentose, this extending partially into scutello-mesothoracic suture; metanotum and narrow adjacent margin of scutellum thinly whitish tomentose, with dense tufts of elongate, whitish hairs at each end posterior to wing bases; posterior face of propodeum rather thinly whitish tomentose on each side of triangle above, and more thinly so along lateral margins; basal abdominal tergum largely greyish tomentose, with a small, subtriangular, median, blackened area, apical rim narrowly black; tergum 2 with a broad, subapical, whitish fascia and a rather broad, lateral patch of fine and rather obscure pale tomentum; terga 3 and 4 with broad, dense, subapical fasciae, 5 and 6 with more definitely apical fasciae, surface beneath more or

less reddish or testaceous; tegulae minutely and rather closely punctate along inner margin, becoming broadly impunctate and shining laterally and posteriorly; punctures of face below ocelli deep, distinct, rather coarse and slightly separated, interspaces shining, punctures becoming quite sparse between eyes and lateral ocelli, somewhat finer and quite close across vertex and on cheeks; face below antennae much more finely and densely punctate, clypeus with a median, shining, impunctate line; scutum quite deeply and rather closely and coarsely punctate, but with some shining spaces evident over median area of disc; punctures of scutellum and axillae somewhat finer and quite close, with only a few shining spaces evident on each side of scutellum; pleura below and laterally shining between deep, distinct, rather coarse and well separated punctures, these becoming very close, almost crowded above; abdominal terga with minute, uniformly close and regular punctures beneath black tomentum; pygidial plate strongly elevated above disc of tergum 7, with a median, obscure, transverse ridge, apical half beyond ridge slightly longer than broad, rather narrowly rounded apically, margin carinate, surface with some irregular, shallow pits, the more basal area quite densely, finely rugoso-punctate; sterna 2 and 3 with rather vague and indefinite, whitish, apical fasciae, 4 and 5 with subapical fringes of elongate, somewhat curved, pale hairs.

TYPE—Holotype: 1 ♂, Marion, N. C., July 29, 1924 (Mitchell, on *Coreopsis stellata*) [author's coll.].

Table 15—Distribution of species of *Triepeolus* by states.

Triepeolus	New England					North Central					Mid Atlantic						South-eastern											
	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida	
alachuensis																											X	
charlottensis (canadian)																												
cirsianus									X																			
concavus							X		X	X												X		X	X	X	X	
coquilletti																								X				
cressonii						X	X	X		X			X						X		X	X						
distinctus																										X	X	
donatus	X	X	X			X	X	X		X					X							X		X		X		
floridanus																											X	
georgicus																										X		
helianthi							X		X	X																		
junctus												X										X						
lunatus			X			X	X	X	X	X		X	X						X	X	X	X	X		X	X	X	
l. concolor						X	X	X	X	X				X							X	X		X	X	X	X	X
michiganensis					X		X					X																
micropygius								X																				
m. atripes														X								X				X		
monardae																						X						
nevadensis								X														X				X		
nigrihirtus																						X						
obliteratus						X																						
pectoralis	X	X		X	X	X	X	X	X	X		X									X	X				X		
quadrifasciatus (western)																												
q. atlanticus															X							X				X	X	
remigatus								X		X		X	X						X	X	X					X	X	
rufithorax																											X	
rugosus																											X	
simplex						X	X	X	X	X												X	X			X		
sublunatus																						X						

Holcopasites Ashmead

(Fig. 67)

Holcopasites Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 82. Type: *Phileremus illinoiensis* Robertson. Desig. by Crawford, 1915.

Holcopasites Crawford, 1915. Insecutor Inscitiae Menstruus 3, p. 123.

Neopasites subg. *Trichopasites* Linsley, 1942. Pan-Pacific Ent. 18, p. 127. Type: *Neopasites (Trichopasites) insoletus* Linsley. Monob. and orig. desig.

Neopasites subg. *Odontopasites* Linsley, 1942. Pan-Pacific Ent. 18, p. 128. Type: *Neopasites (Odontopasites) arizonicus* Linsley. Monob. and orig. desig.

Neopasites Linsley, 1943. Amer. Ent. Soc. Trans. 69, p. 119. (revision)

This is a parasitic group of small bees, usually with the abdomen largely or entirely red. There are but two submarginal cells in the front wing, and the antennae are located adjacent to the clypeal margin, much below the mid transverse line of the face. The males differ from those of most other bees in having 12-segmented antennae, similar to the females. Like many parasitic groups they are closely and very coarsely punctate.

KEY TO SPECIES

Females

1. Scutellum deeply grooved medially, thus strongly bilobed
..... *heliopsis* (Robertson) (p. 487)
Scutellum only slightly incised medially on posterior margin, if at all, dorsal face not grooved 2
2. Abdominal terga 2-5 with basal, transverse, narrow, white-tomentose fasciae that are interrupted medially; terga either black or red
..... *illinoiensis* (Robertson) (p. 488)
Terga 2-4 with four basal, white-tomentose spots that are more or less distinctly separated 3
3. Lower surface of head, laterad of hypostome, closely and deeply punctate; lateral tomentose spots on abdominal terga only slightly separated from median pair of spots
..... *calliopsidis* (Linsley)
Area of head laterad of hypostome shining and largely impunctate, with only a few, widely separated punctures; lateral tomentose spots of terga well separated from median spots
..... *pseudocarinatus* new species (p. 489)

Males

1. Scutellum deeply grooved medially, thus strongly bilobed
..... *heliopsis* (Robertson) (p. 487)
Scutellum only slightly incised medially on posterior margin, if at all, dorsal face not grooved 2
2. Abdominal terga 2-5 with basal, transverse, narrow, white-tomentose fasciae that are interrupted medially; terga either black or red
..... *illinoiensis* (Robertson) (p. 488)
Terga 2-4 with four, well separated, basal, white-tomentose spots
..... *calliopsidis* (Linsley) (below)

***Holcopasites (Holcopasites) calliopsidis* (Linsley)**

Neopasites stevensi Ainslee, 1937. Canad. Ent. 69, p. 99. (biology; misident.)

Neopasites calliopsidis Linsley, 1943. Amer. Ent. Soc. Trans. 69, p. 137. ♀ ♂.

FEMALE—Length 5-6 mm.; head and thorax black, mandibles somewhat reddened and labrum becoming reddish apically; mid and hind tibial spurs pale yellowish; tegulae blackish; wings subhyaline, veins brownish to piceous; abdominal terga largely ferruginous, with some limited blackened areas; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length about one-third the distance between eyes below; eyes very slightly convergent below; mandibles slender and simple; median length of labrum about twice the basal width, apex rather narrowly rounded; basal segment of flagellum equal to segments 2 and 3 combined; scutum with a rather shallow, median, anterior sulcus; posterior margin of scutellum slightly impressed medially; apical margins of abdominal terga narrowly but quite abruptly depressed, basal margins of 2-4 quite strongly grooved; head and thorax rather uniformly, coarsely, closely and deeply punctate, but clypeal punctures somewhat finer, and those on venter of thorax and cheeks below well separated but hardly sparse; abdominal terga densely and somewhat more finely punctate, the depressed margins more finely punctate than the discs, tergum 5 slightly elevated medially, this area rather smooth, without evident punctures, the lateral punctures quite coarse and close; pubescence of head very short and inconspicuous, with some pale appressed tomentum around bases of antennae, and a tomentose patch on cheeks above; pronotal collar and median sulcus of scutum anteriorly white tomentose, pleura with a narrow line of white tomentum just beneath hypopimeral area; scutellum and metanotum

with limited tomentose areas on each extreme side, and a slight amount medially; pubescence of legs very short and inconspicuous but entirely whitish; basal abdominal tergum with a pair of widely separated, basal, whitish, tomentose spots, and terga 2-4 with a series of 4 basal, tomentose spots that are only obscurely connected if at all; apical margins of terga 1-4 narrowly whitish-fasciate at each extreme side on apical margin.

MALE—Length 5-6 mm.; head, thorax and legs black, antennae somewhat reddened beneath apically, mandibles reddish, and labrum becoming testaceous apically; tegulae yellowish-hyaline or piceous, wings subhyaline, veins brownish to piceous; mid and hind tibial spurs pale yellow; abdominal terga more or less ferruginous (varying from light testaceous to deep brick red); cheeks slightly narrower than eyes; clypeus very slightly protuberant, its median length about one-third the distance between eyes; eyes subparallel; mandibles slender and simple; labrum much as in female; basal segment of flagellum equal to segments 2 plus 3 in length; scutum slightly sulcate medially toward anterior margin; posterior margin of scutellum very slightly impressed medially; puncturation much as in female, median length of pygidial plate only very slightly longer than basal width, the margins carinate, parallel, apex broadly rounded; pubescence as in female; sternum 7 more truncate apically than *illinoensis* (fig. 114); and sternum 8 more elongate; genital armature closely resembling that in *illinoensis*, but tips of gonocoxites somewhat reflexed.

DISTRIBUTION—Minnesota to Michigan, south to Tennessee, June to August.

***Holcopsites (Holcopsites) heliopsis*
(Robertson)**

Ammobates heliopsis Robertson, 1897. *Acad. Sci. St. Louis, Trans.* 7, p. 350. ♂.

Holcopsites heliopsis Crawford, 1915. *Ins. Insc. Men.* 3, p. 124.

Holcopsites heliopsis Robertson, 1929. *Flowers and Insects*, Lancaster, Pa., Science Press. (flower records)

Neopasites heliopsis Linsley, 1943. *Amer. Ent. Soc. Trans.* 69, p. 129.

FEMALE—Length 6.5 mm.; black, antennae brownish, mandibles somewhat ferruginous, labrum becoming brownish-ferruginous apically; legs blackish basally, tibiae and tarsi somewhat reddish, mid and hind spurs pale yellowish; tegulae rather dark along inner margin, becoming yellowish-hyaline along outer margin; wings subhyaline basally, becoming faintly infuscated apically, veins brownish-

testaceous to piceous; impressed apical margins of abdominal terga testaceous, discs largely black; cheeks slightly narrower than eyes; clypeus rather strongly protuberant apically, its median length about one-third the distance between eyes below; eyes very slightly convergent below; mandibles slender and simple; basal width of labrum about two-thirds the median length, apex quite broadly rounded, basal half rather strongly carinate medially; basal segment of flagellum slightly less than combined length of segments 2 and 3; scutum with a shallow, median sulcus anteriorly; dorsal surface of scutellum deeply grooved, conspicuously separating the two halves both dorsally and posteriorly; narrow apical margins of abdominal terga abruptly and deeply depressed, basal margins of 2-5 deeply grooved; median length of pygidium very slightly less than basal width, margins carinate and nearly parallel, apical margin broadly truncate; punctures of head and thorax very deep, quite coarse and densely crowded above, becoming somewhat more distinctly separated on cheeks below and on a limited area of mesopleura, the propodeum more irregularly reticulate laterally, posterior face relatively smooth; punctures of abdominal terga densely crowded, discs somewhat more finely punctured than thorax, and impressed margins more finely punctate than discs; tergum 5 slightly ridged medially, this area dull but not evidently punctate, the punctures becoming relatively coarse and deep laterally; pubescence very short and inconspicuous on head and thorax, a limited area of pale tomentum around bases of antennae, on cheeks above, pronotum laterally, and on propodeum dorsally behind wing bases; abdominal terga 1-5 with a pair each of rather widely separated, small, submedian spots of yellowish tomentum, and 2-5 with smaller lateral spots, the four tomentose areas rather widely separated on each tergum; pubescence of legs hardly evident, extremely short and obscure, apparently entirely pale.

MALE—Length 5.5 mm.; color as in female; cheeks subequal to eyes in width; clypeus rather strongly protuberant, its median length about one-third the distance between eyes below; eyes slightly convergent below; mandibles slender and simple; labrum much as in female; puncturation much as in female; median length of pygidial plate only slightly less than twice the basal width, margins carinate, subparallel, apex rather broadly rounded; pubescence as in female; sternum 7 subtruncate apically, otherwise much as in *illinoensis* (fig. 114); gonocoxites of genital armature slightly dilated toward apex, but very similar to *illinoensis*.

DISTRIBUTION — Colorado to North Dakota and Illinois, in August.

FLOWER RECORDS — *Grindelia* and *Solidago*. Robertson (1929) collected the type series on *Heliopsis*.

***Holcopasites (Holcopasites) illinoensis* (Robertson)**

(Figs. 113 & 114)

Phileremus illinoensis Robertson, 1891. Amer.

Ent. Soc. Trans. 8, p. 64. ♀.

Holcopasites pratti (Ashmead ms.) Crawford, 1915. Ins. Insc. Men. 3, p. 123. *Nom. nud.* in syn.

Holcopasites illinoensis Crawford, 1915. Ins. Insc. Men. 3, p. 124. ♀ ♂. (key)

Holcopasites illinoensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Neopasites illinoensis Linsley and Michener, 1939. Amer. Ent. Soc. Trans. 65, p. 15.

Neopasites punctulatus Linsley, 1943. Amer. Ent. Soc. Trans. 69, p. 135. ♂. New synonymy.

FEMALE—Length 4.5-5.5 mm.; head and thorax black; mandibles and margin of clypeus more or less ferruginous; mid and hind tibial spurs pale yellowish; tegulae dark along inner margin, becoming yellowish-hyaline around the outer margin; wings subhyaline, veins brownish to piceous; antennal flagella dark red beneath, piceous above; discs of abdominal terga black or ferruginous, the depressed apical margins yellowish; cheeks about equal to eyes in width; clypeus quite flat, its median length not much greater than a third the distance between eyes (fig. 113); eyes subparallel; mandibles slender and simple; labrum elongate, tapering apically, its median length nearly twice the basal width, the apex rather narrowly rounded; length of basal segment of flagellum equal to segments 2 and 3 combined; scutum with a rather deep, median sulcus anteriorly; posterior margin of scutellum slightly impressed medially; apical margins of abdominal terga narrowly but abruptly depressed; punctures of head and thorax rather uniformly coarse, close and deep throughout, becoming somewhat more widely separated, but hardly sparse on venter of thorax and lower surface of cheeks laterad of the hypostomal carinae; punctures of discs of abdominal terga somewhat finer, densely crowded and quite uniform but somewhat coarser and more distinct laterally than in median area; tergum 5 slightly ridged medially, this area minutely and very densely punctate, lateral punctures becoming quite coarse and deep; median length of pygidium not much more than half the basal width,

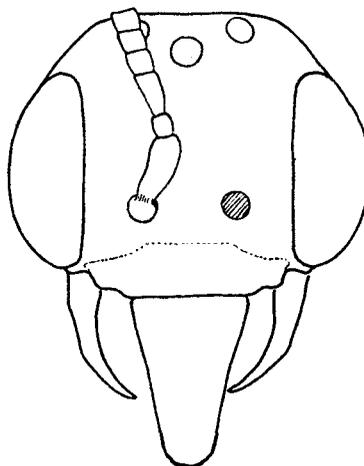


Figure 113
Facial view of head in female of
Holcopasites illinoensis.

margins carinate, strongly converging apically to the abruptly truncate and rather narrow apical margin; sternum 5 very slightly impressed medially, the apical margin slightly incurved; pubescence of head very short and inconspicuous, hardly evident, with a small amount of appressed pale tomentum around and just above antennae; pronotal collar quite densely pale tomentose, the median sulcus of scutum with a small amount of pale tomentum anteriorly; pleura thinly white pubescent above; lateral areas of scutellum and metanotum densely pale tomentose, the propodeum with a small amount of pale tomentum on each side above; basal abdominal tergum with a pair of lateral, anterior, rounded spots of yellowish tomentum, and terga 2-4 with transverse, basal, yellowish fasciae that are interrupted medially, apical margins on 1-4 very narrowly pale fasciate at each extreme side; pubescence otherwise very short, inconspicuous and hardly evident.

MALE—Length 4.5-5.5 mm.; head and thorax black, antennal flagella becoming reddish-testaceous apically beneath, piceous above; mandibles becoming reddish apically; mid and hind tibial spurs pale yellowish; inner margin of tegulae dark, outer margin becoming more or less narrowly yellowish-hyaline; wings subhyaline, veins testaceous to piceous; discs of abdominal terga ferruginous or black, apical margins rather narrowly yellowish; cheeks slightly narrower than eyes; clypeus quite flat, its median length slightly more than one-third the distance between eyes below; eyes very slightly convergent below; mandibles slender and simple; labrum

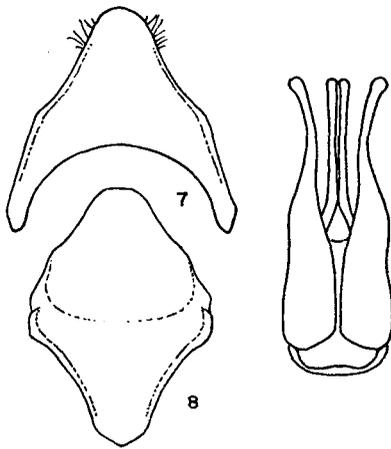


Figure 114

Sterna 7 and 8, and genital armature in male of *Holcopasites illinoensis*.

as in female; basal segment of flagellum about equal to segments 2 and 3 combined; sculpture differing but little from that of female, scutum with a rather deep, median sulcus anteriorly, posterior margin of scutellum slightly impressed medially; apical margins of abdominal terga narrowly but abruptly depressed; punctures of head and thorax rather uniformly coarse, close and deep throughout, becoming somewhat more widely separated but hardly sparse on venter of thorax and lower surface of cheeks laterad of the hypostomal carinae; punctures of discs of abdominal terga somewhat finer, densely crowded and quite uniform but somewhat coarser and more distinct laterally than in median area; tergum 5 slightly ridged medially, this area minutely and very densely punctate, lateral punctures becoming quite coarse and deep; median length of pygidial plate only slightly greater than basal width, margins strongly carinate, nearly parallel, apex broadly rounded; pattern of pubescence as in female; sterna 7 and 8 and genital armature as shown (fig. 114).

DISTRIBUTION—Illinois to Massachusetts, south to Georgia, May to August.

FLOWER RECORDS—*Ceanothus*, *Chrysanthemum*, *Erigeron* and *Oenothera*. Robertson (1929) records it also on *Coreopsis*, *Geum*, *Lespedeza* and *Pycnanthemum*.

The holotype of *Neopasites punctulatus* Linsley has been examined and compared with a rather extensive series of *illinoensis*, and there seems to be no real differ-

ence between them. There is a considerable range of variation in *illinoensis*, and *punctulatus* lies within this range.

Holcopasites pseudocarinatus new species

FEMALE—Length 5.5 mm.; head, thorax and legs black, antennae somewhat more piceous beneath apically, mandibles reddish-testaceous, and labrum reddish-testaceous apically, the clypeal margin very narrowly so; mid and hind tibial spurs pale yellowish; tegulae piceous; wings subhyaline basally, becoming very lightly infuscated apically, veins brownish to piceous; abdominal terga largely ferruginous, the impressed, apical margins somewhat more yellowish, median, basal areas to some degree blackened; cheeks much narrower than eyes; clypeus rather strongly protuberant apically, its median length somewhat less than half the distance between eyes below; eyes very slightly convergent below; mandibles slender and simple; basal width of labrum about three-fourths the median length, rather strongly tapering apically, apex rather narrowly rounded, with a smooth and shining, slightly elevated, median carina over basal two-thirds; length of basal segment of flagellum very nearly equal to segments 2 and 3 combined; scutum with a quite deep, median sulcus anteriorly; posterior margin of scutellum rather deeply grooved medially, but this only partially dividing the dorsal surface; punctures of head and thorax coarse, deep and very slightly separated in general, rather widely so on pleura, cheeks below shining and very sparsely punctate laterad of the proboscoidal fossa; abdominal terga rather finely and very densely punctate throughout, the impressed, apical rims somewhat more finely so than the discs; tergum 5 very slightly ridged medially, without evident punctures, but becoming distinctly and quite coarsely punctate on each side; pygidium rather broadly truncate apically; pubescence very thin, short and invident generally, but with some scale-like, whitish tomentum around bases of antennae, on cheeks above, across pronotum, in median sulcus of the scutum, and in a transverse line on upper part of pleura, continuing rather thinly around tubercles; lateral margins of scutellum, metanotum and propodeum with dense whitish tufts of tomentum; legs with entirely white but rather short and inconspicuous pubescence; basal abdominal tergum with a rather large, basal, triangular spot of pale yellowish tomentum on each side, terga 2-4 with a pair each of rather widely separated, median, rounded spots of pale tomentum and a lateral spot on each extreme side of the same color.

TYPE—Holotype: Female, U. Hill Farm, Madison, Wis., Aug. 6, 1946 (J. T. Medler, on sweet clover)

This species runs to *carinatus* Linsley in his key (1943) to the species of *Neopasites*. It resembles *carinatus* in a number of characters, including those used in the key, but the abdominal terga are somewhat blackened in the basal middle on 2-4, and the surface is very finely and densely punctate. In *carinatus* these terga are black, with red apical margin, and the surface is coarsely punctate. Also, the sparse punctures laterad of the proboscival fossa are described as "minute" in *carinatus*, while in *pseudocarinatus* these are quite coarse.

Neolarra Ashmead

(Fig. 67)

Neolarra Ashmead, 1890. Colo. Biol. Assoc. Bul. 1, p. 8. Type: *Neolarra pruinosa* Ashmead. Monob.

Phileremulus Cockerell, 1895. Psych 7 (sup.), p. 9. Type: *Phileremulus vigilans* Cockerell. Monob. and orig. desig.

Neolarra Michener, 1939. Amer. Ent. Soc. Trans. 65, p. 347. revision

Records of this genus in the eastern states are very few, due possibly to the extremely small size of the included species. They are parasitic in the nests of *Perdita*, and studies of the biology of the host species occurring in the East should yield data on these parasites. In addition to their minute size, they are unique among the eastern bees in the degree of reduction of the wing venation, having but one submarginal cell. Also the marginal cell is very small, and is delimited by a much thickened vein.

Neolarra (Phileremulus) cockerelli (Crawford)

Phileremulus cockerelli Crawford, 1916. Ins. Insc. Men. 4, p. 139. ♀.

FEMALE—Length 3.5 mm.; breadth of abdomen 1 mm.; head and thorax chiefly black, abdomen testaceous, becoming somewhat darkened at tip; labrum testaceous; mandibles yellowish, narrowly red apically; antennae yellowish beneath, brownish above; basal segments of legs dark, tibiae and tarsi more or less testaceous, mid and hind spurs pale yellowish; tegulae testaceous; wings subhyaline,

veins yellowish to piceous; cheeks somewhat narrower than eyes; clypeus only slightly protuberant, its median length about one-third the distance between eyes below; eyes very slightly convergent below; labrum rather broadly rounded apically, its median length about equal to basal width; mandibles simple, rather slender and elongate; basal segment of flagellum slightly shorter than pedicel, somewhat longer than segment 2, median segments considerably broader than long; axillae small, acute, conspicuously separated from margin of scutellum and from the posterior, lateral angle of the scutum, scutellum shallowly impressed medially; metanotum beneath narrowly produced, its apical margin slightly incurved; punctures fine and close but quite distinct over most of head and thorax, the propodeal triangle rather coarsely striate; abdominal terga microscopically roughened, without distinctly separated punctures; pygidial plate narrow and parallel-sided, rather elongate, margins carinate, apex very obscurely incised medially; pubescence greyish-white, very short and subappressed on face, cheeks, pleura and propodeum, very thin and hardly evident on scutum and scutellum but quite dense, appressed and scale-like on the lateral, posterior angles, on the metanotal process, and on propodeum beneath the median triangle; legs thinly but entirely whitish pubescent; pubescence of abdominal terga extremely short and thin, subappressed, forming rather thin, indefinite and barely evident, apical fasciae toward the sides, apical margins of the terga narrowly yellowish-hyaline.

DISTRIBUTION—Texas to Tennessee and Georgia, May to July.

HOST—One specimen of this parasite was collected by R. R. Snelling flying over a nesting area of *Perdita obscurata*.

Epeoloides Giraud

Epeoloides Giraud, 1863. Zool.-Bot. Gesell. Wien, Verh. 13, p. 45. Type: (*Epeoloides ambiguus* Giraud) = *Apis coecutiens* Fabricius. Monob.

Viereckella Swenk, 1907. Ent. News 18, p. 298. Type: *Viereckella obscura* Swenk. Orig. desig.

Epeoloides Crawford, 1917. Ent. Soc. Wash. Proc. 19, p. 167. (synonymy)

This genus is represented in the eastern United States by a single species which probably is a parasite in the nests of *Macropis*. In the front wing (fig. 67) the stigma is well developed but rather short,

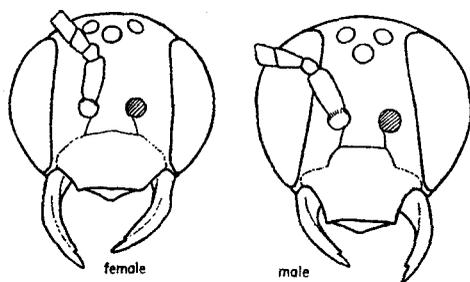


Figure 115
Facial views of head in male and female of
Epeoloides pilosula.

the marginal cell is elongate, obliquely truncate apically, and there are three submarginal cells, the 2nd shorter than the others. Both sexes are entirely black, smooth and shining; with fine or minute puncturation, and in both the abdomen is acutely pointed posteriorly, with the pygidium well developed, but there is no pseudopygidial area. The pubescence is short but densely plumose. The eyes in the female are parallel, but in the male they are strongly convergent above, the ocellar area thus much restricted.

Epeoloides pilosula (Cresson)

(Figs. 115 & 116)

Nomada pilosula Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 77. ♂.

Epeolus pilosulus Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 426. ♀.
New synonymy

Nomia compacta Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 337. ♂.
New synonymy

Viereckella ceanothina Cockerell, 1907. Ent. News 18, p. 300. ♀.

Epeoloides nearcticus Ducke, 1909. Rev. Ent. Caen, 27, p. 39. ♀.

FEMALE—Length 7-9.5 mm.; black, antennal flagella somewhat more piceous, apical tarsal segments becoming brownish, spurs pale testaceous; tegulae black, minutely and rather sparsely punctate; wings hyaline basally, becoming lightly infuscated at apex, veins brownish to piceous; cheeks slightly narrower than eyes; clypeus rather strongly protuberant, its median length about half the distance between eyes; eyes subparallel (fig. 115); mandibles with a small, inner, subapical tooth; median length of labrum about half the breadth, margin broadly truncate and straight; shorter side of basal segment of flagellum slightly longer than pedicel, the

longer side subequal to segment 2, following segments only slightly longer than broad; surface of head and thorax shining, punctures quite coarse, deep and distinct, quite close over lower half of face and clypeus, rather sparse on each side above antennae and on vertex medially, well separated on scutum and scutellum, quite close on pleura, minute and sparse over most of propodeum; abdominal terga smooth and shining, punctures exceedingly minute and rather sparse, apical margins only very slightly impressed, becoming narrowly yellowish-hyaline on the rims; median length of pygidium about equal to basal width, margins carinate, strongly converging to the very narrowly rounded or subtruncate apex; scutellum rather deeply grooved medially; pubescence white, rather short and thin over most of head, somewhat more dense on cheeks; scutum with erect, black pubescence medially, lateral margins and a very narrow median line white pubescent; axillae with a tuft of black pubescence; pleura, propodeum and scutellum entirely pale pubescent, hairs rather long and copious; pubescence of legs largely whitish, but mid tibiae with some brownish pubescence apically, basitarsi with brownish pubescence beneath; abdominal terga with rather indefinite, whitish, apical fasciae evident toward sides but widely interrupted medially, discal pubescence extremely short and obscure, hardly evident, apparently largely pale.

MALE—Length 7.5-10 mm.; black, antennal flagella brownish beneath, more piceous above, mandibles becoming reddened apically, apical tarsal segments brownish-testaceous, spurs pale testaceous; tegulae piceous, smooth and shining, very minutely and rather sparsely punctate; wings hyaline basally, becoming somewhat clouded apically, veins testaceous to brownish; abdominal terga becoming narrowly yellowish-hyaline along rims; cheeks subequal to eyes in width; clypeus rather strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes strongly divergent below (fig. 115); lateral ocelli separated from eyes by about half their diameter; mandibles with a distinct, inner, subapical tooth; median length of labrum considerably less than half the breadth, margin very shallowly incurved on each side, but nearly straight medially, with a strong denticle; surface of head and thorax shining, punctures deep, distinct and quite coarse, quite close over most of face, somewhat more sparse on cheeks, close over most of scutum, but becoming rather sparse posteriorly and rather sparse on scutellum anteriorly, quite close over most of pleura; propodeum shining, punctures minute and sparse

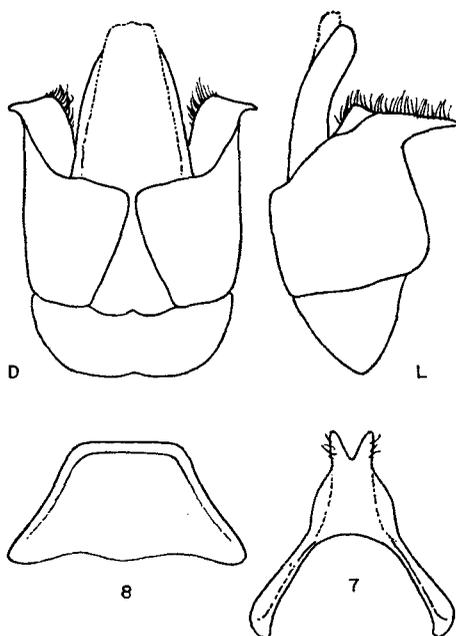


Figure 116

Sterna 7 and 8, and dorsal and lateral views of genital armature in male of *Epeoloides pilosula*.

posteriorly, becoming somewhat deeper and closer on each side; abdominal terga shining, punctures minute, well separated, rather close at sides but becoming rather sparse medially, apical margins of terga only very slightly and narrowly impressed; pubescence of head rather copious but short, entirely whitish, not hiding surface, scutum with fuscous pubescence medially, and axillae with a tuft of fuscous hairs, thorax otherwise largely covered with rather copious, whitish pubescence that does not obscure the surface; abdominal terga with rather indefinite, whitish, apical fasciae, these widely interrupted on the more basal terga, discal pubescence very short but erect, apparently entirely pale; pygidial plate narrow, tongue-like, slightly narrower toward base than toward apex, rounded apically; sterna 7 and 8, and genital armature as shown (fig. 116).

DISTRIBUTION—Michigan to the New England states, south to Georgia, June and July.

FLOWER RECORDS—*Apocynum*, *Galax*, *Houstonia* and *Rubus*.

Melecta Latreille

(Fig. 118)

- Melecta* Latreille, 1802. Hist. Nat. Fourmis, p. 427. Type: (*Apis*) *Centris punctata* (Fabricius). Desig. by Latreille, 1810.
Symmomorpha Klug, 1807. Mag. of Insektenk 6, pp. 198-227. Type: (*Apis*) *Centris punctata* (Fabricius). Monob.
Bombomelecta Patton, 1879. U. S. Geol. and Geog. Surv. Bul. 5, p. 370. Type: *Melecta thoracica* Cresson. Monob.
Melecta Linsley, 1939. Ent. Soc. Amer. Ann. 32, pp. 433-463. (revision)

Bees in the genus *Melecta* are rather robust parasites in the nests of *Anthophora*, and they bear a superficial resemblance to the host species. The marginal cell is very short, not reaching beyond the outer limits of the 3rd submarginal cell. The maxillary palpi have 5 or 6 segments. The inner ramus of the tarsal claws is long and slender. Species of *Melecta* differ conspicuously from those in *Xeromelecta* in lacking any ornamentation of the abdominal terga with pale tomentose bands or spots.

Melecta (Melecta) pacifica atlantica Linsley

(Figs. 117 & 118)

- Bombomelecta thoracica* Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records). (misident.)
Melecta (Melecta) atlantica Linsley, 1943. N. Y. Ent. Soc. Jour. 51, p. 225. ♀.
Melecta (Melecta) atlantica Michener, 1948. Ent. Soc. Wash. Proc. 50, p. 17. ♀ ♂.
Melecta pacifica atlantica Michener, 1954. Kans. Ent. Soc. Jour. 27, p. 66.

FEMALE—Length 12-13 mm., breadth of abdomen 5-5.5 mm.; entirely black, including antennae, mandibles, legs, spurs and tegulae; wings subhyaline at base, becoming lightly infuscated apically, veins brownish to piceous; cheeks about as broad as eyes; clypeus strongly protuberant, its median length somewhat less than half the distance between eyes below; eyes very slightly convergent below; mandibles with a robust, inner, submedian tooth (fig. 118); labrum strongly reflexed at sides, its median length only slightly less than basal width, apical margin subtruncate medially; basal segment of flagellum somewhat longer than segment 2, median segments slightly longer than broad; scutellum bilobed, the lobes acute but hardly spinose apically; punctures densely crowded over most of head

and thorax, somewhat more distinct on clypeus, apical margin narrowly shining and impunctate, and labrum shining, with irregular, scattered and rather vague punctures; abdominal terga smooth and somewhat shining, punctures exceedingly minute, well separated on basal tergum but becoming progressively closer on the more apical terga, becoming quite densely crowded on terga 4 and 5; pygidium very narrow and elongate, narrowly rounded apically; pubescence bright ochraceous to almost fulvous on scutum, scutellum, prothoracic tubercles and across pronotum, the vertex with some pale ochraceous pubescence posteriorly, otherwise head and thorax with copious and elongate black pubescence, and legs entirely black pubescent; basal abdominal tergum with some elongate and rather copious pubescence anteriorly, this usually black but with an intermixture of pale hairs in some specimens, the following terga with rather dense but fine, suberect, black pubescence that does not hide the surface, hairs becoming somewhat more elongate laterally on the more apical terga.

MALE—Length 12 mm., breadth of abdomen 5 mm.; entirely black, including antennae, mandibles, legs, spurs and tegulae; wings subhyaline basally, becoming lightly infuscated apically, veins piceous; cheeks slightly broader than eyes; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; labrum quite strongly reflexed laterally, median length only slightly less than the breadth, apical margin subtruncate medially; mandibles with a robust, inner, subapical tooth; basal segment of flagellum subequal to segment 2, following segments about the same length, very slightly

longer than broad; scutellum strongly bilobed, the lobes angulate but hardly spinose; entire thorax, and head in large part, very finely and densely punctate; clypeus somewhat more distinctly punctate apically, the margin shining; labrum shining, with irregular, more or less separated punctures; vertex somewhat more coarsely but closely punctate; abdominal terga somewhat shining, punctures exceedingly minute, slightly separated on the more basal terga, becoming progressively closer laterally and on the more apical terga; tergum 7 ending in a quite narrow process which is slightly emarginate; scutum and scutellum densely covered with long, copious, pale ochraceous pubescence, tubercles with a fringe of pale hairs, pronotum in large part and vertex posteriorly pale pubescent; head and thorax otherwise with copious and elongate black pubescence, legs entirely black pubescent; basal abdominal tergum with considerable erect and rather copious, largely black pubescence anteriorly, following terga rather densely covered with very short, erect, black pubescence which does not hide surface; sterna 7 and 8 and genital armature as shown (fig. 117).

DISTRIBUTION—Kansas to New Jersey, south to Alabama and Georgia, March to May.

FLOWER RECORDS—Robertson (1929) records this species (as *Bombomelecta thoracica*) on *Fragaria*, *Lithospermum* and *Pentstemon*.

HOST—Collection records indicate the probability that *Anthophora ursina* is the host of *atlantica*.

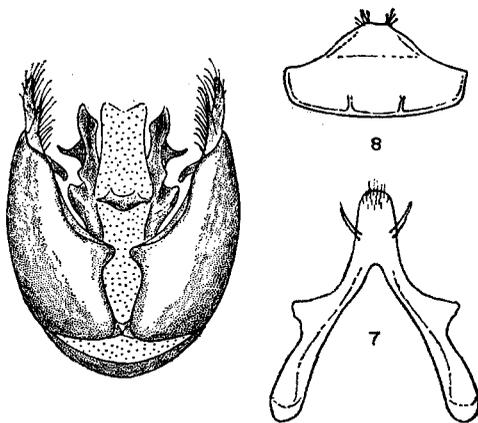


Figure 117

Sterna 7 and 8, and genital armature in male of *Melecta pacifica atlantica*.

Xeromelecta Linsley

(Fig. 118)

Melecta subg. *Xeromelecta* Linsley, 1939. Ent. Soc. Amer. Ann. 32, p. 450. Type: *Bombomelecta larreae* Cockerell. Monob. and orig. desig.

Xeromelecta Hurd and Linsley, 1951. Calif. Ins. Surv. Bul. 1, p. 119.

This genus of parasites is very similar to *Melecta*, but differs in having only 3 or 4 segments in the maxillary palpi, and in having the abdominal terga conspicuously ornamented with dense, cream-colored bands or spots of appressed tomentum. The inner ramus of the tarsal claws is short and lobe-like.

KEY TO SPECIES

Males & Females

1. Propodeal spiracle bounded posteriorly by

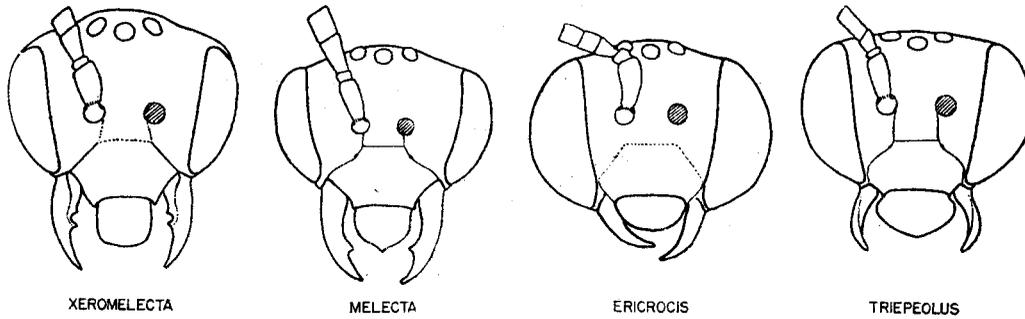


Figure 118—Facial view of head in females of the parasitic genera of Anthophoridae.

an elevated rugose ridge which is strongly carinate above *californica* (Cresson) (below)
 Surface of propodeum posterior to spiracle quite flat and unmodified
 *interrupta* (Cresson) (p. 496)

Xeromelecta (Melectomorpha) californica (Cresson)

(Fig. 119)

Melecta californica Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 91. ♂ ♀.

Melecta miranda Fox, 1893. Ent. News 4, p. 143. ♀.

Pseudomelecta pasadenensis Cockerell, 1910. Ann. Mag. Nat. Hist. (8) 5, p. 27. ♀.

Melecta sladeni Viereck, 1924. Canad. Ent. 56, p. 15. ♀.

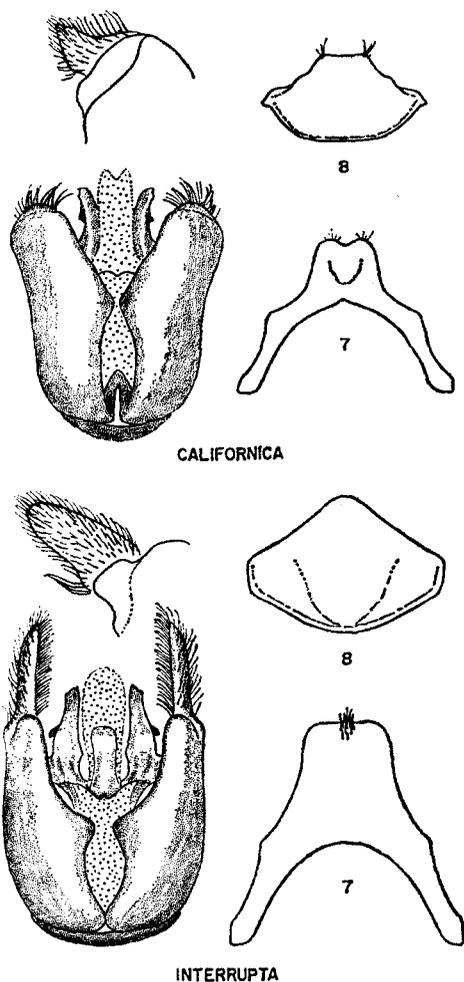
Melecta miranda Hicks, 1926. Univ. Colo. Studies 15, p. 224. (biology)

Melecta californica Linsley and MacSwain, 1942. Amer. Midland Nat. 27, p. 408. (biology)

Xeromelecta (Melectomorpha) californica Hurd and Linsley, 1951. Calif. Ins. Surv. Bul. 1, No. 5, p. 132 and map. 5.

FEMALE—Length 8-14 mm., breadth of abdomen 3-4.5 mm.; black, mandibles somewhat paler apically, apical tarsal segments becoming brownish, spurs piceous; tegulae testaceous-hyaline; wings subhyaline, with brown blotches, apex just beyond the outermost cells abruptly and deeply infuscated, veins brownish to piceous; cheeks much narrower than eyes; clypeus strongly protuberant, its median length somewhat less than half the distance between eyes below; eyes very slightly convergent below; mandibles slender apically, inner margin with a pair of distinct, inner teeth toward base; median length of labrum about equal to the breadth, apical margin subtruncate; basal segment of flagellum slightly longer than segment 2, median segments about as long as broad; scutum

slightly sulcate medially, sparsely punctate and shining near mid-line anteriorly, somewhat depressed in region of notaulices; scutellum quite deeply grooved and lobate, each lobe acute apically; lateral faces of propodeum with a rugose ridge posterior to spiracle, this strongly carinate above and united with anterior lip of spiracle; face, clypeus and cheeks closely and rather finely punctate in general, punctures somewhat coarser and more distinct below ocelli and on vertex laterally; thoracic punctures somewhat coarser, deeper and more distinctly separated, somewhat finer and closer on scutum between notaulices and tegulae, quite coarse and nearly contiguous over most of pleura, the propodeum laterally more reticulate; abdominal terga rather smooth, punctures exceedingly minute, close and obscure beneath dense tomentum; pygidium narrow and elongate, shining, with a low median ridge, margins carinate, apex narrowly rounded; pubescence of head quite copious but rather short, very short and dense over clypeus, hiding the surface, more elongate and erect above antennae, greyish-white in large part, with some intermixture of brownish hairs on upper part of face and on vertex, somewhat darkened on cheeks posteriorly; anterior third of scutum with a pair of subquadrate patches of short, fuscous pubescence that are narrowly fringed posteriorly with pale hairs and separated by a median band of ochraceous pubescence; latero-anterior angle of scutum, pleura above, and propodeum in large part, with quite copious, dense and erect, whitish pubescence; posterior two-thirds of scutum with very short and thin blackish pubescence that is quite obscure, axillae densely covered with short fuscous or blackish pubescence, and scutellum with erect, fuscous hairs and fringed posteriorly with fine, whitish pubescence; abdominal terga 1 and 2 with conspicuous, transverse, apical bands of whitish tomentum that are rather widely separated medially, slightly narrowed laterally, quite abruptly broadened at sides



CALIFORNICA

INTERRUPTA

Figure 119

Sterna 7 and 8, dorsal view of genital armature, and lateral view of gonostyli in males of *Xeromelecta*.

to occupy the entire lateral margins; terga 3 and 4 with a pair of submedian rounded spots of whitish tomentum that are more or less separated from similar lateral tomentose areas, resulting in four more or less distinct spots; tergum 5 with a very narrow submedian pale fascia that is slightly interrupted medially; discs of terga otherwise quite densely covered with very fine, appressed, black tomentum, contrasting sharply with the yellow-tomentose maculations; pleura fuscous pubescent below; legs basally with very short, largely whitish pubescence, tibiae with pale pubescence on outer face but with basal and apical areas of very short, dark pubescence, resulting in a spotted appearance; basitarsi

with pale pubescence on outer face, inner surfaces densely covered with brownish hairs.

MALE—Length 9-13 mm., breadth of abdomen 3-4 mm.; black, mandibles faintly testaceous apically, tarsal segments becoming brownish apically, spurs piceous to black; tegulae testaceous-hyaline; wings subhyaline, with brownish infusions apically, apex beyond the cells abruptly and deeply infuscated, veins brownish to piceous; cheeks somewhat narrower than eyes; clypeus strongly protuberant, its median length slightly less than half the distance between eyes below; eyes rather strongly convergent below; mandibles slender apically, with a pair of well developed, inner, submedian teeth; basal segment of flagellum considerably longer than segment 2, median segments slightly broader than long; median length of labrum somewhat greater than breadth, apical margin subtruncate, sides parallel; scutum shallowly sulcate medially and somewhat depressed in region of notaulices; scutellum rather deeply impressed medially, bilobate, apex of each lobe subacute; lateral faces of propodeum with a rugose ridge posterior to spiracle, this strongly carinate above and united with anterior lip of spiracle; punctures of cheeks, lower part of face and clypeus quite close and rather fine, becoming somewhat coarser and more distinctly separated above antennae and across vertex; thoracic punctures relatively coarse and deep, well separated over most of scutum and scutellum, becoming fine and close along notaulices, close to crowded on pleura, close and somewhat finer on propodeum; abdominal terga relatively smooth, punctures microscopic and rather close and uniform beneath dense tomentum, the narrow apical margins relatively smooth, especially on the more apical terga; pubescence of face and cheeks quite copious, greyish-white in general, some dark hairs intermixed at sides of face below antennae, around ocelli, and on cheeks posteriorly; anterior third of scutum with a pair of small angulate spots of fuscous pubescence on each side of median sulcus, separated by an equally wide area of pale pubescence that reaches the latero-apical angles; pleura above and propodeum with rather elongate, greyish-white pubescence; posterior two-thirds of scutum with rather short but erect blackish pubescence, axillae densely covered with short, black pubescence, and scutellum with scattered, elongate dark hairs in the generally light pubescence; pubescence of pleura below fuscous, more or less intermixed with a few pale hairs, legs largely pale pubescent, outer surface of front tibiae with a median, transverse band of short fuscous pubescence, mid tibiae densely covered with short, cream-

colored tomentum through most of its length, and hind tibiae thinly covered with whitish pubescence; tarsi largely covered with thin, whitish pubescence on outer surface, inner surface with dense brownish pubescence; abdominal terga 1-5 with broad and conspicuous, apical or subapical bands of dense, whitish tomentum, these slightly separated medially, more or less constricted toward the broadened outer ends which more or less completely cover the lateral margins, those on 3-5 more or less widely removed from apical margin and subinterrupted laterally; tergum 6 with a pair of small, rather widely separated and indefinite spots of pale tomentum; pygidial plate of tergum 7 represented by a pair of angles, separated by a triangular, median, emarginate area; sterna 7 and 8 and genital armature as shown (fig. 119).

DISTRIBUTION—Mexico to British Columbia, east to Illinois. It is probably in flight through the summer months.

HOST—*Anthophora abrupta*. Other species of *Anthophora* have been recorded as hosts in the West.

Xeromelecta (Melectomorpha)
interrupta (Cresson)

(Fig. 119)

Melecta interrupta Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 275. ♀ ♂.

Melecta interrupta var. *fallugiae* Cockerell, 1904. Ann. Mag. Nat. Hist. (7) 14, p. 13.

Melecta interrupta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Xeromelecta (Melectomorpha) interrupta Hurd and Linsley, 1951. Calif. Ins. Surv. Bul. 1, p. 132 and Map 5.

FEMALE—Length 15-16 mm., breadth of abdomen 5 mm.; black, mandibles ferruginous medially, legs dark red to piceous, spurs black; tegulae brownish to testaceous-hyaline; wings quite uniformly infuscated, somewhat darker apically, with hyaline band along the outermost veins, these brownish to piceous; cheeks somewhat narrower than eyes; clypeus strongly protuberant, its median length about half the distance between eyes below; eyes slightly convergent below; mandibles slender apically, inner margin with a pair of distinct, inner teeth toward base; median length of labrum about equal to the breadth, apical margin subtruncate; basal segment of flagellum slightly longer than segment 2, median segments about as long as broad; scutum slightly sulcate medially, somewhat depressed in region of notaulices; scutellum shallowly grooved

and lobate; pygidial plate broadly triangular; face, clypeus and cheeks rather closely and finely punctate in general, the punctures somewhat more widely separated between eyes and ocelli and on vertex medially; thoracic punctures rather fine and close, coarser on pleura below, and close on scutum between notaulices and tegulae; propodeum laterally not ridged, finely punctate; abdominal terga rather smooth, punctures exceedingly minute, close and obscure beneath dense tomentum; pygidium broadly triangular, margins carinate, apex narrowly rounded; pubescence of head quite copious but rather short, pale yellow around antennae and along vertex, blackish on cheeks and across lower part of face, anterior third of scutum and pleura above with quite dense, yellowish pubescence, and dense tufts of longer yellow hairs on propodeum posterior to wing bases, the posterior and lateral faces dark pubescent, that on pleura below and venter of thorax black; abdominal terga 1-3 with conspicuous, transverse, apical bands of pale yellowish tomentum that are interrupted medially, narrowly broadened at sides to occupy most of lateral margins; tergum 4 quite broadly tomentose on each side, these areas well separated medially; tergum 5 with similar but smaller tomentose areas; discs of terga otherwise quite densely covered with very fine, appressed, black tomentum, contrasting sharply with the yellow-tomentose maculations; legs with short, largely dark pubescence.

MALE—Length 13-14 mm., breadth of abdomen 4.5-5.0 mm.; black, including mandibles, legs and spurs; tegulae piceous; wings quite deeply infuscated, a hyaline band along outermost veins, these piceous to black; cheeks somewhat narrower than eyes; clypeus strongly protuberant, its median length slightly less than half the distance between eyes below; eyes rather strongly convergent below; mandibles slender apically, with a pair of well developed, inner, submedian teeth; basal segment of flagellum considerably longer than segment 2, median segments distinctly broader than long; median length of labrum subequal to breadth, apical margin subtruncate, sides parallel; scutum shallowly sulcate medially and somewhat depressed in region of notaulices; scutellum shallowly impressed medially, bilobate, apex of each lobe obtuse; punctures of lower part of face and clypeus quite close and rather fine, becoming somewhat coarser and more distinctly separated above antennae, on cheeks and across vertex; thoracic punctures relatively coarse and deep, slightly separated over most of scutum and scutellum, very fine and close between notaulices and tegulae, close on pleura, somewhat

finer on propodeum; abdominal terga relatively smooth, punctures microscopic and rather close and uniform beneath dense tomentum, the narrow apical margins relatively smooth, especially on the more apical terga; pubescence of face and cheeks quite copious, yellowish in general, some dark hairs intermixed at sides of face below antennae, across clypeus and on cheeks; anterior third of scutum, upper part of pleura, and posterior, lateral angle of propodeum with dense and elongate, pale yellowish to fulvous pubescence, otherwise thorax with short black pubescence; axillae densely covered with short, black pubescence; legs largely black pubescent, but front femora with a few pale hairs toward apex posteriorly, and mid tibiae densely covered with short, cream-colored or yellowish tomentum through most of its length; abdominal terga 1-5 with broad and conspicuous, apical bands of dense, pale yellowish or fulvous tomentum, these rather widely interrupted medially, outer ends broadened to cover most of each plate; apical margins of tergum 7 with a shallow, median emargination; sterna 7 and 8 and genital armature as shown (fig. 119).

DISTRIBUTION — Arizona and Colorado to Minnesota, Wisconsin and Illinois. It is probably in flight through the summer months.

FLOWER RECORD—Robertson (1929) records this only on *Pycnanthemum flexuosum*.

HOST—*Anthophora abrupta*.

Ericrocis Cresson

(Fig. 118)

Ericrocis Cresson, 1887. Amer. Ent. Soc. Trans. Sup. Vol. pp. 131 & 134. Type: *Crocisa? lata* Cresson. Monob.

Ericrocis Linsley, 1939. Ent. Soc. Amer. Ann. 32, pp. 463-468. (revision)

Ericrocis more nearly resembles *Xeromelecta* than any of the other parasitic Anthophoridae. The species are probably parasitic on *Centris*, but are of very rare occurrence in the eastern United States. The abdomen is sharply acute at apex, and lacks the pseudopygidial area found in many other parasites. In this it resembles *Melecta* and *Xeromelecta*, but differs from both in having a much elongated marginal cell. In the male the abdomen has no pygidial plate, and the mid tibial spurs are

blunt apically, to some degree emarginate or bifurcate. In the pubescence these bear a strong resemblance to *Xeromelecta*, having very similar patterns of pale tomentose bands or spots on the abdominal terga.

Ericrocis lata (Cresson)

(Fig. 120)

Crocisa? lata Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 91. ♂.

Ericrocis lata Cresson, 1887. Amer. Ent. Soc. Trans. Sup. Vol., p. 298.

FEMALE—Length 11 mm., breadth of abdomen 4 mm.; black, antennae piceous beneath, black above, apical tarsal segments becoming more piceous, mid and hind spurs brownish-testaceous; tegulae yellowish-hyaline, very large, broadly rounded or subtruncate posteriorly; wings pale brownish basally, becoming quite deeply infuscated toward apical margin, veins brownish to piceous; cheeks much narrower than eyes; clypeus quite flat, its median length about half the distance between eyes below; eyes slightly convergent below (fig. 118); mandibles with a slight, inner, subapical angle; basal segment of flagellum slightly shorter than segment 2, median segments very slightly longer than broad; mid tibial spurs deeply incised just before apex; scutellum deeply grooved; punctures over median and lower parts of face and on cheeks fine and close beneath dense pubescence, face and vertex above shining and bare, punctures relatively coarse, deep and sparse, becoming close and fine along margin of vertex; scutum with a deep, median, longitudinal sulcus; punctures of scutellum, and of scutum medially and posteriorly, extremely minute and close, densely crowded, becoming more coarse and distinctly separated toward sides anteriorly; pleura quite coarsely punctate, closely so above, beneath dense pubescence, the lower exposed area with coarse, irregular punctures that are to some degree separated, interspaces shining; lateral faces of propodeum largely bare and shining, punctures shallow but rather close, obsolescent below; punctures of abdominal terga uniformly microscopic and densely crowded, surface becoming almost tessellate rather than punctate; pygidium rather indefinite, its median length slightly less than basal width, margins subcarinate, surface quite coarsely punctate toward base, becoming smooth and shining apically, apex subacute; median area of face around antennae densely covered with short but copious, whitish or golden pubescence, lower half of face, cheeks, and vertex in part, black pubescent; area below ocelli largely

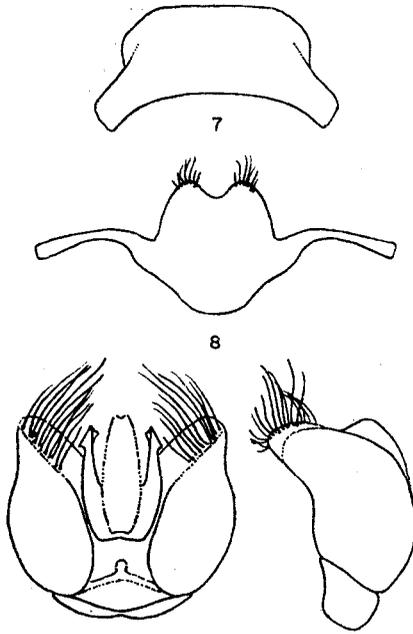


Figure 120

Sterna 7 and 8, and dorsal and lateral views of genital armature in male of *Erirocis lata*.

bare, vertex fringed posteriorly with lighter pubescence; upper part of pleura quite densely ochraceous pubescent, and propodeum with an area of dense, elongate, ochraceous pubescence behind wing bases; scutum anteriorly with some brownish pubescence on each side and in median sulcus, these separated by a narrow area of more fuscous pubescence, the posterior two-thirds, axillae and clypeus with very short, subappressed, fuscous tomentum, propodeum medially with some erect, black pubescence; lower portion of pleura with very short, black pubescence which does not obscure surface, and legs largely black pubescent, but tibiae with a basal area of ochraceous pubescence on outer face; basal abdominal tergum broadly yellow tomentose on each side, this area rather broadly rounded and rather widely separated medially; apical impressed areas of terga 2-5 yellow tomentose on each side, these areas widely separated

medially but connected by a broad, lateral, continuous band, those on tergum 2 extended for some distance obliquely toward midline; discs of terga otherwise densely black tomentose, contrasting sharply with the yellow tomentose areas; tergum 6 with rather sparse, erect, black bristles.

MALE—Length 12 mm., breadth of abdomen 4 mm.; black, antennae piceous, apical tarsal segments becoming piceous, and mid and hind spurs brownish-piceous; tegulae yellowish-hyaline, very large, broadly rounded posteriorly; wings lightly infuscated basally, becoming quite deeply so apically, veins brownish to piceous; cheeks nearly equal to eyes in width; clypeus rather strongly protuberant, its median length about half the distance between eyes below; eyes slightly convergent below; mandibles rather slender, with a slight, inner, subapical angle; shorter side of basal segment of flagellum subequal to segment 2, median segments about as broad as long; mid tibial spur as in female; scutum with a deep, median sulcus, the scutellum deeply grooved medially; puncturation of head and thorax much as in female; puncturation of abdominal terga 1-4 as in female, but terga 5-7 becoming more coarsely, distinctly and closely punctate; apical margin of tergum 7 slightly incised medially; pubescence of face quite dense and copious but rather short, largely yellow, with an obscure fringe of black hairs on clypeus laterally, labrum entirely black; median length of labrum slightly greater than half the breadth, margin truncate medially; cheeks black pubescent; vertex largely ochraceous pubescent, but with some dark hairs around ocelli and toward upper end of eyes; pubescence of thorax and legs much as in female, but scutellum with a rather distinct band of short, ochraceous pubescence on each side; lateral, yellow tomentose areas of basal abdominal tergum narrowly rounded at inner end, nearly meeting; apical impressed areas of terga 2-5 yellow tomentose as in female, but bands less widely separated medially, those on 5 more whitish, discal pubescence very short and black as in female; sterna 7 and 8 and genital armature as shown (fig. 120).

DISTRIBUTION—Southern California to Florida, May or June.

FAMILY XYLOCOPIDAE

Only two genera are included in the Xylocopidae as it occurs in the Eastern United States, *Ceratina*, the small carpenter bees, and *Xylocopa*, the large carpenter bees. In both of these genera there are three submarginal cells in the front wing, the second subtriangular in form; the glossa is of the slender, elongate form; the clypeus is quite flat; the lower end of the eye is in practical contact with the base of the mandible, the malar space thus lacking; there are no facial foveae and no pygidial plate; the front coxae are transverse; and the scopa is located on the hind tibiae and basitarsi.

KEY TO GENERA

1. Large and robust (20 mm. or more); 1st transverse cubitus nearly parallel to costa; metanotum vertical in position, forming a part of the posterior surface of the thorax *Xylocopa* (p. 507)
- Relatively small (6-8 mm.), slender; 1st transverse cubitus oblique with respect to the costa; metanotum horizontal, forming a part of the dorsal surface of the thorax *Ceratina*

Ceratina Latreille

(Fig. 121)

Clavicera Latreille, 1802. Hist. Nat. Fourmis, p. 433. Type: (*Hylaeus albilabris* Fabricius) = *Apis cucurbitina* Rossi. Monob.

Ceratina Latreille, 1802. Hist. Nat. Crust. Ins. 3, p. 380. Proposed to replace *Clavicera*. Type: (*Hylaeus albilabris* Fabricius) = *Apis cucurbitina* Rossi.

Zadontomerus Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 69. Type: *Ceratina tejonensis* Cresson. Monob. and orig. desig.

Zadontomerus Cockerell and Porter, 1899. Ann. Mag. Nat. Hist. (7) 4, p. 406. Emend.

Ceratina Smith, 1907. Amer. Ent. Soc. Trans. 33, p. 115. (key)

Ceratina Sandhouse, 1935. Ent. Soc. Wash. Proc. 37, p. 93. (eastern spp.)

Zadontomerus Michener, 1936. Amer. Mus. Novitates 844, p. 1. (key)

Ceratinula Moure, 1941. Mus. Paranaense Arq. 1, p. 78. Type: *Ceratina lucidula* Smith. Orig. desig.

Our species of *Ceratina* are black, bluish-green or blue, often with yellowish or ivory maculations on the clypeus, pronotal tubercles and legs. In the front wing the stigma is well developed. Although the

clypeus is quite flat, the labrum is quite fully exposed by the closed mandibles. These have a broad base, but the upper margin is deeply concave, with the apex slender. The labrum fits into the resulting space. The thorax is gradually declivous posteriorly, the menanotum and dorsal area of the propodeum forming a part of the dorsal surface. The abdomen in the female is obtusely angulate at the apex, while in the male the sixth tergum may bear a low median tuft of hairs that superficially resembles the angle in the females. Tergum 7 in the males is well developed, occupying a more ventral position, and is either conspicuously carinate or tuberculate.

These bees commonly nest in the pithy stems of plants. Several papers on their biology have been published by Ashmead, Packard, Rau, Graenicher, Hicks and Krombein. (See *C. dupla*. p. 503)

KEY TO SPECIES

Females

1. Scutum and head in large part polished and impunctate
 *cockerelli* H. S. Smith (p. 501)
 Head and scutum with numerous coarse, deep and distinct punctures 2
2. Front tibiae with a basal ivory stripe . 3
 Front tibiae with at most a basal ivory spot; usually larger (7 mm. or more) 4
3. Small (5-6 mm.); scutellum somewhat swollen, the punctures well separated; color usually more greenish
 *metallica* H. S. Smith (p. 506)

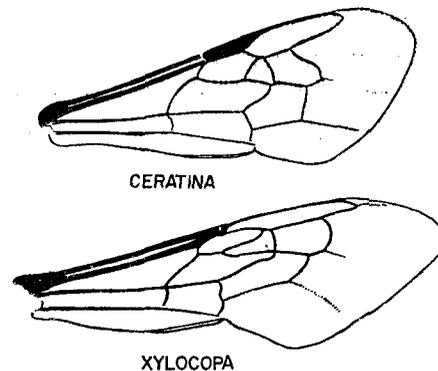


Figure 121
Venation of front wing in *Ceratina* and
Xylocopa.

- Usually larger; scutellum quite flat, and closely punctate; color more bluish . . .
dupla floridana new subspecies (p. 505)
- 4(2). Abdominal terga 2 and 3 with close, almost crowded punctures, separated in center of discs by less than their own diameter
dupla floridana new subspecies (p. 505)
 Punctures in center of discs of abdominal terga more widely separated 5
5. Area between notaulices of scutum with numerous punctures; clypeus with a yellow spot . . . *dupla dupla* Say (p. 503)
 Area between notaulices of scutum polished, with few if any punctures; clypeus maculated or not
calcarata Robertson (p. 502)

Males

1. Carinate apex of tergum 7 composed of two widely separated, acute tubercles
cockerelli H. S. Smith (p. 501)
 Apex of tergum 7 with a single, median, lobe-like carina 2
2. Hind femur somewhat dilated toward base, but without a median projection, the greatest width near the base hardly more than a third its length 3
 Hind femur with a median, triangular projection, width at this point about equal to half the length 4
3. Color deep blue; tergum 3 more closely punctate, interspaces no greater than diameter of punctures; carina of tergum 7 broadly rounded, subtruncate medially
dupla floridana new subspecies (p. 505)
 Color usually more greenish; tergum 3 less closely punctate, interspaces considerably greater than diameter of punctures; carina of tergum 7 more regularly rounded
dupla dupla Say (p. 503)
- 4(2). Carina of tergum 7 very narrow, fully as long as broad, and not over a fourth as broad as the tergum
metallica H. S. Smith (p. 506)
 Carina of tergum 7 at least twice as broad as long, fully half as broad as width of the tergum
calcarata Robertson (p. 502).

Ceratina (Ceratinula) cockerelli H. S. Smith

(Figs. 122 and 124)

- Ceratina lunata* H. S. Smith, 1907. Amer. Ent. Soc. Trans. 33, p. 119. ♂ ♀. Preocc.
Ceratina cockerelli H. S. Smith, 1907. Canad. Ent. 39, p. 260. (new name)

FEMALE—Length 3.5-4.5 mm.; general body color black, clypeus with a median, oblong, yellow maculation; legs piceous basally, outer surface of front tibiae ivory, the tarsi yellow; mid and hind tibiae relatively dark, with rather small and obscure, basal, yellowish maculations, the tarsi becoming yellowish apically, spurs pale yellow; tubercles ivory; tegulae yellowish-hyaline; wings subhyaline, veins testaceous to piceous; cheeks about equal to eyes in width, somewhat swollen below; clypeus quite flat, its median length about equal to apical width; mandibles tridentate apically; eyes slightly convergent below; segments 2-6 of flagellum somewhat broader than long; surface of head and thorax largely polished, head impunctate except for a few punctures across vertex and along inner orbits; pleura with minute, slightly separated and rather vague punctures; scutum minutely punctate anteriorly and posteriorly; scutellum with very fine and rather close punctures; propodeum rather dull and finely tessellate; abdominal terga 1-2 smooth but rather dull, practically impunctate, with only a few very minute punctures across apex of 2, 3 with minute scattered punctures across base and over apical half, 4 and 5 largely covered with rather deep but very fine and quite close punctures; pubescence very short, thin and obscure, hardly evident, visible chiefly on thorax laterally and on legs, forming a whitish scopa on hind tibiae, and the more apical abdominal segments thinly whitish pubescent.

MALE—Length 3-4 mm.; general body color black, the clypeus largely yellow; labrum with a median, basal, yellow maculation and a pair of small, lateral maculations between clypeus and lower margin of eye; legs piceous basally, tarsi and spurs yellowish; front tibiae yellowish, outer surface pale ivory, and lower margin of femur narrowly yellow; mid and hind tibiae brownish-testaceous, narrowly yellow basally; tubercles ivory, the tegulae more testaceous; wings subhyaline, becoming faintly clouded apically, veins testaceous; cheeks somewhat narrower than eyes, somewhat swollen below; clypeus quite flat, median length about equal to apical width; eyes slightly convergent below; mandibles bidentate apically; segments 2-5 of flagellum considerably broader than long; hind femora slightly dilated toward base but not angulate; carina of tergum 7 produced on each side to form an acute, rather slender spine; surface of head quite smooth, polished in large part, a few punctures evident on vertex; pleura with some minute, rather vague and sparse punctures, the scutum minutely punctate anteriorly, scutellum with very minute, well separated punctures, propodeum minutely tessellate; abdominal terga somewhat roughened, discs of 1 and 2 without evident punctures, 3 with some

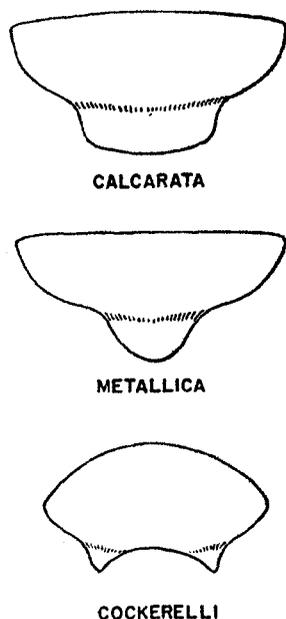


Figure 122
Tergum 6 in males of *Ceratina*.

minute punctures across the apical third, 3-5 with quite distinct, very fine and rather close punctures; pubescence extremely short, thin and obscure, hardly evident, visible chiefly on mid and hind legs and on the more apical abdominal segments; apical margin of sternum 6 deeply cleft medially, with a minute, peg-like tubercle at its base; basal stem of sternum 7 quite elongate, strongly compressed and keel like, the lateral arms very slender; gonocoxites of genital armature slender apically, strongly flexed toward mid-line, the tips approximate.

DISTRIBUTION—Georgia and Florida, January to September.

FLOWER RECORDS—*Bidens*, *Erigeron*, *Euphorbia* and *Polygala*.

***Ceratina (Zadontomerus) calcarata*
Robertson**

(Figs. 122-125)

Ceratina calcarata Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 54. ♂.

Ceratina calcarata Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 184. (biology)

Ceratina calcarata Rau, 1928. Ent. Soc. Amer. Ann. 21, p. 380. (biology)

Zadontomerus calcaratus Robertson, 1929.

Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Ceratina calcarata Krombein, 1960. Ent. News 71, p. 68. (biology)

FEMALE—Length 6.5-8 mm.; general body color bluish to blue-green, clypeus either largely black or with a median, subapical, ivory maculation; antennae somewhat more piceous apically; legs basally metallic blue-green, becoming darker on tibiae, tarsi becoming brownish-testaceous apically, spurs pale testaceous; tegulae brownish-testaceous; wings lightly infuscated, veins testaceous to piceous; cheeks very slightly narrower than eyes; clypeus quite flat, its median length somewhat more than half the apical width; mandibles distinctly tridentate apically; clypeus smooth and impunctate medially, becoming rather sparsely punctate on each side; face laterally with rather coarse, close punctures, but surface shining and largely impunctate just below antennae, and a shining impunctate area below ocelli, punctures otherwise quite coarse and deep, irregularly scattered, becoming fine and very sparse on cheeks laterally and below; punctures of thorax much finer than those on face, scutum sparsely punctate between notaulices, with only a few punctures along mid-line, becoming closely punctate anteriorly and posteriorly; scutellum finely and quite sparsely punctate medially; punctures of pleura considerably coarser, deeper and well separated, those on propodeum laterally very fine and densely crowded, becoming shallow and obscure posteriorly, dorsal face rather narrowly and finely striate along upper margin; punctures of abdominal terga rather fine but distinct, quite sparse medially, becoming close laterally on 2 and 3, and closer on the more apical terga; pubescence entirely pale, very short, thin and inconspicuous, somewhat more conspicuous and elongate on mid and hind legs.

MALE—Length 5-7 mm.; general body color blue-green, clypeus largely ivory, only narrowly greenish on each side above; labrum with a quadrate, median, yellow maculation; antennae piceous to black; legs blackish with metallic reflections, tarsi becoming testaceous apically, spurs pale yellowish; tegulae testaceous-hyaline; wings lightly infuscated, veins testaceous to piceous; cheeks much narrower than eyes; clypeus quite flat, its median length considerably greater than half the apical width; mandibles bidentate apically, having a small, subapical tooth on lower margin; segments 2 and 3 of flagellum considerably broader than long; hind femora conspicuously angulate beneath, median width about one half the length; carina of tergum 7 broadly rounded, fully twice as broad as its

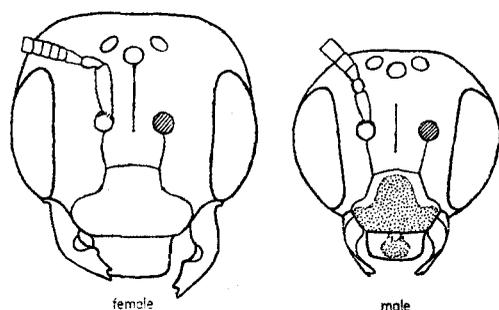


Figure 123
Facial view of head in male and female of
Ceratina calcarata.

median length; clypeus largely impunctate, face shining between the coarse and deep punctures, these rather close below antennae, becoming more irregular and sparse above, shallow and rather close on cheeks above, becoming quite sparse below; punctures of thorax much finer than those on head, sparse on scutum between notaulices, becoming close anteriorly and posteriorly; scutellum rather flat, finely and rather closely punctate, punctures only slightly separated anteriorly; coarser but deep, distinct and quite close on pleura; minute on propodeum, densely crowded on lateral faces, rather obscure on the more shining posterior face, dorsal area very finely and closely striate along upper margin; punctures of abdominal terga fine, well separated across median areas of 2-4, interspaces considerably exceeding diameter of punctures; pubescence very short, thin and obscure, more evident on thorax laterally and on legs, tergum 6 with a rather dense, median, subapical tuft of short pale hairs; apical margin of sternum 6 with a median cleft bearing a pair of peg-like processes and a shorter median process; sternum 7 Y-shaped, its basal stem rather short, the latero-apical arms very slender (as shown); sternum 8 and genital armature as shown (fig. 124).

DISTRIBUTION—Quebec and Maine, south to Missouri and Georgia, March to October.

FLOWER RECORDS—*Apocynum*, *Chrysanthemum*, *Chrysopsis*, *Crataegus*, *Fragaria*, *Geranium*, *Haplopappus*, *Hydrangea*, *Ilex*, *Malus*, *Prunus*, *Pyracantha*, *Rubus*, *Salix*, *Salvia*, *Taraxacum* and *Vaccinium*. Robertson (1929) records *calcarata* on the following: *Antennaria*, *Arabis*, *Aruncus*, *Aster*, *Blephilia*, *Cacalia*, *Camassia*, *Cardamine*, *Cercis*, *Claytonia*, *Collinsia*, *Cypripedium*, *Dirca*, *Ellisia*, *Erigenia*,

Erigeron, *Eulophus*, *Geum*, *Gillenia*, *Hepatica*, *Isopyrum*, *Lepidium*, *Osmorrhiza*, *Oxalis*, *Polemonium*, *Potentilla*, *Ranunculus*, *Rhus*, *Rudbeckia*, *Sanguinaria*, *Smilacina*, *Taenidia*, *Verbena*, *Viola* and *Zanthoxylum*.

Ceratina (Zadontomerus) dupla dupla Say

(Fig. 125)

- Ceratina dupla* Say, 1837. Boston Jour. Nat. Hist. 1, p. 397. ♀ (♂ misdet.)
Halictus Ontariensis Provancher, 1882. Nat. Canad. 13, p. 203. ♂.
Ceratina dupla Angus, 1869. Amer. Nat. 2, p. 49. (biology)
Ceratina dupla Ashmead, 1894. Psyche 7, p. 25. (biology)
Ceratina dupla Comstock and Comstock, 1895. Manual for Study of Insects, p. 669. (biology)
Ceratina dupla Packard, 1897. N. Y. Ent. Soc. Jour. 5, p. 112. (biology)
Ceratina dupla Graenicher, 1905. Ent. News 16, p. 43. (biology)
Ceratina dupla Graenicher, 1905. Wis. Nat. Hist. Soc. Bul. 3, p. 158. (biology)
Ceratina dupla var. *halophila* Cockerell, 1911. Canad. Ent. 43, p. 390. ♀.
Ceratina dupla Hicks, 1926. Colo. Univ. Studies 15, p. 250. (biology)
Ceratina dupla Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Ceratina (Zadontomerus) dupla Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1063. (larva)

FEMALE—Length 6-8 mm.; general body color blue-green, clypeus with an oblong, median, ivory maculation, antennae brownish-piceous apically beneath; legs greenish basally, the apical tarsal segments becoming brownish-testaceous, spurs pale yellowish, and front tibiae with a small, basal, ivory spot; tubercles with a small posterior ivory maculation; tegulae testaceous-hyaline; wings very lightly infuscated, veins testaceous to piceous; cheeks slightly narrower than eyes; mandibles distinctly tridentate apically; clypeus quite flat, its median length about two-thirds the apical width; segments 2-5 of flagellum distinctly broader than long; maculated area of clypeus smooth and impunctate, lateral greenish areas shallowly and coarsely punctate, face otherwise quite coarsely and rather closely punctate, with a limited impunctate area below each antenna, and punctures between ocelli and antennae rather sparse, cheeks rather finely and closely punctate above, becoming

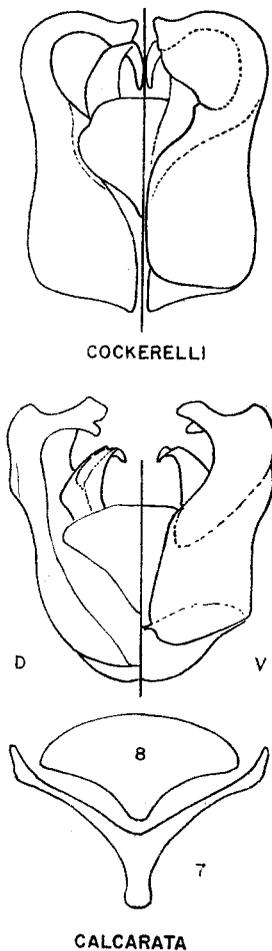


Figure 124

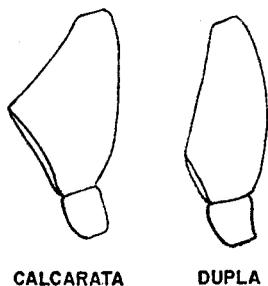
Sterna 7 and 8, and genital armature in male of *Ceratina calcarata*, and armature of *C. cockerelli*.

very sparsely punctate laterally and below; thorax more finely punctate than head, the scutellum quite sparsely so between notaulices, with numerous punctures medially and toward the notaulices, becoming quite closely punctate anteriorly and posteriorly; scutellum with well separated, deep and somewhat finer punctures medially, becoming more finely and densely punctate along the margin; pleura quite coarsely and deeply punctate, the punctures close above, becoming rather sparse below; lateral faces of propodeum very finely and densely punctate, the posterior face becoming somewhat more shining and more sparsely but rather vaguely punctate, dorsal area rugoso-striate along margin, lower margin narrowly impunctate and quite smooth; punctures of abdominal terga quite deep and

distinct but rather fine, quite close in general, but well separated medially and on discs of 2-4, interspaces much exceeding diameter of punctures; pubescence very short, thin, hardly evident except on thorax laterally, on legs, and to some degree on the more apical abdominal segments.

MALE—Length 6-7 mm.; general body color blue-green, clypeus ivory in large part, narrowly greenish laterally, the labrum with a small, submedian, ivory maculation; antennae more brownish beneath, piceous above; legs largely metallic greenish, the apical tarsal segments becoming brownish-testaceous, basal half of front tibiae with an ivory stripe on outer face; mid and hind spurs pale testaceous; tubercles ivory; tegulae yellowish-hyaline; wings very lightly infuscated apically, veins testaceous to piceous; cheeks slightly narrower than eyes; clypeus quite flat, its median length about two-thirds the apical width; mandibles obscurely bidentate apically, having a small, subapical tooth on lower margin; segments 2-4 of flagellum somewhat broader than long; hind femora somewhat dilated toward base but not angulate, the length more than twice the maximum width; carina of tergum 7 quite evenly rounded, the median length only slightly less than basal width; clypeus somewhat roughened but not distinctly punctate except at extreme sides; face shining, punctures coarse, deep and quite close below, rather sparse just below antennae and in a limited shining area below ocelli, otherwise quite close on face and vertex above, becoming shallow and quite sparse on cheeks laterally and below; punctures of thorax considerably finer than those on head, the scutum rather sparsely punctate medially, becoming quite closely punctate anteriorly and posteriorly; scutellum with somewhat finer and quite close punctures throughout; punctures of pleura rather coarse and subcontiguous; propodeum very finely and densely punctate laterally, posterior face rather coarsely, vaguely and shallowly punctate, the dorsal area rather coarsely reticulate, its lower margin narrowly impunctate; punctures of abdominal terga quite deep and distinct, rather fine, close in general but interspaces on terga 2 and 3 considerably greater than diameter of the punctures; pubescence entirely pale, very short, thin and inconspicuous, more evident on thorax laterally and on legs; apical margin of sternum 6 with a deep median cleft bearing a more lateral pair of peg-like processes and a shorter, finer median pair; sternum 7 and genital armature much as in *calcarata* (fig. 124).

DISTRIBUTION—Michigan to Maine, south to Mississippi and Florida, through-



CALCARATA DUPLA

Figure 125

Hind femur in males of *Ceratina*.

out the year in Florida, elsewhere March to August.

FLOWER RECORDS—*Daucus*, *Erigeron*, *Fragaria*, *Galactia*, *Geranium*, *Helenium*, *Malus*, *Medicago*, *Melilotus*, *Oenothera*, *Oxalis*, *Pycnanthemum*, *Rubus*, *Salix*, *Salvia*, *Senecio*, *Spiraea*, and *Stachys*. The following additional records are given by Robertson (1929): *Amelanchier*, *Ammannia*, *Amorpha*, *Anemonella*, *Antennaria*, *Arabis*, *Arctium*, *Aruncus*, *Asclepias*, *Aster*, *Bidens*, *Blephilia*, *Brauneria*, *Cacalia*, *Camassia*, *Cardamine*, *Ceanothus*, *Cephalanthus*, *Cerastium*, *Chrysanthemum*, *Circaea*, *Cirsium*, *Claytonia*, *Collinsia*, *Convolvulus*, *Coreopsis*, *Cornus*, *Crataegus*, *Cryptotaenia*, *Cypripedium*, *Delphinium*, *Dentaria*, *Dianthera*, *Diospyros*, *Dirca*, *Ellisia*, *Erigenia*, *Eryngium*, *Erythronium*, *Eupatorium*, *Gerardia*, *Gillenia*, *Hedeoma*, *Helianthus*, *Heliopsis*, *Heracleum*, *Houstonia*, *Hydrangea*, *Hydrophyllum*, *Hypoxis*, *Isopyrum*, *Krigia*, *Lactuca*, *Leonurus*, *Lepidium*, *Liatris*, *Lithospermum*, *Lobelia*, *Lycopus*, *Lythrum*, *Malva*, *Marrubium*, *Monarda*, *Nelumbo*, *Nepeta*, *Pastinaca*, *Pentstemon*, *Petalostemum*, *Phyrma*, *Polemonium*, *Polygonatum*, *Polygonium*, *Potentilla*, *Prunus*, *Prunella*, *Psoralea*, *Ptelea*, *Ranunculus*, *Rhamnus*, *Rhus*, *Rosa*, *Rudbeckia*, *Sabatia*, *Sagittaria*, *Sambucus*, *Scrophularia*, *Scutellaria*, *Sida*, *Silphium*, *Smilax*, *Solidago*, *Specularia*, *Stellaria*, *Teucrium*, *Tradescantia*, *Trifolium*, *Tristeium*, *Verbena*, *Verbesina*, *Vernonia*, *Veronica*, *Viburnum*, *Viola* and *Zizia*.

Certina dupla floridana new subspecies

FEMALE—Length 5.5-8 mm.; deep blue, clypeus with a median, elongate, ivory maculation, legs bluish basally, apical tarsal seg-

ments becoming brownish-testaceous, spurs pale testaceous, basal half of front tibiae with an outer ivory stripe; the mid and hind tibiae with very small ivory basal maculations; cheeks, mandibles, clypeus and antennae much as in *dupla* s. str.; puncturation somewhat closer, the abdominal terga very closely and distinctly punctate, interspaces on 2 and 3 no greater than diameter of the punctures; wings rather deeply infuscated apically, veins pale testaceous to piceous.

MALE—Length 5-7 mm.; general body color deep blue, clypeus largely ivory, labrum with a small, median, ivory maculation; legs dark basally, more or less metallic, apical tarsal segments becoming brownish-testaceous; spurs pale yellow, the anterior tibia with a narrow ivory stripe along the basal half of outer margin; tegulae testaceous-hyaline; wings rather deeply infuscated apically, veins testaceous to piceous; cheeks, mandibles, antennae and hind femora much as in *dupla* carina of tergum 7 somewhat broader, the median length only about half the basal width; punctures of head and thorax much as in *dupla* but discs of abdominal terga more closely punctate, interspaces on 2 and 3 no greater than the diameter of punctures; sterna 6 and 7, and genital armature as in typical *dupla*.

TYPES — Holotype: Male, Tarpon Springs, Fla., March 21, 1950 (H. A. Howden). Allotype: topotypical (H. K. Townes) [both author's coll.]. Paratypes: FLORIDA: 3 ♂♂, topotypical (Howden and Townes); 3 ♂♂, 2 ♀♀, Miami, Sept. 10, Dec. 22 and 23, and Feb. 10, 1916 and 1917; 1 ♂, 7 ♀♀, Larkins, Sept. 11, Dec. 8-14, Feb. 19-24 and March 21, 1921-1926, on *Chrysopsis*, *Galactia*, *Opuntia*, *Poinciana* and *Sinapis* (all Graenicher); 1 ♂, 2 ♀♀, Collier Co., Apr. 6, 1959, on *Senecio*; 2 ♀♀, Matheson Hammock, Dade Co., Apr. 8, 1959; 3 ♀♀, Key Largo, Apr. 11, 1959; 5 ♀♀, Highland Hammock St. Pk., Apr. 5, 1959 on *Bidens*; 1 ♀, Sanibal, Mar. 22, 1954; 4 ♀♀, Flagler Beach, Sept. 2, 1949; 7 ♀♀, Ft. Myers, Mar. 21, 1954, on *Cirsium*; 5 ♀♀, Alachua Co., Apr. 12, 1955, on *Rubus* (all Mitchell); 6 ♂♂, 22 ♀♀, Lake Co., Mar. 14 and 24, Apr. 6 & 8, 1956, on *Erigeron quercifolius*, *Salvia lyrata* and sweeping weeds (R. A. Morse); 1 ♀, Volusia Co., July 25, 1954; 1 ♂, 1 ♀, Alachua Co., Mar. 14, 1954 and Mar. 24, 1956, on *Medicago lupulina* (H. V. Weems, Jr.); 1 ♂, 1 ♀, Alachua Co., May 8, 1955, on *Stokesia laevis*; 2 ♂♂, 8 ♀♀, Alachua

Co., Apr. 13 and 27, 1955, Mar. 7 and Apr. 2 & 17, 1956, on *Melilotus alba*; 1 ♂, 15 ♀ ♀, Alachua Co., Apr. 16 & 17, 1956, on *Stachys floridana*; 2 ♀ ♀, Gainesville, May 28 and 29, 1955, on *Stokesia laevis*; 3 ♀ ♀, Marion Co., Apr. 6 and 17, 1956, on *Erigeron quercifolius*; 2 ♂ ♂, 6 ♀ ♀, Gainesville, Apr. 13, on *Stachys floridana*, and Oct. 31, 1956, on *Aster* and *Bidens pilosa* (all R. A. Morse); 1 ♀, Gainesville, Apr. 26, 1959; 2 ♂ ♂, 3 ♀ ♀, Merritt Is., Mar. 12, 1956; 1 ♂, Sarasota Co., June 4, 1954; 3 ♂ ♂, Key Largo, Dec. 26, 1954, Mar. 27, 1957 and Feb. 26, 1956; 5 ♀ ♀, Key Largo, Apr. 11, 1959, on *Emilia coccinae*; 3 ♀ ♀, Collier Co., Apr. 6, 1959, on *Cirsium*; 1 ♀, Stock Is. Dec. 27, 1954, on *Flaveria linearis*; 1 ♀, St. Johns Co., Sept. 3, 1955, on *Helianthus*; 3 ♀ ♀, Levy Co., Nov. 13, 1955, on *Bidens mitis*, and Apr. 14, 1955, on *Erigeron quercifolius* (all H. V. Weems, Jr.); 1 ♂, 18 ♀ ♀, Jacksonville, Mar. 30-Apr. 6, 1957, Apr. 12-May 25, 1958, and Aug. 9, 1958 (Dave Ribble); 1 ♀, Loxahatches, Palm Beach Co., Mar. 20, 1955 (R. R. Driesbach); 1 ♀, Fort Myers, Feb. 19, 1937; 1 ♀, Homestead, Apr. 1, 1939 (both J. C. Bradley) NORTH CAROLINA: 1 ♂, Beaufort, May 2, 1947, on *Ilex*; 1 ♀, Beaufort, June 9, 1931; 1 ♀, Burgaw, May 18, 1950, on *Oenothera*; 1 ♀, Wrightsville, July 8, 1953; 1 ♀, Holly Shelter, Pender Co., Oct. 9, 1954 (all Mitchell). SOUTH CAROLINA: 3 ♀ ♀, Edesto Beach, Aug. 31, 1949 (Mitchell). GEORGIA: 1 ♀, Thalman, June 3, 1922 (Mitchell); 1 ♀, St. Simon Isl., Apr. 22-May 12, 1911; 1 ♀, Unadilla, June 25, 1910 (both J. C. Bradley).

Paratypes are in collections of Cornell University, the North Carolina Department of Agriculture, the Florida Plant Board, the U. S. National Museum, R. R. Driesbach, David Ribble and the author.

Ceratina (Zadontomerus) metallica
H. S. Smith

(Fig. 122)

- Ceratina metallica* H. S. Smith, 1907. Amer. Ent. Soc. Trans. 33, p. 121. ♂.
Ceratina metallica Michener, 1937. Ann. Mag. Nat. Hist. (10) 19, p. 404. (taxonomy)
Ceratina metallica Krombein, 1960. Ent. News 71, p. 68. (biology)

FEMALE—Length 5-6.5 mm.; general body color blue-green, antennae becoming brownish

apically, clypeus with a median, oblong, ivory maculation; mandibles somewhat reddish; legs piceous, with some metallic reflections, the apical tarsal segments becoming testaceous; basal two-thirds of front tibiae with an outer, ivory maculation; mid and hind tibial spurs pale yellowish; tegulae yellowish-hyaline; wings subhyaline, veins testaceous to brownish; tubercles bright yellow in both sexes; cheeks slightly narrower than eyes; clypeus quite flat, the median length somewhat more than half the apical width; mandibles distinctly tridentate at apex; antennal segments 2-5 considerably broader than long; irregulary largely impunctate medially, with some irregular, scattered punctures on each side; face shining, an impunctate polished area below ocelli, punctures otherwise rather coarse but irregular, rather close on each side below, those in median area sparse in general, becoming closer above on vertex, close and fine on cheeks above, very sparse and minute below; thoracic punctures much finer than those on head, scutum quite sparsely punctate between notaulices, becoming rather closely punctate anteriorly and posteriorly; scutellum with fine, well separated punctures, those on pleura somewhat coarser but well separated; lateral faces of propodeum minutely and densely punctate, becoming more shallow and obscure but still close posteriorly, dorsal area narrowly striate along upper margin; punctures of abdominal terga fine, but deep and distinct, well separated medially on 2-4 where interspaces are considerably greater than diameter of punctures; pubescence entirely pale, very short and thin, somewhat more evident on thorax laterally, on legs, and on the more apical abdominal terga.

MALE—Length 4.5-5 mm.; general body color metallic blue-green, clypeus ivory except for the very narrow lateral margin, and labrum with a quadrate, median, ivory maculation; antennae brownish beneath, more piceous above; legs largely blackish, with metallic reflections, the apical tarsal segments becoming somewhat more brownish, front tibiae with an ivory stripe along outer margin nearly to tip; spurs pale yellow; tegulae testaceous-hyaline; wings hyaline, veins testaceous to brownish; tubercles bright yellow in both sexes; cheeks somewhat narrower than eyes; clypeus quite flat, median length somewhat less than apical width; mandibles with a small, subapical tooth on lower margin; segments 2 and 3 of flagellum much broader than long; clypeus nearly impunctate, punctures of face otherwise quite coarse but rather shallow, quite close below antennae, becoming somewhat deeper and not so close above, fine and sparse on cheeks below; thoracic punc-

tures much finer than those on head, quite sparse on scutum medially, well separated on scutellum medially, quite close over most of pleura, very fine and close on lateral faces of propodeum, becoming more sparse, shallow and obscure posteriorly, dorsal face narrowly and finely striate along upper margin; discs of abdominal terga with rather fine but deep and distinct punctures, quite close in general but interspaces across median portion of 2 and 3 somewhat greater than diameter of the punctures; hind femora conspicuously angulate beneath, width at this point fully half the length; carina of tergum 7 very narrow, its median length nearly equal to the basal width; pubescence entirely pale, very short, thin and inconspicuous; apical margin of sternum 6 with a deep, median emargination bearing a pair of short but robust, peg-like processes, and a more median, minute pair which are only partially separated; sternum 7 and genital armature much as in *calcarata* (fig. 124).

DISTRIBUTION—New York to Georgia and Louisiana, March to September.

FLOWER RECORDS—*Asclepias*, *Chrysanthemum*, *Fragaria*, *Geranium*, *Helianthus*, *Oenothera*, *Prunus*, *Rubus*, *Senecio* and *Vaccinium*.

Xylocopa Latreille

(Fig. 121)

Xylocopa Latreille, 1802. Hist. Nat. Fourmis, p. 432. Type: *Apis violacea* Linnaeus. Desig. by Latreille, 1810.

Xylocopa Latreille, 1802. Hist. Nat. Crust. Ins. 3, p. 379. Emend.

Xylocopa subg. *Schönherria* Lepeletier, 1841. Hist. Nat. Ins. Hym. 2, p. 207. Type: *Xylocopa micans* Lepeletier. Desig. by Sandhouse, 1943.

Xylocopa subg. *Xylocopoides* Michener, 1954. Amer. Mus. Nat. Hist. Bul. 104, p. 155. Type: *Apis virginica* Linnaeus. Orig. desig.

Xylocopa subg. *Neoxylocopa* Michener, 1954. Amer. Mus. Nat. Hist. Bul. 104, p. 157. Type: *Apis brasilianorum* Linnaeus. Orig. desig.

Xylocopa Hurd, 1955. Calif. Ins. Survey Bul. 4, pp. 35-72. (Calif. spp. and key to spp. of U. S.).

Xylocopa subg. *Notoxylocopa* Hurd, 1956. Amer. Mus. Novitates 1776, p. 2 Type: *Xylocopa tabaniformis* Smith. Orig. desig.

Xylocopa is a genus of large, robust bees, often confused with bumble-bees by the general public. Commonly they are to some degree metallic in color, the males more conspicuously so, and the face of the males

has yellow maculations. The stigma in the front wing is very small, and the marginal cell is very narrow and elongate, the tip bent away from the costal margin. The clypeus is flat, and the rather short mandibles almost completely hide the labrum when closed. In the thorax the menanotum is vertical in position, forming a part of the posterior surface which is nearly at right angles to the dorsal surface. The basitarsi are fully as long as their corresponding tibiae, and the hind pair are well covered with scopal hairs.

These are wood-boring bees, excavating tunnels in soft woods for nesting sites, feeding the larvae on pollen and nectar.

There are only two species, with one subspecies, found in the Eastern United States.

KEY TO SPECIES

1. Males 2
Females 4
2. Bright metallic green; tibiae and metatarsi with patches of pale pubescence *micans* Lepeletier (below)
Dark purplish black; legs entirely black pubescent 3
3. Pubescence of scutum entirely pale yellowish, a restricted central area bare *virginica virginica* (Linnaeus) (p. 510)
Central bare area of scutum more extensive, with a marginal fringe of conspicuous, black pubescence
..... *virginica krombeini* Hurd (p. 511)
- 4(1). Metallic purplish blue; dorsum of thorax black pubescent
..... *micans* Lepeletier (below)
Black, with faint metallic tints; dorsum of thorax yellow pubescent 5
5. Abdominal terga 5 and 6 with some rather conspicuous, white pubescence at each extreme side
..... *virginica krombeini* Hurd (p. 511)
Terga 5 and 6 entirely black pubescent
..... *virginica virginica* (Linnaeus) (p. 510)

Xylocopa (Schönherria) micans Lepeletier

(Figs. 126 and 127)

?*Apis nasuta* Christ, 1791. Naturg. Klassif. Nomencl. Ins. Bienen-, Wespen-, Ameisengeschl. 8, p. 130.

Xylocopa micans Lepeletier, 1841. Hist. Nat. Ins. Hym. 2, p. 208. ♂

Xylocopa vidua Lepeletier, 1841. Hist. Nat. Ins. Hym. 2, p. 210. ♀

Xylocopa purpurea Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 284. ♀

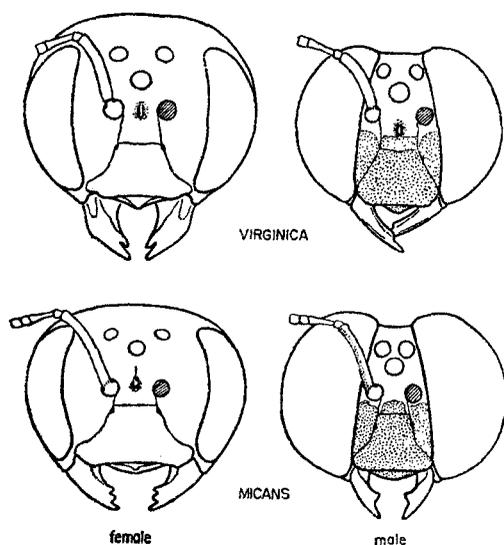


Figure 126
Facial view of head in males and females of
Xylocopa.

FEMALE—Length 15-19 mm., breadth of abdomen 8-9 mm.; general body color black, with bluish or greenish reflections; wings lightly infuscated basally, becoming somewhat more deeply so apically, veins brownish to piceous; cheeks slightly narrower than eyes; clypeus flat, its median length about half the apical width, apical margin nearly straight; mandibles short, apical margin tridentate, not much narrower than the base; labrum much shorter than the breadth, with a small, median, basal tubercle, apical margin somewhat depressed below the median area; lateral ocelli subequally distant from eyes and each other, much more widely removed from margin of vertex which is very broad; basal segment of flagellum slightly shorter than segments 2-4 combined; punctures of face quite deep and distinct but rather fine, well separated on clypeus and supraclypeal area, somewhat closer toward eyes, surface densely tessellate, densely crowded just above level of antennae, becoming very sparse on vertex and on cheeks above, finer and closer on cheeks below; scutum with a median, shining, impunctate area, the punctures on each side quite deep and distinct but not very coarse, sparse toward median line, becoming quite close laterally; scutellum shining, punctures fine and quite sparse in general, becoming rather close along posterior margin; punctures of pleura quite deep, distinct, rather coarse and close throughout; propodeum dull and tessellate, without evident punctures; abdominal terga smooth, somewhat shining,

punctures rather shallow but distinct, quite close laterally, becoming rather sparse medially on 2-5, the apical rims narrowly impunctate; pygidial area of 6 very narrow and elongate, rather poorly defined, punctures on each side rather coarse and close, becoming fine and crowded along lateral margins; hind tibiae with a median, carinate process on outer face; pubescence of head fuscous, very short but more or less erect, rather dense at sides of face and on cheeks below, the vertex practically bare; scutum bare medially, becoming rather copiously short pubescent laterally and anteriorly, largely fuscous but more or less intermixed with pale hairs; scutellum very sparsely pubescent, with a few scattered dark hairs, the posterior margin with a fringe of whitish pubescence; posterior face of propodeum more or less whitish pubescent, with a few intermixed dark hairs, lateral faces, entire pleura and legs black pubescent; abdominal terga 1-4 practically bare, tergum 1 with a small amount of pale pubescence at each extreme side, 4-6 with more or less erect, scattered, black hairs, becoming quite elongate and conspicuous on tergum 6, and terga 5 and 6 with conspicuous tufts of elongate whitish hairs laterally.

MALE—Length 16-19 mm., breadth of abdomen 8-9.5 mm.; general body color metallic green or blue, the clypeus, lateral face marks, lower half of supraclypeal area, and basal margin of labrum, bright yellow, maculations abruptly terminated at level of antennae; antennal scape narrowly yellow anteriorly; wings lightly infuscated, veins brownish to piceous; cheeks much narrower than eyes; clypeus flat, its median length nearly equal to the apical width, margin about straight; labrum much broader than the median length, subtruncate apically, margin deeply depressed below the somewhat swollen maculated basal area; mandibles quite short, rather slender, with a robust inner subapical angle or tooth; eyes strongly convergent above, nearly meeting at top of head, the lateral ocelli constricted into a narrow space considerably below top of the head; lateral portions of vertex practically eliminated, eyes occupying most of the upper surface of head; basal segment of flagellum distinctly longer than segments 2 and 3 combined, but shorter than 2-4; front trochanter with an acute posterior spine; hind tibiae with a small, submedian, carinate protuberance; punctures of lower half of face minute and well separated, median area of clypeus rather broadly impunctate, punctures above hardly evident except in the narrow space between upper end of eyes where they are rather fine and well separated; cheeks with fine and rather close punctures below; scutum with a median impunctate area that is shining

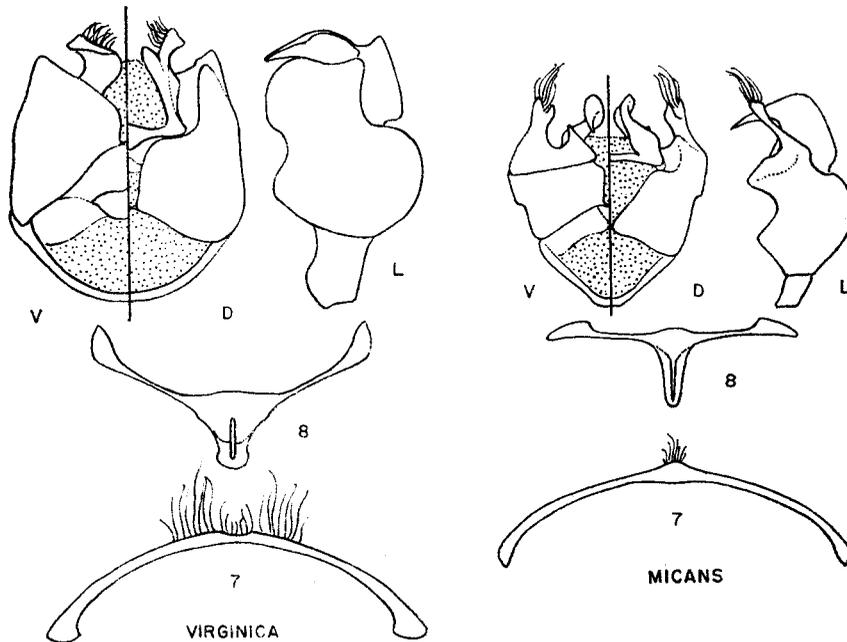


Figure 127—Dorsal (D), ventral (V), and lateral (L) views of male genital armature, and sterna 7 and 8 in *Xylocopa*.

and somewhat blackened, sparsely but coarsely and deeply punctate on each side, the punctures becoming rather fine and close laterally and anteriorly, this area greenish in color; scutellum bluish-green, shining, punctures fine and rather close posteriorly, becoming quite sparse anteriorly; pleura somewhat shining between fine, deep and distinct, rather close punctures; posterior face of propodeum shining and practically impunctate, lateral faces dull, tessellate, without distinct punctures; abdominal terga 1 and 2 green, becoming bluish apically on 2, with quite deep, distinct and rather close punctures; terga 3-6 blue, the punctures somewhat coarser and more sparse, tergum 6 rather finely punctate medially, becoming sparsely and copiously punctate laterally; apical margins of all terga narrowly shining and impunctate; pubescence of head short but rather dense, rather sparse on face below, yellowish over the maculated areas, with a few dark hairs at each extreme side, dark above antennae, yellowish and quite dense and elongate on cheeks, becoming fuscous above across posterior surface of head; scutum, scutellum and pleura largely covered with dense, rather short, bright yellowish pubescence, median area of scutum bare, with a few dark hairs evident, the metapleura and lateral surface of propodeum fuscous pubescent, and all the coxae quite densely yellowish pubescent; front tibiae and tarsi pale pubes-

cent on outer surface, but tarsi with a rather dense posterior fringe of elongate hairs which are in part fuscous; mid tibiae yellowish pubescent on anterior half, the posterior black pubescent, the basitarsus yellowish pubescent over basal half, black on the apical half and following segments; hind tibiae with but one spur, the lower apical angle prolonged into a stout, slightly curved, shining process, yellow pubescent in general, with elongate hairs below, outer hairs more decumbent but quite dense, tarsi with some elongate pale hairs basally, becoming shorter and black apically; basal abdominal tergum largely yellowish pubescent, tergum 2 with short yellowish pubescence toward base and laterally, but with some short blackish pubescence on disc apically; terga 3-6 with thin, short, suberect black pubescence, 6 with some dense tufts of elongate, fuscous hairs laterally, with a few very elongate pale hairs intermixed, a somewhat similar but shorter tuft on 5 laterally and tergum 7 very densely fringed with fuscous, plumose hairs posteriorly, these slightly interrupted medially by a shorter more sparsely pubescent area; sterna 1-6 exposed, 7 and 8 retracted, form as shown, and genital armature as shown (fig. 127).

DISTRIBUTION — Southeastern Virginia to Florida, throughout the season.

FLOWER RECORDS—*Aesculus*, *Bidens*, *Cephalanthus*, *Cicuta*, *Galactia*, *Glycine*, *Hibiscus*, *Ilex*, *Ligustrum*, *Medicago*, *Melilotus*, *Phaseolus*, *Prunus*, *Rhus*, *Richardia*, *Senecio*, *Solanum*, *Solidago*, *Stachys*, *Suriana*, and *Vernonia*.

***Xylocopa (Xylocopoides) virginica virginica* (Linnaeus)**

(Figs. 126 and 127)

- Apis virginica* Linnaeus, 1771. Mant. Plant. 2, p. 450.
Apis virginica Drury, 1773. Illust. Nat. Hist. Exotic Ins. 1 (index), p. 2.
Centris carolina Fabricius, 1804. Syst. Piez., p. 357. [♂]
Xylocopa virginica Angus, 1868. Amer. Nat. 1, p. 157. (biology)
Xylocopa virginica Walsh, 1868. Amer. Ent. 1, p. 9. (biology)
Xylocopa virginica Angus, 1869. Amer. Nat. 2, p. 49. (biology)
Xylocopa virginica Howard, 1892. Ent. Soc. Wash. Proc. 2, p. 331. (biology)
Xylocopa virginica Ashmead, 1894. Psyche 7, p. 23. (biology)
Xylocopa virginica Comstock and Comstock, 1895. Manual for Study of Insects, p. 670. (biology)
Xylocopa virginica Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 162. (biology)
Xylocopa virginica Rau, 1929. Jour. Compar. Psychol. 9, p. 37. (biology)
Xylocopa virginica Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Xylocopa virginica Rau, 1931. Jour. Compar. Psychol. 12, p. 257. (biology)
Xylocopa (Schönherria) virginica Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1062. (larva)
Xylocopa (Xylocopoides) virginica Michener, 1954. Amer. Mus. Nat. Hist. Bul. 104, p. 155.

FEMALE—Length 19-23 mm., breadth of abdomen 9.5-10.5 mm.; entirely black, including antennae, legs, spurs and tegulae; wings rather deeply infuscated, veins brownish-piceous to black; cheeks broader than eyes; clypeus flat and slightly concave toward apical margin, median length about half the apical width, apical margin nearly straight; labrum much broader than long, with a robust, basal tubercle, median area elevated above the apical margin which is straight and with a conspicuous fringe of brownish setae; mandibles short, tapering apically, with a distinct, inner, subapical tooth, outer surface shallowly excavated at base; eyes subparallel; vertex broad, lateral ocelli much nearer each other

than to its posterior margin, subequally distant from eyes and each other; face with a median carinate tubercle between antennae; basal segment of flagellum only slightly shorter than segments 2-4 combined; posterior margin of hind tibiae with a shallowly concave area that is delimited by a rather sharp carina, this angulate apically; punctures of face below and clypeus close and rather fine, quite deep and distinct, becoming somewhat more widely separated and sparse above, very sparse on vertex laterally and cheeks above, becoming relatively close and somewhat finer on cheeks below; scutum with a polished impunctate area medially, bordered with some very coarse, deep and rather sparse punctures which become very fine and close laterally and anteriorly; scutellum shining between deep, distinct, rather fine and close punctures, these somewhat separated along anterior margin; punctures of pleura rather fine but close and distinct; propodeum dull and tessellate, with scattered, sparse, shallow punctures; abdominal terga shining, punctures minute, widely scattered and sparse; tergum 6 with a median triangular pygidial area that is minutely and rather sparsely punctate, demarcated by a series of short, robust, decumbent spines that converge apically, lateral areas of the tergum quite finely and closely punctate; pubescence of head short, erect, entirely blackish or fuscous, very thin on vertex, rather dense on sides of face and cheeks below; scutum, scutellum, pleura above and posterior face of propodeum densely yellowish or tawny pubescent, median area of scutum largely bare, the entire venter, pleura below, and legs black pubescent; basal abdominal tergum with a small amount of pale pubescence anteriorly, following terga practically bare, sterna with a small amount of rather short but erect black pubescence, becoming abundant and more elongate on the more apical segments, forming a rather dense apical fringe.

MALE—Length 17-21 mm., breadth of abdomen 7.5-9.5 mm.; black, with bluish or greenish reflections, the clypeus, lateral face marks, lower margin of supraclypeal area, and basal margin of labrum, bright yellow, these forming a nearly straight line just below level of antennae; wings rather lightly infuscated basally, becoming somewhat more deeply so apically, veins brownish-piceous to blackish; cheeks subequal to eyes in width; clypeus nearly flat, its median length about two-thirds the apical width; labrum much broader than its median length, subtruncate apically, the basal maculated area somewhat elevated; mandibles short and rather slender, with a conspicuous, superior, subapical angle; eyes rather strongly converging above, the

lateral ocelli in practical contact with inner margin of eyes; lateral areas of vertex practically eliminated, surface entirely occupied by eyes; basal segment of flagellum slightly shorter than segments 2-4 combined; hind tibiae with a very low, submedian, carinate process on outer surface, punctures on lower half of face minute and scattered, rather sparse on clypeus, quite close on lateral maculated areas, slightly coarser and deeper above, quite sparse between eyes above, rather deep and well separated on cheeks; scutum greenish, with a rather limited, median, shining and impunctate area, with a few sparse coarse, punctures on each side, these becoming fine and close laterally and anteriorly, and to a lesser degree across posterior margin; scutellum greenish, shining, punctures quite fine and close, becoming narrowly sparse along anterior margin; pleura shining between fine and rather close punctures; propodeum dull and tessellate, punctures shallow, irregularly scattered and rather sparse; basal abdominal tergum more greenish, punctures rather deep and distinct, well separated medially, becoming quite close laterally; punctures of the following terga somewhat finer and closer but deep and distinct, quite evenly distributed, but becoming somewhat closer toward lateral margins, somewhat more sparse apically on 4 and 5; pubescence of head erect and rather short, thin on face, rather copious between eyes and on cheeks and vertex, with intermixed pale and dark hairs; scutum, scutellum, lateral and upper faces of mesopleura, posterior face of propodeum and basal abdominal tergum quite densely covered with pale ochraceous pubescence, the thoracic venter and lateral areas of propodeum black or fuscous pubescent; legs in large part black pubescent, but front tibiae with some pale hairs in posterior fringe, the basitarsi with a quite prominent posterior fringe of pale hairs; pubescence of mid and hind legs entirely black; abdominal

terga 2-7 entirely black pubescent, pubescence of the more basal of these very short, erect and quite dense but not at all obscuring the surface, that on 5-7 elongate and copious, forming a quite dense posterior fringe; sternum 7 transverse, linear in form and very slender, with a very shallow median emargination; sternum 8 broadly subtriangular, with slender lateral arms, apical margin nearly straight; genital armature as shown (fig. 127).

DISTRIBUTION — Kansas to the New England States, south to Texas and Florida, throughout the season.

FLOWER RECORDS — *Abelia*, *Bidens*, *Ilex*, *Lespedeza*, *Malus*, *Opuntia*, *Prunus*, *Rhus*, *Rubus*, *Solidago*, *Stachys* and *Vaccinium*. This has been recorded by Robertson (1929) on *Brauneria*, *Cornus*, *Melilotus*, *Petalostemum* and *Verbena*.

Xylocopa (Xylocopoides) virginica krombeini Hurd

Xylocopa (Xylocopoides) virginica krombeini Hurd, 1961. Amer. Ent. Soc. Trans. 87, p. 251. ♂ ♀.

This subspecies differs from the typical form chiefly in color of the pubescence. In the female abdominal terga 5 and 6 have a quite conspicuous tuft of white hairs at each extreme side, and the central bare area of the scutum has a marginal fringe of black pubescence. In males this marginal fringe on the scutum is more conspicuous than in the female, while the pale hairs of terga 5 and 6 may or may not be evident.

DISTRIBUTION — South Florida, throughout the year.

