

FAMILY MEGACHILIDAE

Females of the non-parasitic groups in this family are most easily recognized by the location of the pollen-collecting scopa on the venter of the abdomen. Also, the front wings, without exception, have but two submarginal cells, and the stigma is small. These are typical "long-tongued" bees, having a greatly elongated and slender glossa. Segments 1 and 2 of the labial palpi also are much elongated and flattened, with the two apical segments very short. The galeae of the maxillae are similarly elongated, the maxillary palpi with a variable number of relatively short segments. Except for the primitive genus *Lithurgus*, the pygidial area is absent, and without exception there are no facial foveae.

KEY TO GENERA

1. Pygideal area well developed in male, in female represented by a short terminal spine; scopa present in female, hind tibiae beset with coarse spicules or short spines *Lithurgus* (p. 6)
- Pygideal area absent in both sexes; scopa present or absent; hind tibiae relatively smooth 2
2. Body surface usually ornamented with pale integumental maculations; claws in female cleft or with subapical inner teeth; stigma short, its inner margin not much longer than its width 3
- Body surface other than legs not maculated; claws in female with at most basal angles or teeth; stigma elongate 9
3. Scopa absent; mandibles in male black, or if maculated, then clypeus black, at least in part 4
- Scopa present; male mandibles yellow maculated and clypeus entirely yellow 5
4. Margin of scutellum somewhat protuberant, propodeum completely vertical, without a dorsal, pitted area *Heterostelis* (p. 33)
- Scutellum not at all protuberant, propodeum with a narrow but distinct dorsal area *Stelis* (p. 35)
- 5(3). Pulvilli (arolia) absent; mandible of female with five or more teeth *Anthidium* (p. 9)
- Pulvilli present; mandible of female with at most four teeth 6
6. Hind margin of scutellum produced to form a carinate and broadly truncate lip over-hanging posterior surface of propodeum *Anthidiellum* (p. 18)
- Hind margin of scutellum rounded ... 7
7. Anterior margin of pronotal tubercle broadly expanded, conspicuously carinate, extending along anterior border of notum *Dianthidium* (p. 15)
- Pronotal tubercles not broadly expanded, not appreciably produced along anterior border of notum 8
8. Second recurrent vein received within or very near apex of second submarginal cell; abdominal terga with entire or nearly entire, transverse, apical or sub-apical, yellow or ivory bands; ocelli relatively large .. *Heteranthidium* (p. 23)
- Second recurrent vein received considerably beyond apex of second submarginal cell; abdominal yellow bands submedian, interrupted medially, not strongly narrowed toward mid-line; ocelli extremely small *Paranthidium* (p. 13)
- 9(2). Scopa absent; scutellum with prominent axillary spines *Coelioxys* (p. 192)
- Scopa present; axillary spines absent 10
10. Arolia absent; black, usually robust bees *Megachile* (p. 108)
- Arolia present 11
11. Basal segment of abdomen with anterior face broadly concave 12
- Basal segment of abdomen at most narrowly concave or merely sulcate ... 13
12. Basal concavity of abdomen with a sharply carinate rim *Heriades* (p. 48)
- Basal concavity not carinate *Ashmeadiella* (p. 53)
- 13(11). Tip of marginal cell approximate to costa; mandible of female narrow and elongate; form slender; color black ... *Prochelostoma* (p. 52)
- Tip of marginal cell bent away from costa 14
14. Color black (in all eastern species); form usually slender; notaulices elongate linear *Hoplitis* (p. 56)
- Color metallic blue or green; form usually short; notaulices punctiform oval *Osmia* (p. 69)

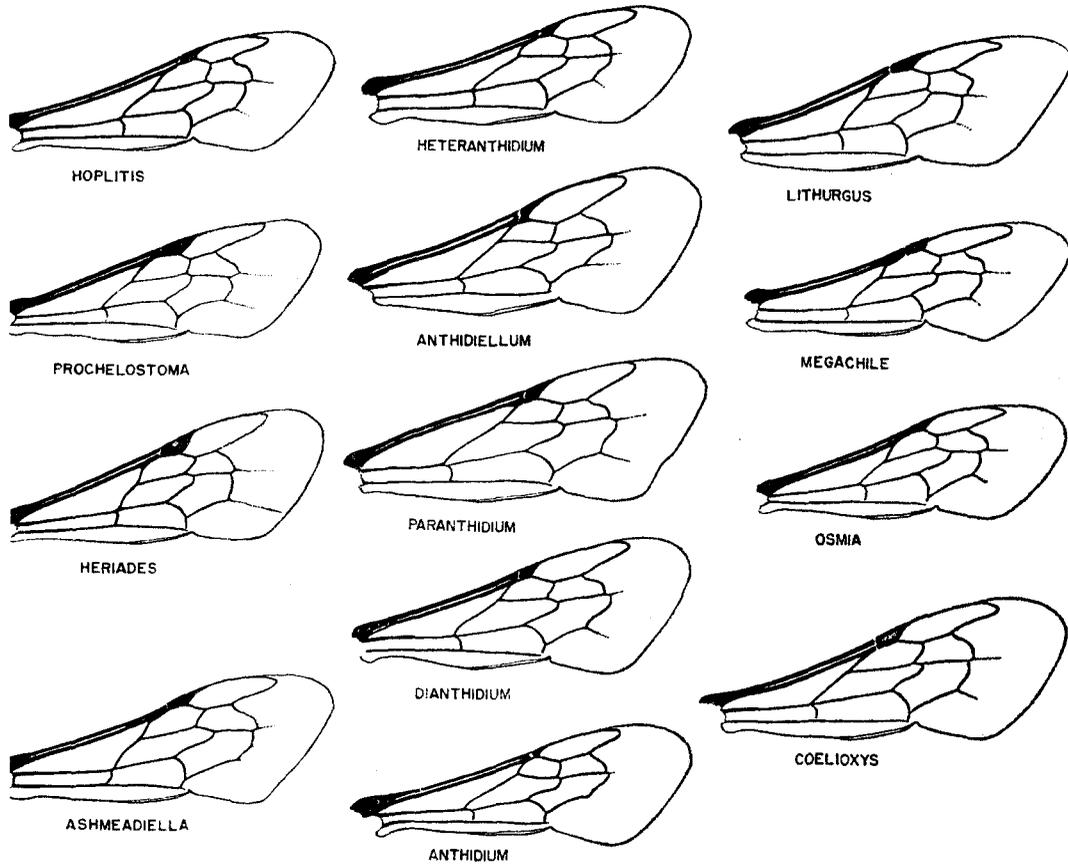


Figure 1—Venation of front wing in the Megachilidae.

Lithurgus Latreille

(Fig. 1)

Lithurge Latreille, 1825. Fam. Nat. Regne Anim., p. 463. (vernacular).

Type: *Andrena cornuta* Fabricius. Monob.

Lithurgus Berthold, 1827. In Latreille, Nat. Fam. Thierr. p. 467. (valid emend.).

Lithurgopsis Fox, 1902. Ent. News 13, p. 138.

Type: *Lithurgus apicalis* Cresson. Orig. desig.

Lithurgus Mitchell, 1938. Psyche 45, p. 146-155. (revision).

Lithurgus is a widely distributed group of rather primitive bees, at least with respect to the family Megachilidae. It is unique in this family in having a well developed pygidial area in the male, while in the female it is represented by a short, apical spine. The scopa is well developed, the tibiae of both sexes are coarsely spiculate, almost spinose, on the outer surfaces, and the proboscis is much elongated, exceeding

the total length of the head and thorax. In the North American species, which constitute the subgenus *Lithurgopsis*, the males have aroliae between the claws, but these are invident in the female. The males are further characterized by having a rather generalized abdomen, with six sternal plates exposed and only the 7th and 8th retracted.

It has been pointed out by Pate (1946. Brooklyn Ent. Soc. Bul. 41, p. 13) that Berthold's emendation of *Lithurge* to *Lithurgus* is valid.

KEY TO SPECIES

1. Females 2
Males 3
2. Facial protuberance relatively narrow, projecting uniformly for the entire width *gibbosus* Smith (p. 7)
Facial protuberance much wider, projecting much more strongly at each side than in the central area
..... *brucei* Mitchell (p. 8)

3. Labrum with a robust, median, basal tubercle *gibbosus* Smith (below)
 Labrum with a pair of erect, basal tubercles, median area excavated
 *bruesi* Mitchell (p. 8)

***Lithurgus (Lithurgopsis) gibbosus*
 Smith**

(Frontispiece & fig. 2)

- Lithurgus gibbosus* Smith, 1853. Cat. Hym. Brit. Mus. 1. p. 147. ♀.
Lithurgus compressus Smith, 1853. Cat. Hym. Brit. Mus. 1. p. 147. ♂.
Lithurgopsis gibbosus Fox, 1902. Ent. News 13, p. 140.
Lithurgus gibbosus Mitchell, 1938. Psyche 45, p. 151.

FEMALE—Length 17-18 mm.; black; length of face about equal to distance between eyes above; eyes slightly convergent below; facial protuberance below antennae prominent, projecting at right angles from surface of face, slightly bowed in facial view; clypeus quite flat, shining and sparsely punctate, apical margin straight, with a prominent silvery fringe; cheeks somewhat broader than eyes; mandibles 3-dentate, median tooth more prominent than the others; labrum densely ochraceous pubescent beyond the basal, transverse ridge which is emarginate medially; pubescence of head entirely pale, quite dense around antennae and along inner orbits, thin elsewhere, rather elongate on cheeks below; punctures fine and close on vertex medially, becoming somewhat more widely separated laterally, somewhat coarser and more distant on the shining cheeks below; dorsum of thorax dull, densely rugose, finely so on scutellum and on scutum posteriorly, becoming rather coarsely aciculate anteriorly; pleura distinctly punctate, closely and quite deeply so above, becoming more coarsely and more widely separated but not sparse below; propodeum relatively smooth but rather dull, punctures very shallow and obscure; tegulae piceous, quite smooth but rather dull, not noticeably punctate; wings subhyaline, veins and stigma piceous; hind tibiae coarsely aciculate, the fore and mid tibiae quite deeply, distinctly and closely punctate, aciculate along posterior margin toward apex, femora shining, quite sparsely punctate; thoracic pubescence very short and inconspicuous above, more dense and elongate laterally and beneath, largely whitish; whitish and quite copious and elongate on basal segments of legs, the basitarsi rather prominently fringed, more or less fuscous beneath and on hind tarsi; spurs testaceous; abdominal terga shining, punctures on basal terga very minute if at all evident medially, becoming more distinct but fine and close

laterally, those on the more apical terga becoming coarser and more sparse; terga 2-5 with white, apical fasciae, these widely interrupted on 2 and 3, entire and very dense and conspicuous on 4 and 5, 6 with a dense covering of coarse, blackish pubescence which nearly hides the pygidial spine, ventral scopa pale ochraceous, sterna with thin, entire, white, apical fasciae, but that on sternum 5 quite dense and conspicuous.

MALE—Length 15-16 mm.; black; face considerably longer than distance between eyes above; eyes rather strongly convergent below; face below antennae somewhat swollen but not protuberant, quite densely punctate; clypeus slightly convex, densely rugoso-punctate, median portion of apical margin quite straight; labrum with a quite robust, median, elongate spine at base just below margin of clypeus; cheeks subequal to eyes in width; face above antennae very closely but rather finely punctate, punctures quite deep and distinct, quite dense on cheeks throughout; pubescence of head entirely whitish, quite dense around antennae, along inner orbits and across apical margin of clypeus, rather thin above, quite elongate and copious on cheeks below; dorsum of thorax densely rugoso-punctate, finely so on scutellum and over most of scutum, but this becoming somewhat more distinctly punctate anteriorly; pleura quite closely and finely punctate beneath rather dense pubescence; propodeum rather smooth, punctures fine and rather shallow except in dorsal area; pubescence of thorax entirely whitish, except that there is some faint yellowing on scutum and scutellum, quite dense and elongate laterally and on propodeum, largely whitish on legs, quite dense on anterior femora and on the apical segments, as also on mid tibiae; femora and tibiae rather closely but quite distinctly punctate, not to any marked degree aciculate; spurs testaceous; tegulae piceous, rather densely pubescent anteriorly and along inner margin, not noticeably punctate; wings subhyaline or faintly infuscated, veins and stigma piceous; abdominal terga somewhat shining, the more basal terga minutely and rather obscurely punctate medially, punctures becoming more distinct but fine and close laterally, those on 4 and 5 somewhat coarser and more widely separated medially, but becoming close laterally, and close over entire extent of 6; pubescence entirely pale on basal tergum, but discal pubescence on the following terga more or less blackish, very short and inconspicuous medially, becoming more noticeable toward extreme sides; terga 2-6 with white, apical fasciae, these more widely interrupted on the more basal terga, entire on 5 and 6; abdominal

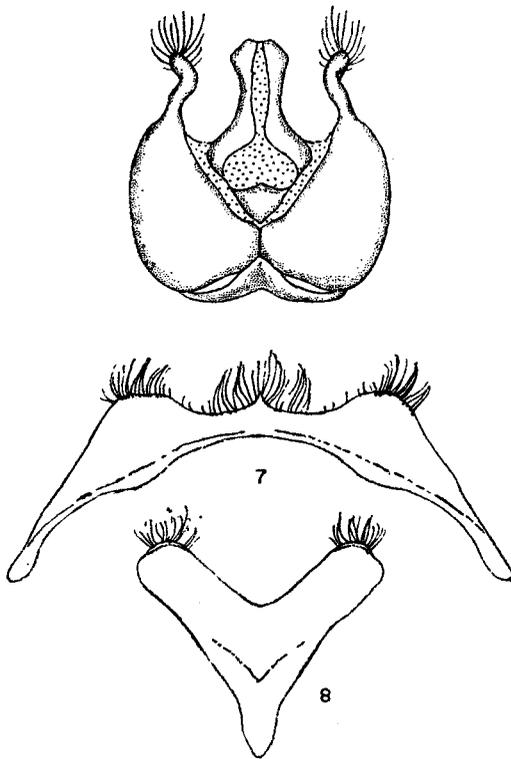


Figure 2

Genital armature and sterna 7 and 8 in males of *Lithurgus gibbosus*.

sterna entirely pale pubescent, the apical fasciae very narrow and obscure; sterna 7 and 8, and genital armature as shown, (fig. 2).

DISTRIBUTION—North Carolina to Florida and Texas, March to July, but as early as January in Florida.

FLOWER RECORDS—*Opuntia* is the principal flower upon which this depends for pollen, but it has been collected also on *Cirsium*, *Helianthus*, *Ilex*, *Pontederia* and *Rudbeckia*.

***Lithurgus (Lithurgopsis) bruesi*
Mitchell**

Lithurgus bruesi Mitchell, 1927. *Psyche* 34, p. 104. ♂.

Lithurgus bruesi Mitchell, 1938. *Psyche* 45, p. 150. ♀.

Lithurge bruesi Michener, 1954. *Kans. Ent. Soc. Jour.* 27, p. 1.

FEMALE—Length 13-16 mm.; entirely black, including tegulae and legs; face con-

siderably longer than distance between eyes above; eyes slightly convergent below; facial prominence low medially, strongly protuberant at each side; clypeus smooth, shining, with rather fine, sparse but distinct punctures, apical margin straight, with a quite prominent fringe of long greyish hairs; cheeks much broader than eyes; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; mandibles 3-dentate, middle tooth rather prominent; labrum with a basal, transverse process, which has a slight median, and a pair of lateral, emarginations; pubescence of head entirely pale, rather copious around antennae and down inner orbits, quite long and copious on lower part of cheeks; punctures fine and close on face above antennae and on vertex, becoming rather sparse above each eye and more shallow and indefinite along cheeks, becoming rather coarse and close below; scutum dull, finely and densely rugose, becoming almost reticulate anteriorly, scutellum finely rugose except along posterior margin; pleura distinctly but finely and closely punctate; propodeum smooth but rather dull; tegulae smooth, with some minute and close punctures anteriorly; wings subhyaline, veins and stigma piceous, recurrent veins entering 2nd submarginal cell subequally distant from base and apex; hind tibiae coarsely spiculate on outer surface, mid tibiae more finely so, and front tibiae more punctate than spiculate; spurs pale yellowish; legs largely pale pubescent, but mid basitarsi with some blackish hairs beneath apically, and hind basitarsi with prominent, erect, black, seta-like hairs; abdominal terga 1-3 shining and practically impunctate medially, becoming finely, closely and quite distinctly punctate toward sides, terga 4-5 more distinctly punctate medially, punctures of 5 quite deep, distinct and relatively coarse; terga 2-5 with whitish, apical fasciae, these widely interrupted on 2, somewhat less so on 3, entire on 4, and entire and conspicuous on 5; discal pubescence extremely short and inconspicuous on the more basal terga, becoming quite distinct but very short on tergum 5 where it is largely black, tergum 6 with a dense covering of fuscous pubescence which completely hides the surface except for the median, apical spine; scopa pale yellowish, with a few black hairs on sternum 5; sterna 1-5 with narrow but entire, whitish, apical fasciae, discs with rather coarse, well separated but hardly sparse punctures, these becoming relatively close and fine on the basal sterna, sternum 6 triangular, with a narrow, impunctate, median line, closely and deeply punctate on each side.

MALE—Length 10-13 mm.; entirely black, including tegulae and legs; face somewhat longer than distance between eyes above; eyes

Anthidium cognatum Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 109. ♀ ♂

Anthidium maculifrons Hungerford and Williams, 1912. Ent. News 23, p. 256. (biology)

Anthidium cognatum Schwarz, 1927. Amer. Mus. Novitates 253, p. 3.

Anthidium maculifrons Schwarz, 1928. N. Y. Ent. Soc. Jour. 36, p. 369. (synonymy)

Anthidium cognatum Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10 mm.; black, with yellow maculations; clypeus with a pair of lateral, subapical, rounded maculations, a pair of slightly larger, oblong maculations between clypeus and lower inner orbits; mandibles yellow at base; vertex with a pair of small and narrow maculations on each side; tegulae with a small antero-lateral maculation, a similar one at each extreme side of scutum, adjacent to tegula; a small maculation on each axilla, and posterior margin of scutellum narrowly yellow, this band interrupted medially; abdominal terga 1-4 with large, yellow maculations at each extreme side and a pair of narrow, transverse and rather short maculations near center, the inner and outer maculations on terga 2-4 narrowly connected; tergum 5 with a pair of larger, submedian, transverse maculations which are only slightly separated and a narrow band connecting these with the extreme lateral margin, but without the lateral yellow spot; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks somewhat narrower than eyes; clypeus slightly convex, apical margin somewhat thickened, very finely tuberculate on each side, median area nearly straight; mandibles with 7 or 8 fine and rather irregular teeth; vertex and cheeks not carinate; tegulae shining, with minute and slightly separated punctures; wings subhyaline, veins piceous; legs black in large part, tibiae with elongate, basal, yellow maculations on outer face, front and middle tarsi with dense, short, snowy white pubescence, this somewhat more elongate on posterior side; spurs testaceous; pubescence short, and thin in general, entirely pale, white and rather copious between antennae and ocelli, on lower portion of cheeks, on pleura and lateral faces of propodeum; ventral scopa white; punctures fine and close over entire head and thorax, very fine and densely crowded between antennae and ocelli and on vertex medially, somewhat more coarse and irregular on clypeus, more distinct, with very narrow but definite intervening lines on scutum and scutellum; abdominal terga somewhat shining, punctures quite close but distinct, deep and rather well separated and coarser on anterior

portion of basal tergum, the slightly depressed apical rims on terga 1-5 somewhat more finely and closely punctate, tergum 6 about twice as broad as median length, broadly triangular, with a median angle and a small angle at each extreme side, margin between minutely crenulate.

MALE—Length 11-12 mm.; black, with yellow maculations; clypeus, outer face of mandibles, scape, lateral facial maculae terminating abruptly at level of antennae, and a pair of transverse, narrow bands on each side of vertex, yellow; anterior margin of scutum with a pair of small, yellow maculations on each side, near but not attaining the tubercles, and a very small one adjacent to tegulae; axillae with rather small maculations, and posterior margin of scutellum narrowly yellow, this band interrupted medially; abdominal terga 1-5 with four maculations across each disc, the lateral pair quite large, median pair smaller, the inner and outer maculation on 2-5 narrowly connected, 6 with a pair of submedian, more or less rounded maculations that are slightly separated medially; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli slightly nearer eyes than to margin of vertex; clypeus slightly convex, apical margin very slightly incurved across median third; labrum with a pair of small tubercles near base, entirely black; mandibles conspicuously 3-dentate, inner tooth about mid way between the apical and inner teeth, the teeth black in marked contrast to the yellow base; tegulae with a yellow, antero-lateral blotch, otherwise dark, surface very finely and quite closely punctate; wings subhyaline, veins more piceous; coxae, trochanters and femora entirely black, each front and mid tibia with a yellow stripe along outer face, hind tibiae with a small, basal, yellow spot, otherwise these joints black; tarsi yellow, becoming somewhat more brownish at tips, front and mid pair with dense, snowy white pubescence which forms a rather conspicuous but short posterior fringe, hind tarsi with a somewhat similar anterior fringe; tegulae yellowish; hind trochanters with a very small and inconspicuous posterior tubercle; pubescence rather strongly ochraceous above on head and thorax, becoming snowy white laterally and beneath, quite copious over most of face, on vertex medially, and on cheeks below, thin on thorax dorsally but quite dense on pleura and propodeum, short and inconspicuous over most of abdomen; punctures very fine and close over entire head and thorax, somewhat less conspicuous on maculated areas of face and clypeus, and to a considerable degree obscured by pubescence above antennae; scutum densely and finely rugoso-punctate, punctures somewhat more

distinct but very close on scutellum and pleura; terga 1-5 of abdomen shining, punctures distinctly although not widely separated on the more basal areas of each disc, the broadly impressed, apical margins more finely and closely but quite regularly punctate, those on 6 close and fine, 7 with a distinct, median spine, and on each lateral angle a robust, subtruncate projection, giving a tri-dentate appearance; extreme lateral angles of tergum 6 with a robust, slightly curved but rather short spine; abdominal sterna 1-5 exposed, more or less copiously pubescent, especially laterally, sterna 6-8 retracted, form as shown (fig. 3); genital armature as shown.

DISTRIBUTION—Mexico and Arizona, east to Illinois, Virginia and Florida, March to November in the more southern parts of its range.

FLOWER RECORDS—*Azelia*, *Bidens*, *Cracca*, *Crotalaria*, *Galactia*, *Galax*, *Phaseolus* and *Psoralea*. Robertson (1929) records it on *Asclepias* and *Coreopsis*.

Anthidium psoraleae Robertson

(Fig. 3)

Anthidium psoraleae Robertson, 1902. Canad.

Ent. 34, p. 322. ♀ ♂

Anthidium emarginatum bilineatum Schwarz, 1927. Amer. Mus. Novitates 252, p. 4. ♂

Anthidium psoraleae Schwarz, 1928. Canad. Ent. 60, p. 214.

Anthidium psoraleae Schwarz, 1928. N. Y. Ent. Soc. Jour. 36, p. 384.

Anthidium psoraleae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 11 mm.; black, with yellow maculations; vertex with a narrow, elongate maculation extending from each eye to posterior margin, head otherwise black; tubercles with a very small, yellow spot, and tegulae with an anterior, yellow blotch; scutum black except for a narrow, marginal, yellow mark at each extreme side adjacent to tegulae; scutellum with a narrow, posterior, yellow border, this interrupted medially; thorax otherwise black; basal abdominal tergum with a pair of angular blotches on each extreme side and a pair of widely separated and quite small spots between, terga 2-5 with transverse bands that are slightly separated medially, these very narrow, becoming abruptly broadened at each extreme side except on tergum 5, tergum 6 entirely black; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex; cheeks slightly broader than eyes; clypeus

rather flat, apical margin smooth and somewhat thickened, straight except for a pair of minute denticles at each extreme side; mandibles with seven small but well developed and distinct teeth, entirely black; tegulae shining, with minute and slightly separated punctures; wings subhyaline, veins piceous; legs entirely black, basitarsi somewhat longer than following segments combined, spurs yellowish; pubescence entirely whitish, rather thin but somewhat elongate, more copious around antennae, on lower cheeks, on pleura and propodeum laterally, and on basal abdominal tergum, the ventral scopa entirely white; punctures quite deep and distinct but rather fine and close in general, densely crowded over face below antennae, on cheeks and on pleura, more distinctly separated but still close on vertex, scutum and scutellum; quite distinctly separated but still rather close on disc of basal abdominal tergum, the apical, impressed area more closely and finely punctate, discs of the following terga somewhat more closely punctate, but punctures not crowded, those on 7 densely crowded; tergum 7 triangular in outline, with a low median protuberance which is narrowly bi-dentate, and a strong, lateral angle on each side, a broad and rather deep emarginate area between these three projections.

MALE—Length 12-13 mm.; black, with yellow maculations; outer surface of mandibles, entire clypeus, lateral facial maculae ending abruptly at level of antennae, and a small maculation between upper end of eye and margin of vertex, yellow; upper portion of face, entire cheeks and antennae, black; tubercles with a very small yellow spot, and tegulae with a rather large yellow blotch, scutellum narrowly rimmed with yellow posteriorly, this interrupted medially, entire thorax otherwise black; basal abdominal tergum with rather large, angular, yellow blotches at each extreme side and a pair of widely separated, small, yellow spots between; terga 2-5 with transverse, lateral maculae which are narrowly interrupted medially, these quite narrow but abruptly broadened at each extreme side, less so on 5, 6 with a pair of small, oblique spots which are only slightly separated, 7 entirely black; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex; cheeks somewhat broader than eyes; clypeus slightly convex, only slightly broader than median length, apical margin nearly straight; mandibles distinctly 3-dentate, median tooth nearer apical tooth than to inner angle; tegulae somewhat shining, but finely and rather closely punctate; wings subhyaline, veins piceous; legs black in large part, but tibiae with apical, yellow blotches, basi-

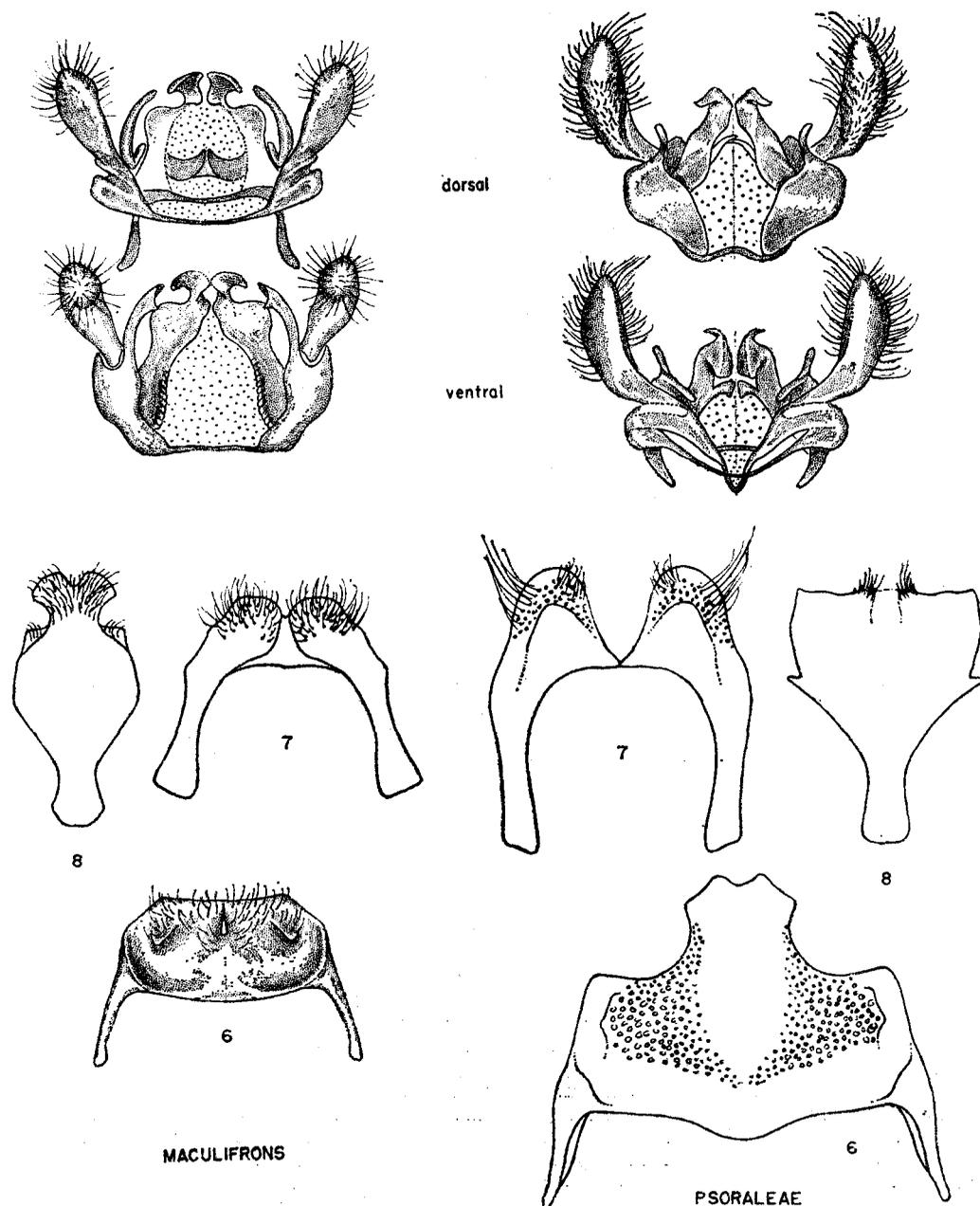


Figure 3—Dorsal and ventral views of genital armature and sterna 6-8 in males of *Anthidium*.

tarsi yellow in large part, with dense white pubescence, the more apical tarsal segments becoming piceous; spurs yellow; pubescence entirely pale, quite thin, rather elongate over head and thorax, more dense around antennae and on pleura and propodeum; punctures quite deep but rather fine and close generally, densely crowded between ocelli and antennae and on cheeks, more distinct but still close on pleura, vertex, scutum and scutellum; abdominal terga somewhat shining, punctures on disc of basal tergum rather definitely separated, the

depressed apical margin very finely and closely punctate, discs of the following terga more closely punctate, becoming crowded on 6 and 7; tergum 6 with a robust, curved spine at each extreme side; 7 with a slender, median spine, lateral margins evenly rounded, a deep emargination separating the median spine from the more truncate, lateral areas; sterna 1-5 exposed, more or less fringed apically with erect, rather elongate, pale pubescence, terga 6-8 and genital armature as shown (fig. 3).

DISTRIBUTION—Colorado and North Dakota, east to Illinois and Michigan, July. Possibly the range of this species extends to the Pacific Coast.

FLOWER RECORDS—Robertson (1929) records this species on *Astragalus*, *Lobelia*, *Psoralea*, *Trifolium* and *Verbena*.

Paranthidium Cockerell and Cockerell

(Fig. 1)

Anthidium subg. *Paranthidium* Cockerell and Cockerell, 1901. Ann. Mag. Nat. Hist. (7) 7, p. 50. Type: (*Anthidium perpictum* Cockerell) = *Paranthidium jugatorium perpictum* (Cockerell). Orig. desig.

Paranthidium Schwarz, 1926. Amer. Mus. Novitates 226, pp. 19-25 (review).

Paranthidium subg. *Mecanthidium* Michener, 1942. N. Y. Ent. Soc. Jour. 50, p. 278.

Paranthidium Michener, 1948. Amer. Mus. Novitates 1381, p. 10.

In *Paranthidium* there is no carina separating the anterior and lateral faces of the mesopleura, but the prothoracic tubercles are sharply carinate, although short. The scutellum is rounded and the posterior face of the propodeum is completely vertical. The mandibles in the female are broad apically, with a pair of low, median teeth between the apex and inner angle, resulting in a 4-dentate condition. In the males they are 3-dentate. The maxillary palpi are 3-segmented; arolia are present; and the 2nd recurrent vein terminates beyond the tip of the 2nd submarginal cell.

KEY TO SPECIES

1. Males 2
Females 3
2. Vertex and tergum 7 largely or entirely black
..... *jugatorium jugatorium* (Say)
Vertex with a more or less continuous yellow band extending down to mid point of cheeks; tergum 7 yellow
..... *jugatorium lepidum* (Cresson) (p. 15)
3. Lateral facial maculae broad, not much narrowed above, reaching top of eye; vertex usually conspicuously banded; tubercles yellow or yellow-maculated
..... *jugatorium lepidum* (Cresson) (p. 15)
Lateral facial maculae narrowed above; vertex entirely black or with a much reduced and incomplete yellow band; tubercles black
..... *jugatorium jugatorium* (Say)

Paranthidium (*Paranthidium*) *jugatorium jugatorium* (Say)

(Fig. 4)

Megachile jugatoria Say, 1824. In Keating, Narr. Long's 2nd Exped. 2, p. 352. ♀.

Stelis obesa Say, 1837. Boston Jour. Nat. Hist. 1, p. 398. [♂].

Paranthidium jugatorium Schwarz, 1926. Amer. Mus. Novitates 226, p. 23.

FEMALE—Length 8 mm.; black, with yellow maculations; clypeus yellow laterally, black medially, lateral facial maculations narrowed above, terminated near top of eye; a small band back of each eye, a narrow band on each side of scutum extending on to anterior margin, a pair of posterior bands on scutellum, all yellow; axillae and tubercles black; abdominal terga with transverse, lateral maculations, separated medially, widely so on basal tergum, that on apical tergum extensive and complete; face only slightly longer than distance between eyes above; eyes subparallel; ocelli very small, their diameters only about twice that of the neighboring punctures, lateral ocelli somewhat nearer margin of vertex than to eyes; clypeus slightly convex, apical margin slightly out-curved, obscurely crenulate, with a slight median emargination; mandibles entirely black, broadened apically, obscurely 4-dentate; cheeks very slightly broader than eyes; malar space hardly evident; wings faintly infuscated, more deeply so in region of marginal cell, veins and stigma piceous; tegulae very finely and closely but distinctly punctate, with an obscure, antero-lateral, yellow spot; coxae, trochanters and basal portion of femora piceous, tibiae and apex of femora reddish-yellow, tarsi more brownish, front and mid tibiae rather bright yellowish anteriorly, their basitarsi quite slender, about equal in length to the following segments combined, hind basitarsi slightly longer than the following segments, quite broad and flat but narrower than their tibiae; spurs yellow; pubescence short, thin and inconspicuous, uniformly very pale ochraceous over entire body; ventral scopa entirely pale yellow; punctures deep, distinct and quite coarse, close over lower part of face, on cheeks, and over most of thorax, well separated above antennae and on vertex, slightly so on scutellum; punctures much finer and well separated on abdominal terga 2-5 medially, becoming quite close laterally, apical margins narrowly impunctate; basal tergum with coarse, well separated punctures across base, these becoming fine and close along apical margin, those on tergum 6 very fine and densely crowded.

MALE—Length 8-9 mm.; black, with yellow maculations; clypeus, mandibles in large part, three small spots on labrum, narrow lateral

maculations ending at top of eye, a rather narrow band back of each eye above and a smaller one below, and a very narrow stripe in middle of vertex, yellow; scutum with a narrow yellow band on each side extending on to anterior margin, median third of margin black; axillae and posterior half or more of scutellum yellow; pleura and tubercles entirely black; basal portions of legs black, but apex of femora, anterior and outer surfaces of front and mid tibiae, entire hind tibiae and all tarsi, yellow; abdominal terga 1-6 with transverse, yellow bands which are slightly interrupted on 1-4, entire on 5 and 6, 7 variable, usually blackish apically, more or less yellowish toward base; face slightly longer than distance between eyes above; eyes slightly convergent below; ocelli very small, diameter only about twice that of the neighboring punctures, lateral pair considerably nearer margin of vertex than to eyes; clypeus quite evenly convex, apical margin slightly out-curved, with about four minute denticles; mandibles distinctly 3-dentate, middle tooth somewhat nearer apex than to inner angle; cheeks narrower than eyes; malar space invident; tegulae finely punctate, yellow, with a median, brownish area, the rim more hyaline; wings faintly infuscated, quite deeply so in region of marginal cell, veins and stigma piceous; basitarsi uniformly slender, about equalling the following segments combined; spurs pale yellow; pubescence largely pale ochraceous, very short, thin and inconspicuous, somewhat more whitish and more dense on thorax below, very short and barely evident on abdominal terga; punctures deep, distinct and quite coarse, close over most of face and cheeks, scutum, pleura and posterior face of propodeum, somewhat more widely separated just below ocelli, on vertex laterally, and on scutellum; abdominal terga shining, punctures deep and distinct but variable as to size and spacing, in general rather fine and close toward the narrow, apical, impunctate rims, coarse and more distant across middle; tergum 7 protuberant medially, with a narrow, acute angle on each extreme side; sterna 1-3 yellow, rather fully exposed, 4 partially exposed, with a median, conspicuous, apical, piceous comb, 5 largely hidden, with lateral narrow areas on each side bearing a piceous comb similar to that on 4, 6-8 as shown (fig. 4); penis valves rather short, acutely pointed, the gonostyli angulately dilated as shown.

DISTRIBUTION—Minnesota to New York and New Jersey, July and August.

FLOWER RECORD—*Helianthus*.

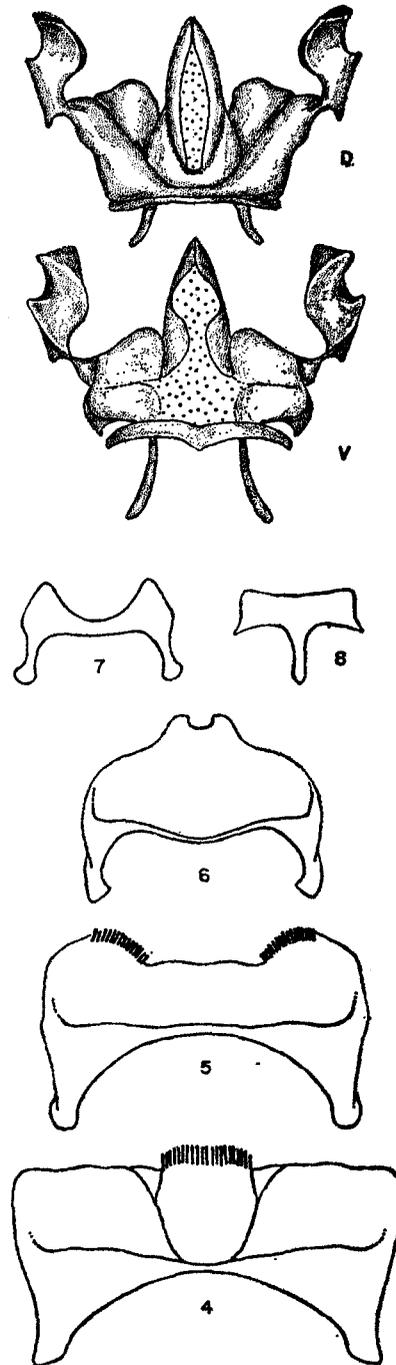


Figure 4

Dorsal and ventral views of genital armature, and sterna 4-8 in males of *Paranthidium*.

of face slightly greater than distance between eyes above; eyes subparallel; lateral ocelli quite small, slightly nearer margin of vertex than to eyes; clypeus slightly convex, apical margin straight; mandibles entirely black, tri-dentate, median tooth nearer apical angle than to inner angle; cheeks narrower than eyes; malar space invident; tegulae very closely and minutely punctate, largely red, but anterior half yellow, outer margin hyaline; wings quite deeply infuscated, especially in area of marginal cell, veins piceous; coxae, trochanters and femora black, apex of femora narrowly yellow; tibiae yellow in large part but becoming more ferruginous apically, the tarsi largely testaceous or brownish; spurs yellow; hind coxa with a very short, posterior, triangular tubercle; pubescence entirely pale, very short and inconspicuous, copious only below wing bases on metapleura and propodeum; ventral scopa entirely pale ochraceous; punctures coarse, deep and distinct, close on face and cheeks, and over entire thorax; apical margins of abdominal terga impunctate, the discs coarsely punctate, punctures well separated medially on terga 2-4, close toward sides and on basal and apical terga.

MALE—Length 7 mm.; black, with yellow maculations; clypeus and mandibles yellow; broad, lateral maculations of face which end broadly at upper end of eye, lower margin of supraclypeal area, a narrow band on cheeks above upper end of eye, tubercles, adjacent anterior margin of scutum, axillae and posterior border of scutellum, all yellow; basal abdominal tergum with a median and a pair of lateral maculations; terga 2-4 with transverse bands which are slightly interrupted medially and conspicuously emarginate posteriorly, these well separated from the apical margin of each tergum, tergum 5 with a pair of small lateral spots, and tergum 7 entirely yellow except for a narrow basal band of black; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli very slightly nearer eyes than to margin of vertex; clypeus slightly convex, the apical margin straight; mandibles obscurely tri-dentate, median tooth very small and obscure; cheeks narrower than eyes; tegulae very finely and closely punctate, narrowly yellowish anteriorly, otherwise more ferruginous; wings lightly infuscated, veins piceous; legs black basally, femora narrowly yellowish at apex, outer face of front and mid tibiae, basal third of hind tibiae and outer face of hind basitarsi, yellow; legs otherwise more testaceous or brownish; spurs pale yellow; hind coxae with a robust, posteriorly directed, triangular spine which is bright yellow; pubescence of entire body pale ochraceous, very

short and inconspicuous, copious only beneath wing bases on metapleura and propodeum; punctures deep, distinct and quite coarse, close over lower part of face, on cheeks, and over entire thorax, slightly separated above antennae and on vertex, those on vertex, scutellum and pleura coarser than on cheeks, face below and over scutum; apical margins of abdominal terga impunctate, discs coarsely and deeply punctate, punctures well separated on terga 2-4 medially, close laterally and on basal and apical terga; tergum 7 with a median, triangular projection which is separated from the broadly truncate lateral margins by rather deep emarginations; abdominal sterna 1-5 largely exposed, 4 and 5 with conspicuous, dense and elongate pubescence medially, 6 broadly out-curved and to a large degree exposed, 7 and 8 retracted, as in *simile* (fig. 5); genital armature nearly identical with that of *simile*.

DISTRIBUTION—Missouri to North Carolina, south to Florida, April to October.

FLOWER RECORDS—*Aster*, *Chrysopsis*, *Helenium*, *Koelia* and *Psoralea*.

The subspecific designation of *curvatum* is made necessary by the recognition of two other subspecies in the West.

Dianthidium floridiense Schwarz

Dianthidium floridiense Schwarz, 1926. Amer. Mus. Novitates 226, p. 5. ♂ ♀.

FEMALE—Length 9 mm.; black, with ferruginous maculations and entirely ferruginous legs; clypeus, scape and basal segments of flagellum ferruginous, antennae becoming more piceous apically; lateral face marks slightly narrowed above, terminating near top of eye; vertex with a narrow band which is slightly interrupted medially and extends down below upper end of eye; tubercles, tegulae, axillae and entire scutellum ferruginous, the scutum, including median third of anterior margin, black, lateral areas adjacent to tubercles narrowly ferruginous, this extending very narrowly along lateral margins to the axillae; entire pleura and propodeum black; basal abdominal tergum, except for the somewhat darkened apical margin, entirely ferruginous; terga 2-4 with lateral, transverse maculae, which are slightly emarginate on posterior border, widely separated, but becoming broadly ferruginous at extreme sides of tergum 2, tergum 5 with a pair of small, ferruginous blotches that are quite widely separated; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and eyes; vertex

and cheeks with a carinate, posterior margin; cheeks very slightly narrower than eyes; clypeus very slightly convex, apical margin entire; mandibles dark, 3-dentate, middle tooth much nearer the apical tooth than to the inner angle; wings quite deeply infuscated, more deeply so in region of marginal cell, veins piceous; tegulae very finely and closely punctate; hind coxae with a short, triangular, spine-like tubercle; spurs pale yellow; pubescence entirely pale, very short and inconspicuous, but somewhat more elongate and copious beneath wings on metapleura and propodeum above; ventral scopa entirely whitish; punctures quite coarse, deep and distinct, close over most of head and thorax, slightly separated across vertex, those on vertex, scutellum and pleura coarser than on other areas; abdominal terga 1-5 shining, punctures well separated, becoming quite close laterally, densely crowded on 6.

MALE—Length 10-11 mm.; black, with yellow maculations on head and ferruginous maculations on thorax and abdomen, legs almost completely ferruginous; clypeus, mandibles in large part, and lateral facial maculations yellow, the lateral maculations narrowed above, terminated near top of eye where they are somewhat infused with red; scape, pedicel and segments 1 and 2 of antennae ferruginous, flagellum otherwise piceous; tubercles, tegulae, axillae and posterior half of scutellum ferruginous, pleura and propodeum entirely black; scutum, including median third of anterior margin, black, this margin otherwise narrowly ferruginous, this band extending very narrowly along lateral margins to axillae; basal abdominal tergum largely ferruginous, tergum 2 ferruginous over basal two-thirds, apical third more blackish, tergum 3 with a pair of elongate, lateral, curved maculations, and tergum 4 with widely separated, small maculae; face somewhat longer than distance between eyes above, eyes very slightly convergent below; lateral ocelli slightly nearer eyes than to margin of vertex; posterior margin of vertex and cheeks distinctly carinate; cheeks considerably narrower than eyes; mandibles distinctly 3-dentate, middle tooth conspicuous, very slightly nearer apical tooth than to inner angle; tegulae very finely and densely punctate; wings deeply infuscated, somewhat violaceous, veins piceous; hind basitarsi somewhat yellowish, legs otherwise pale ferruginous or testaceous, spurs yellowish, hind coxa with a conspicuous, robust, posteriorly directed, bright yellow spine; pubescence entirely pale, very short and inconspicuous, copious only beneath wing bases and upper part of lateral faces of propodeum; punctures coarse, deep and distinct, close over most of head and thorax, slightly separated only on vertex, rather fine on lower cheeks, lower half

of face, and on scutum, quite coarse on scutellum and pleura; abdominal terga shining, punctures well separated medially on terga 1-4, somewhat closer on 5, crowded on 6, close but distinct on 7 which is broadly truncate apically, with a median triangular protuberance which is separated from the truncate, lateral margins by rather deep emarginations, the plate largely testaceous, with base and median area blackish; the more basal sterna pale testaceous or ferruginous, sternum 3 with a dense brush of short pubescence occupying median third of apical margin, sternum 5 with much elongate, erect pubescence, 6 largely exposed, with thin, erect, elongate pubescence, 7 and 8 retracted (fig. 5); gonostyli of genital armature very nearly equal to penis valves in length, in contrast with *simile* (fig. 5).

DISTRIBUTION—Florida, March to November.

FLOWER RECORDS—*Bidens* and *Sabal*.

Timberlake (1943) believed *floridiense* to be merely a form of *curvatum*, but the extreme difference in coloration, with no evident intergradation, the larger size, and the more conspicuous second mandibular tooth of the male convinces this writer that it is distinct.

Dianthidium simile (Cresson)

Fig. 5

Anthidium simile Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 378. ♀ ♂.

Dianthidium simile Schwarz, 1926. Amer. Mus. Novitates 226, p. 9.

FEMALE—Length 8 mm.; black, with yellow maculations; clypeus black medially, with large yellow blotches on each side, these contiguous with lateral facial maculae which are broad below but very much narrowed above, terminating near top of eye; cheeks with a small yellow maculation above top of each eye; tubercles with a yellow spot; scutum with a small yellow maculation on anterior margin near tip of tubercle; tegulae ferruginous, with a rather large, yellow maculation; axillae largely yellow, and scutellum with a narrow, yellow border which is interrupted medially; pleura entirely black; basal abdominal tergum with a pair of lateral, yellow blotches and a narrow, median band, these widely separated; terga 2-5 with lateral, transverse maculae which are strongly emarginate on posterior border and widely separated medially; length of face subequal to distance between eyes; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex; vertex and cheeks with a very low, carinate, posterior margin; cheeks slightly narrower than eyes, clypeus slightly convex, apical margin straight

and entire; mandibles entirely black, 3-dentate, median tooth conspicuous and much nearer apical tooth than to inner angle; tegulae very finely and densely punctate; wings rather deeply infuscated, veins piceous; coxae and trochanters black, femora black except for small, apical, yellow maculations, front and mid tibiae largely yellow on outer face except at apex, and hind tibiae with a more restricted, basal, yellow maculation, tarsi and remainder of tibiae brownish-ferruginous; spurs yellowish to dull testaceous; hind coxa with a low, triangular, spine-like tubercle; pubescence entirely pale, very short and inconspicuous, to some degree more elongate and copious beneath wing bases on upper part of metapleura and propodeum; ventral scopa entirely pale ochraceous; punctures coarse, deep and distinct, close over entire head and thorax, being slightly separated only on vertex; punctures slightly separated on basal, abdominal tergum medially, becoming quite close at extreme sides, those on terga 2-5 somewhat separated medially, but becoming close laterally, apical margins narrowly impunctate, punctures of tergum 6 densely crowded.

MALE—Length 8-9 mm.; black, with yellow maculations; outer face of mandibles and entire clypeus yellow, lateral face marks yellow, more or less triangular, ending very narrowly toward upper end of eye; cheek with a very small, yellow spot back of eye at top of head; tubercles with a small yellow blotch, and tegulae with an anterior, yellow maculation; scu-

tum with a pair of very small, anterior spots, axillae with small yellow spots and scutellum very narrowly rimmed with yellow on each side; otherwise thorax entirely black; basal abdominal tergum with a pair of short, lateral maculations and a median, more elongate but conspicuous spot; terga 2-5 with lateral, transverse, elongate maculations which are broadly emarginate posteriorly, and nearly meet medially, tergum 7 largely yellow, with only the narrow base black; face somewhat longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex; vertex and cheeks with a sharp but rather low, carinate, posterior rim; clypeus broadly convex, apical margin straight; mandibles obscurely 3-dentate, with a very low and inconspicuous middle tooth; tegulae very finely and densely punctate; wings rather deeply infuscated, veins piceous; coxae, trochanters and femora black, but mid and hind femora, with small, yellow marks apically; outer face of front and mid tibiae yellow, and hind border, base and apex of hind tibiae yellow, otherwise black; fore and hind basitarsi yellow, the mid tarsi and the more apical tarsal segments of the others, more brownish; all spurs, and apical, robust spines of hind coxae, bright yellow; pubescence very short and inconspicuous, entirely pale, somewhat more dense beneath wing bases on upper part of metapleura and propodeum; punctures coarse, deep and distinct, close over entire head and thorax; punctures well separated medially on abdominal terga 2-4, somewhat closer on 1 and 5, dense on 6 and quite close on all; tergum 7 broadly truncate, with a median, triangular protuberance which is slightly separated from lateral areas by shallow emarginations; basal sterna dark, sternum 3 with a median, apical, dense brush of moderately elongate pubescence, and sternum 5 with a fringe of quite elongate pubescence, 6 largely exposed, thinly pubescent, 7 and 8 retracted; genital armature as shown (fig. 5).

DISTRIBUTION—Minnesota to Ontario and Maine, south to Georgia, July to September.

FLOWER RECORD—*Aster*.

Anthidiellum Cockerell

(Fig. 1)

Anthidium subg. *Anthidiellum* Cockerell, 1904. South. Calif. Acad. Sci. 3, p. 3. Type: *Anthidium strigatum* Panzer. Orig. desig.
Anthidium subg. *Ceri-anthidium* Friese, 1923. Die Europ. Bienen. p. 304. Type: *Anthidium strigatum* Panzer. Desig. by Cockerell, 1925.
Cerianthidium Cockerell, 1925. Calif. Acad. Sci. Proc. (4) 14, p. 361. (Emend.)

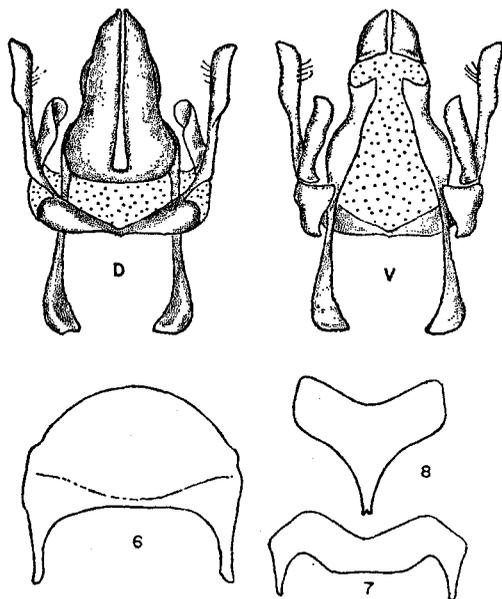


Figure 5

Dorsal and ventral views of genital armature and sterna 6-8 in males of *Dianthidium simile*.

Anthidiellum Schwarz, 1926. Amer. Mus. Novitates 226, pp. 15-19. (revision)

Anthidiellum Michener, 1948. Amer. Mus. Novitates 1381, p. 23.

In *Anthidiellum* the mesopleura are vertically carinate, dividing the area into an anterior face and a lateral, more coarsely sculptured face. This carina originates at the front coxa and extends to the anterior margin of the prothoracic tubercle, which also is sharply carinate. The scutellum has a straight and elongate posterior margin which protrudes conspicuously over the completely vertical posterior face of the propodeum. The mandibles are 4-dentate in the females, 3-dentate in the males. The maxillary palpi are 2-segmented; and the 2nd recurrent vein of the front wing terminates at the tip of the 2nd submarginal cell. Sterna 5-8 in the males are retracted and somewhat modified.

The cells in this group are attached to rocks or to vegetation.

KEY TO SPECIES

1. Males 2
Females 5
2. Segment 7 of abdomen triangular in outline; base of abdomen deep red
..... *perplexum* Smith (p. 21)
Segment 7 broad and very short, apical margin sinuate 3
3. Lateral face marks extending along inner margin of eye nearly to vertex 4
Lateral face marks abruptly truncate above, terminating just above level of antennae
..... *notatum boreale* Robertson (p. 20)
4. Maculations yellow; basal abdominal tergum with widely separated, lateral, yellow blotches
..... *notatum notatum* Latreille
Maculations ferruginous; basal abdominal tergum almost entirely ferruginous, with only a narrow, subapical, transverse, blackish band
..... *notatum rufimaculatum* Schwarz (p. 21)
- 5(1). Area between lateral ocelli swollen and impunctate 6
Area between lateral ocelli well punctured, only slightly swollen
..... *perplexum* Smith (p. 21)
6. Clypeus entirely black; lateral facial maculae abruptly truncate at level of antennae
..... *notatum* (?) *boreale* Robertson (p. 20)
Clypeus, in part, yellow or red 7

7. Maculations yellow; basal abdominal tergum with widely separated, lateral, blotches
..... *notatum notatum* Latreille

Maculations ferruginous; basal abdominal tergum ferruginous, with only a relatively narrow, apical, black band
..... *notatum rufimaculatum* Schwarz (p. 21)

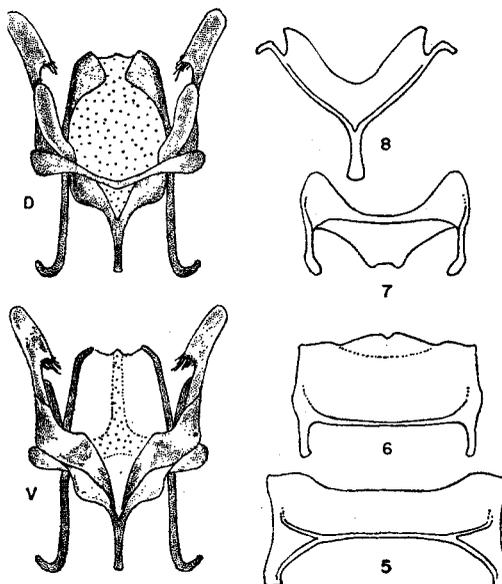


Figure 6
Dorsal and ventral views of genital armature and sterna 5-8 in males of *Anthidiellum notatum*.

Anthidiellum notatum notatum (Latreille)

(Fig. 6)

Anthidium notatum Latreille, 1809. Mus. Nat. Hist. Ann. 13, pp. 48 & 231. ♂.

Anthidium notatum Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 376. ♀ ♂.

Anthidiellum notatum Schwarz, 1928. N. Y. Ent. Soc. Jour. 36, p. 394.

FEMALE—Length 8 mm.; black, with yellow maculations; clypeus in large part, and adjacent margin of supra-clypeal area, yellow; lateral facial maculae yellow, extending broadly nearly to top of eye; posterior margin of vertex with a yellow band terminating just above top of eye; tubercles and adjacent margin of scutum broadly yellow, the median third or more of this margin black; axillae, an adjacent small spot at lower lateral angle of scutum, and scutellum in large part, yellow; median, anterior area of scutellum black; mandibles, apical margin of clypeus, entire

cheeks and pleura, black; legs black basally, tibiae in large part yellow, hind pair becoming ferruginous toward apex, tarsi largely brownish-ferruginous, but front tarsi somewhat yellowish; basal abdominal tergum black, with a pair of rather short but broad maculae at each extreme side, tergum 2 with a pair of elongate, slightly curved, basal, transverse, yellow bands which nearly meet at midline; terga 3-5 with rather widely separated, rectangular, yellow blotches; face somewhat longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli considerably nearer margin of vertex than to eyes; posterior margin of vertex subcarinate; cheeks very much narrower than eyes; clypeus somewhat convex, apical margin slightly thickened, only slightly out-curved; mandibles robust, quite distinctly 4-dentate, the teeth low; tegulae reddish-testaceous, with a yellow, anterior blotch, very minutely and quite closely punctate; wings rather deeply infuscated, veins piceous; front and middle spurs very short, yellowish-hyaline, hind spurs dull brownish-testaceous, nearly as long as the basitarsi; pubescence extremely short, thin, entirely pale, hardly evident on dorsum of thorax and on abdominal terga, ventral scopa entirely whitish; punctures quite coarse, deep and distinct, quite close below ocelli, closely crowded on cheeks, area between ocelli swollen and impunctate, with a deep, median impression; punctures very coarse and quite close on pleura, scutellum and axillae, somewhat less coarse and more definitely separated but still quite close on scutum; punctures distinct, deep and rather close on abdominal terga medially, becoming more coarse and close at extreme sides, apical margins narrowly shining and impunctate, depressed toward extreme sides; tergum 6 densely and finely rugoso-punctate, surface rather deeply impressed just before apical margin.

MALE—Length 7-8 mm.; black, with yellow maculations; outer face of mandibles, entire clypeus, lower and lateral areas of supra-clypeal area and adjacent, lateral, facial maculae terminating rather narrowly near upper part of eyes, yellow; posterior margin of vertex narrowly yellow, ending just above top of eye; tubercles, an anterior spot on each tegula, axillae in large part, and scutellum posteriorly, yellow; anterior margin of scutum adjacent to tubercle with a yellow band, median third or more of this margin black; pleura, cheeks and upper part of face black; basal abdominal tergum black, with large yellow blotches at each extreme side, tergum 2 with transverse, slightly curved, sub-basal, yellow maculations which nearly meet medially, terga 3-5 with submedian, rather widely separated,

rectangular blotches and small, yellow maculations at extreme sides; face considerably longer than distance between eyes above; eyes convergent below; lateral ocelli somewhat nearer margin of vertex than to eyes; cheeks very much narrower than eyes; clypeus slightly convex, apical margin nearly straight; mandibles distinctly 3-dentate, teeth black; tegulae reddish, with minute and quite close punctures; wings deeply infuscated, veins piceous; legs in large part ferruginous, but front and mid tibiae on outer face, and basal spot on hind tibiae, yellow; all basitarsi yellow, the more apical tarsal segments ferruginous; spurs yellowish, front and mid pair very short, more hyaline, hind pair somewhat more elongate but not approaching basitarsi in length; punctures coarse, deep and distinct, quite close between ocelli and antennae, somewhat more widely separated below, densely crowded on cheeks; area between ocelli swollen and impunctate but with a deep, median impression; punctures coarse and distinct, not crowded on pleura, axillae and scutellum, the scutum shining, punctures well separated in central part of disc posteriorly, becoming finer and closer anteriorly; basal tergum closely, deeply and distinctly punctate across entire disc, punctures on terga 2-5 slightly more widely separated and coarse, apical margins of discs narrowly impunctate, somewhat reddened, becoming depressed toward extreme sides; tergum 6 black except for the yellowish, lateral margins and narrowly along posterior margin, with a pair of low, submedian, apical protuberances; tergum 7 broad and quite short, slightly emarginate medially, coarsely and quite closely punctate; sterna 1-4 largely exposed, with rather elongate and thin, whitish pubescence; sterna 5-8 largely retracted, form as shown (fig. 6); gonostyli of genital armature elongate and quite narrow, much exceeding penis valves at apex.

DISTRIBUTION—Illinois to Massachusetts, south to Florida and Mississippi, April to September.

FLOWER RECORDS—*Azelia*, *Baptisia*, *Chrysopsis*, *Desmodium*, *Erigeron*, *Eupatorium*, *Galactia*, *Helianthus*, *Melilotus*, *Monarda*, *Phaseolus*, *Psoralea Solidago* and *Trifolium*.

Anthidiellum notatum boreale
(Robertson)

Dianthidium boreale Robertson, 1902. Canad. Ent. 34, p. 323. ♂
Anthidiellum boreale Swenk, 1914. Univ. Nebr. Studies 14, p. 32.

Anthidiellum notatum boreale Schwarz, 1928. N. Y. Ent. Soc. Jour. 36, p. 394.

Dianthidium boreale Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

The material available for study of this form is very inadequate. The holotype male has been seen. It is very similar to typical *notatum*, but the axillae have a very much reduced maculation, being almost entirely black. A female at hand, from northern Illinois may represent that sex for this form. It differs from the typical *notatum* female in the reduction of the swollen, impunctate area between the ocelli, this area being nearly flat and with a few, scattered punctures; the clypeus and axillae in this specimen are entirely black, otherwise the maculation is very similar to that of *notatum*.

DISTRIBUTION—Nebraska and Illinois.

FLOWER RECORD—Robertson (1929) records this subspecies on *Verbena stricta*.

Anthidiellum notatum rufimaculatum
Schwarz

Anthidiellum notatum var. *rufimaculatum* Schwarz, 1926. Amer. Mus. Novitates 226, p. 18. ♂ ♀.

Anthidiellum notatum rufimaculatum Schwarz, 1928. N. Y. Ent. Soc. Jour. 36, p. 395. (biology)

This form is nearly or quite identical with typical *notatum* structurally, differing chiefly in the color of the maculated areas, which are ferruginous, with entirely ferruginous legs. The color differences for the two sexes are as follows:

FEMALE—Lateral areas on clypeus, adjacent margin of supraclypeal area, and lateral facial maculae ending broadly nearer upper end of eye, ferruginous; posterior margin of vertex with a broad ferruginous band, extending down to upper third of eye on cheeks; scape, pedicel and segments 1 and 2 of flagellum reddish-testaceous, the more apical segments piceous; tubercles ferruginous and adjacent margin of scutum quite broadly ferruginous, extending down each side nearly to axillae; axillae entirely, and scutellum in large part, ferruginous; tegulae reddish-testaceous; pleura and propodeum entirely black; basal half of abdominal tergum 1 entirely ferruginous, apical half across central portion of disc, black; tergum 2 largely ferruginous basally, but the curved and slightly separated, more yellowish maculae faintly visible within the ferruginous area; terga 3-5

with submedian, rather widely separated, rectangular, ferruginous blotches, lateral margins of these terga entirely black.

MALE—Clypeus and mandibles, except teeth, entirely yellow, lateral facial maculae yellow in large part, but terminated near top of eye by a more ferruginous area, and supraclypeal area yellow in large part, but tinged with ferruginous above; posterior margin of vertex broadly ferruginous, the band reaching upper third of eye on cheeks; antennae largely reddish-testaceous, but becoming somewhat more brownish apically; tegulae yellowish-ferruginous, adjacent area of scutum rather broadly ferruginous, extending down each side nearly to axillae; axillae and scutellum entirely ferruginous; pleura entirely black, posterior face of propodeum with a pair of extensive, yellow blotches; legs yellowish-ferruginous, but basitarsi more definitely yellowish on outer face; basal abdominal tergum almost entirely ferruginous, with a subapical, narrow, blackish band extending nearly from one side to the other; tergum 2 with a somewhat similar, slightly broader and more conspicuous dark band; terga 3-5 with submedian rather widely separated, rectangular blotches, and the extreme lateral, tuberculate margins of each tergum ferruginous; tergum 6 black medially, ferruginous laterally and tergum 7 almost entirely ferruginous.

DISTRIBUTION—Florida, March to December.

FLOWER RECORD—*Rhus*.

Anthidiellum perplexum (Smith)

(Fig. 7)

Anthidium perplexum Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 214. ♀ ♂.

Anthidium perplexum Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 377. ♀ ♂.

FEMALE—Length 8 mm.; black, with yellow and ferruginous maculations, legs largely ferruginous; lateral facial maculae bright yellow, filling area between clypeus and eyes and ending broadly just above level of antennae, a limited area beneath each antennal fossa more ferruginous; scape, pedicel and segments 1 and 2 of antennae ferruginous, the more apical segments piceous; vertex with a narrow posterior, yellowish band that terminates just beyond upper end of eye; tubercles and an adjacent anterior band on scutum, reddish-yellow, median third of this margin black; axillae, and scutellum in large part ferruginous, the latter blackish medially and along anterior margin; clypeus, mandibles, upper part of face, cheeks, and entire pleura and propodeum, black; basal abdominal tergum

largely dark reddish, with bright yellow maculations at each extreme side; tergum 2 with a narrow, sub-basal, elongate and slightly curved, yellow maculation which is bordered posteriorly with a narrow area of ferruginous; terga 3 and 4 with a pair of widely separated, more or less rectangular, yellow blotches, which are more basal in location; abdomen otherwise black; face considerably longer than distance between eyes above; eyes distinctly converging below; lateral ocelli somewhat nearer margin of vertex than to eyes; posterior margin of vertex subcarinate; cheeks much narrower than eyes; clypeus slightly convex, apical margin broadly rounded; mandibles robust, 4-dentate, teeth rather low; wings deeply infuscated, veins piceous; tegulae ferruginous, very finely and closely punctate; tibiae quite coarsely, deeply and closely punctate on outer faces, the front and middle spurs very short, yellowish-hyaline, hind spurs more testaceous, nearly as long as the basitarsi; pubescence extremely short and thin, apparently entirely pale, hardly evident on dorsum of thorax and abdominal terga, more evident beneath and on legs; ventral scopa entirely whitish; punctures quite deep and distinct, quite coarse and close over most of head, crowded on clypeus and below ocelli, crowded and very coarse and deep on pleura; scutum dull, punctures rather fine, distinctly but not widely separated over the disc, those in central area becoming quite close but not crowded laterally; punctures of axillae and scutellum very coarse, deep and close; abdominal terga shining, punctures of basal tergum uniformly close, rather coarse, becoming somewhat finer toward the very narrow, apical, impunctate rim, more widely separated on terga 2-4 medially, becoming more closely and deeply punctate laterally and becoming densely crowded on 6, which is rather deeply impressed just before apical margin medially, slightly emarginate on each side.

MALE—Length 9 mm.; black, with yellow and ferruginous maculations, legs largely ferruginous; entire clypeus, outer face of mandibles, lateral maculae, and supraclypeal area in large part, yellow, the facial maculae ending broadly just above base of antennae; antennal scape reddish-piceous, flagellum more blackish; vertex with a yellow, posterior band that extends just beyond upper end of eye on each side; tubercles reddish-yellow, the adjacent, anterior margin of scutum with a yellow band, median third of this margin black; axillae ferruginous, posterior half of scutellum more yellowish, but becoming blackish anteriorly and toward median line; pleura, cheeks in large part, and upper part of face, black; basal abdominal tergum

largely ferruginous, with large yellow blotches on each extreme side; tergum 2 with elongate, transverse, sub-basal, yellow bands which are slightly curved and rather broadly margined with ferruginous posteriorly, becoming brighter yellow at extreme sides; terga 3-5 with a pair of rather widely separated, angulate, yellow blotches, terga 3-6 with small yellow maculations at each extreme side, tergum 7 narrowly margined with yellow; legs largely red, but hind basitarsi more yellowish, and anterior face of front tibiae yellowish; face considerably shorter than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and margin of vertex; cheeks very much narrower than eyes; clypeus only very slightly convex, apical margin very broadly and evenly rounded; mandibles rather narrow apically, conspicuously 3-dentate, teeth black; tegulae ferruginous, very minutely and quite closely punctate, outer rims becoming impunctate and translucent; wings quite deeply infuscated, veins blackish; outer face of tibiae coarsely, deeply and closely punctate, front and mid spurs yellowish-hyaline and extremely short, hind spurs more testaceous, nearly as long as the basitarsi; pubescence extremely short and thin, entirely pale, hardly evident on dorsum of thorax and abdominal terga, somewhat more copious on legs, forming a rather thin posterior fringe on front and middle tibiae and tarsi; punctures quite deep and distinct in general, densely crowded between ocelli and antennae, rather well separated on lower part of face and on vertex, and very close and coarse on cheeks; close and very coarse on pleura and scutellum, somewhat finer on scutum where they are distinctly but not widely separated, the surface rather dull; abdominal terga shining, punctures on terga 1 and 2 rather fine, well but not widely separated, becoming somewhat coarser laterally, terga 3-5 somewhat more coarsely punctate, punctures distinctly but not widely separated medially, becoming close and coarse laterally, quite close on 6, close and rather fine on 7; tergum 7 rather broadly rounded, with an obtuse, median angle, becoming nearly triangular; tergum 6 with a pair of low, subapical protuberances; sterna 1-4 largely exposed, with considerable elongate, rather dense, pale pubescence, sterna 5-8 retracted, 5 broadly incurved across apical margin, rather densely pubescent at each extreme side, 6-8 as shown (fig. 7); gonostyli of genital armature rather broadly expanded apically.

DISTRIBUTION—North Carolina to Florida, throughout the year in Florida, elsewhere April to October.

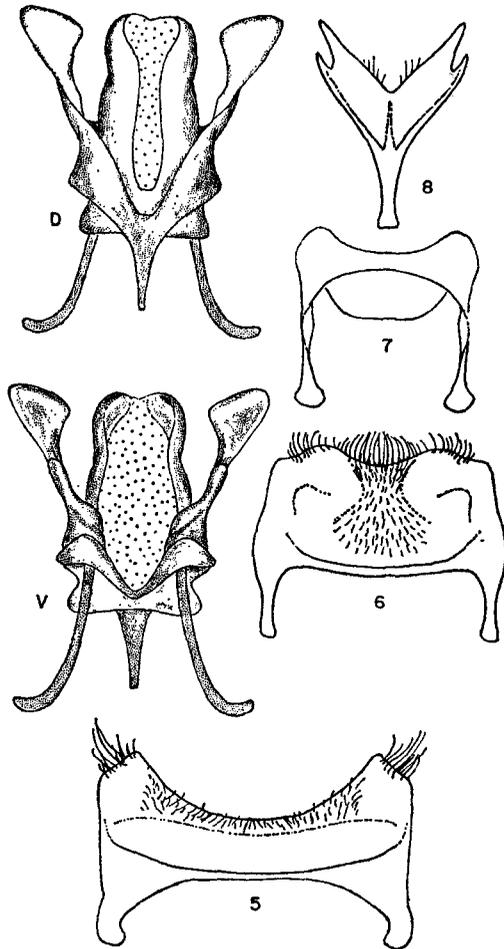


Figure 7
Dorsal and ventral views of genital armature and sterna 5-8 in males of *Anthidiellum perplexum*.

FLOWER RECORDS—*Azelia*, *Amorpha*, *Bidens*, *Chrysopsis*, *Desmodium*, *Eriogeron*, *Hypericum*, *Ilex*, *Kuhnistera*, *Linaria*, *Monarda*, *Ocimum*, *Polygonum*, *Psoralea*, *Ptilimnium*, *Rhus* and *Solidago*.

Heteranthidium Cockerell

(Fig. 1)

Heteranthidium Cockerell, 1904. Ent. News 15, p. 292. Type: *Anthidium dorsale* Lepeletier. Monob. and orig. desig.

Heteranthidium Schwarz, 1926. Amer. Mus. Novitates 218, pp. 1-15. (revision)

Heteranthidium Michener, 1948. Amer. Mus. Novitates 1381, p. 9.

Heteranthidium is a genus of large, ro-

bust, usually conspicuously maculated bees. The maxillary palpi are 3-segmented; arolia are present; the mandibles in males are 3-dentate, while in the females they are broadened apically, with one or two slight indentations, but without distinct teeth. The pleura are not carinate, and the tubercles have a very low, inconspicuous carina or none. Sterna 6-8 in males are retracted and modified, and the genital armature is robust and shows marked differences between the included species. The 2nd recurrent vein terminates very close to the tip of the 2nd submarginal cell, being either interstitial with the transverse cubitus, or slightly within or beyond the tip of the cell.

KEY TO SPECIES

Females

1. Head and thorax entirely black; abdominal terga with narrow, ivory, apical bands *ridingsi* Cresson (p. 28)
Head and thorax to some degree maculated; abdominal bands subapical in position . . . 2
2. Pleura entirely black; scutum entirely black, or with at most a pair of yellow maculae adjacent to tegulae; tubercles not carinate
..... *zebratum* Cresson (p. 29)
Scutum with conspicuous, lateral, yellow stripes and pleura usually maculated . . 3
3. Scutum with submedian, yellow stripes, in addition to the pair of lateral maculae *dorsale* Lepeletier (p. 26)
Scutum not maculated near center of disc 4
4. Mandibles and tergum 6 of abdomen entirely black; tubercles carinate
..... *crassipes* Cresson (p. 24)
Mandibles and tergum 6 of abdomen yellow-maculated; tubercles not carinate
..... *fontemvitae* Schwarz (p. 27)

Males

1. Thorax entirely black; abdominal terga with narrow, ivory, apical bands
..... *ridingsi* Cresson (p. 28)
Thorax to some degree maculated; abdominal bands subapical in position 2
2. Abdominal sternum 3 with a pair of short, slender spines
..... *fontemvitae* Schwarz (p. 27)
Sternum 3 not spinose 3
3. Abdominal tergum 7 nearly straight apically *crassipes* Cresson (p. 24)
Tergum 7 angulate 4

4. Tibiae entirely bright yellow
 *dorsale* Lepeletier (p. 26)
 Tibiae largely black, with small, yellow
 maculations at base and apex
 *zebratum* Cresson (p. 29)

***Heteranthidium crassipes* (Cresson)**

(Fig. 8)

Anthidium crassipes Cresson, 1878. Amer. Ent.
 Soc. Trans. 7, p. 112. ♀.

FEMALE—Length 10 mm.; black, with yellow maculations; clypeus except the narrow, apical margin, a triangular maculation on supraclypeal area, lateral facial maculae reaching top of eye, and a pair of small, oblong spots on each side of vertex, yellow; a small yellow spot on tubercle; anterior third of tegulae, an L-shaped mark on scutum extending from anterior margin to axillae, the entire axillae, and posterior margin of scutellum, yellow; pleura with a large, anterior, yellow blotch; mandibles, upper part of face in large part, and median basal part of scutellum, black; coxae, trochanters and femora largely ferruginous, tibiae and basitarsi more yellowish, the more apical tarsal segments becoming reddish; spurs testaceous; abdominal terga with entire, transverse, yellow bands, these gradually and strongly narrowed toward midline, filling entire disc at each side, the apical depressed rims narrowly black; tergum 6 entirely black; face slightly longer than distance between eyes; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex; cheeks much narrower than eyes; clypeus only slightly convex, rather short, apical margin with a shallow, median, emarginate area and very minute crenulations on each side; mandibles with very low, scarcely perceptible teeth on the dentate margin; tegulae somewhat shining, very minutely and closely but quite deeply punctate; wings lightly infuscated, veins piceous; tubercles strongly carinate; hind basitarsi nearly as broad as their tibiae, length no more than twice the greatest breadth; pubescence very short and inconspicuous, entirely pale, barely visible on dorsum of thorax and abdominal terga, more dense on face, cheeks and pleura, but still quite short and thin; scopa entirely pale ochraceous; tergum 6 in large part covered with dense, appressed tomentum; punctures quite coarse, deep and distinct, close and rather fine around antennae, somewhat more coarse and distinct on maculated areas, and more widely separated on vertex, becoming close on cheeks below; punctures rather coarse and quite close on pleura anteriorly and above, becoming finer and closer below and posteriorly, those on scutum and scutellum uniformly very close, coarse and deep, almost

crowded; abdominal terga 1-3 quite coarsely, deeply and uniformly punctate, punctures slightly separated near midline, becoming somewhat closer laterally and closer on terga 4 and 5, tergum 6 with minute and densely crowded, barely visible punctures.

MALE—Length 9 mm.; black, with yellow maculations; clypeus, mandibles, apical third of supraclypeal area, scape below, and lateral facial marks extending narrowly to top of eye, yellow; vertex with a pair of small, oblong, yellow spots on each side and a smaller, more indefinite spot on upper part of cheeks; scutum with a pair of lateral, yellow bands, extending from median third of anterior margin along side to axillae, the axillae and postero-lateral half of scutellum yellow, median half black; an oblong, yellow spot on pleura anteriorly; tubercles yellow in large part, tegulae with a pale yellow, anterior blotch; coxae, trochanters and femora ferruginous, tibiae more yellowish, basitarsi pale yellow, and the more apical tarsal segments more ferruginous; spurs pale yellow; abdominal terga 1-6 with transverse yellow bands, these broad laterally, strongly narrowed medially, that on tergum 1 slightly interrupted; apical margin of terga narrowly depressed and shining, reddish in color; band on tergum 6 occupying two-thirds of plate, tergum 7 narrowly yellow apically, the remainder ferruginous; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks somewhat narrower than eyes; mandibles 3-dentate, teeth black in contrast with the yellow outer face; clypeus slightly protuberant, apical margin nearly straight but with a barely perceptible, median, emarginate area delimited by a pair of minute tubercles; tegulae somewhat shining, with very fine and rather close but indefinite punctures; wings subhyaline, veins more piceous; pubescence entirely pale, very short and thin, somewhat yellowish above, very inconspicuous on dorsum of thorax and on abdominal terga, more dense around antennae and on cheeks, pleura and propodeum; punctures deep and distinct, close in large part, quite fine below ocelli, somewhat more widely separated on maculated areas and well separated and rather fine on vertex, becoming close and fine on cheeks below; rather coarse and well separated on pleura anteriorly, adjacent to maculation, becoming fine and close below; coarse and uniformly close over scutum and scutellum, intervening lines somewhat shining; front basitarsi very small and inconspicuous, mid basitarsi elongate, narrow, slightly curved, fully twice as long as hind basitarsi which are much shorter than following joints

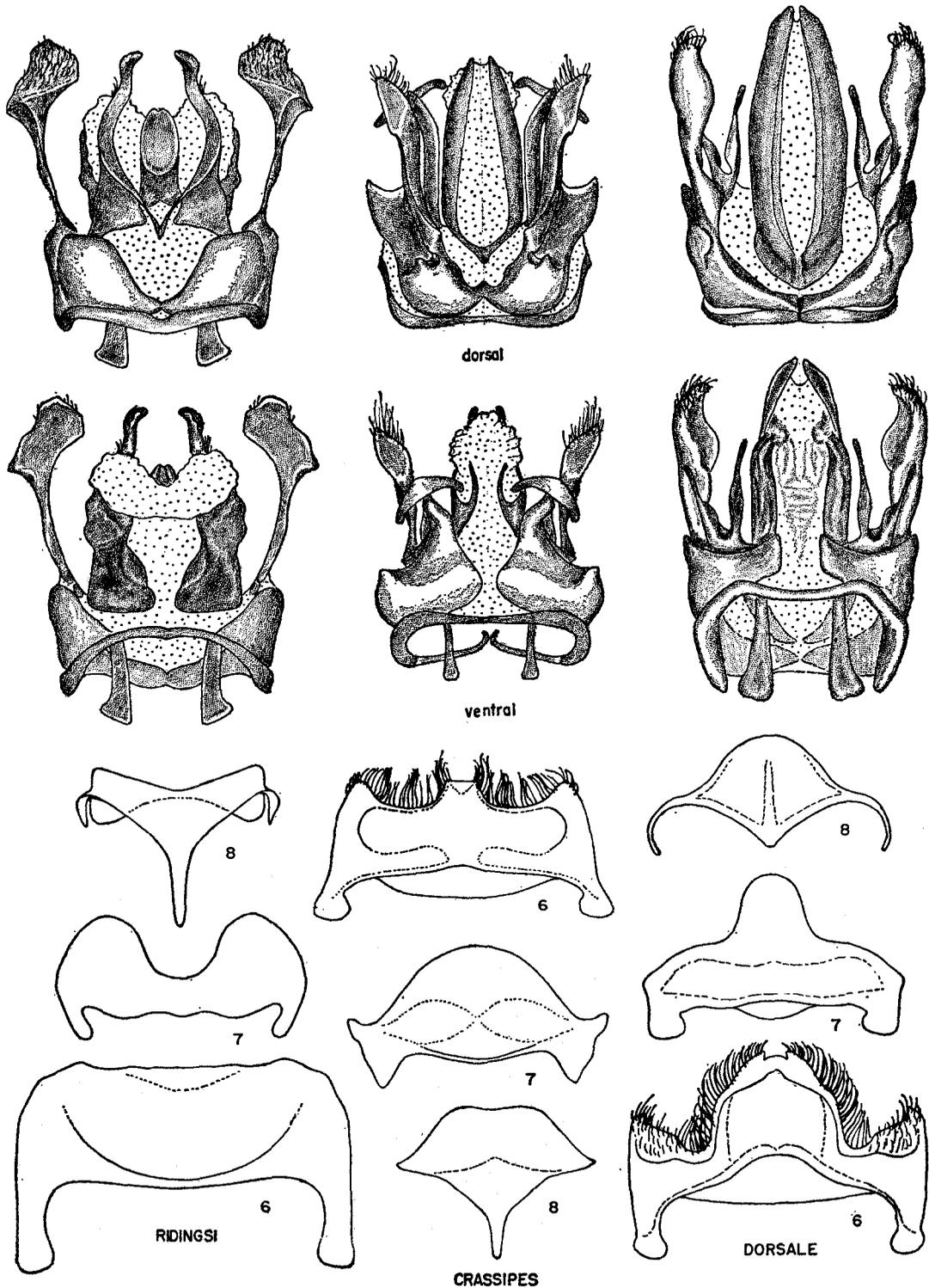


Figure 8—Dorsal and ventral views of genital armature and sterna 6-8 in males of *Heteranthidium*.

combined and not much more than one-third length of tibia; abdominal terga shining, punctures deep and distinct, well separated medially on terga 1-4, becoming quite close and coarser at extreme sides, quite close on terga 5 and 6; tergum 7 nearly straight apically, very slightly convex; sterna 1-3 largely exposed, 2 and 3 with dense pubescence which becomes more elongate toward sides; sterna 4-8 retracted and hidden, form as shown (fig. 8); genital armature as shown.

DISTRIBUTION—North Carolina to Florida, July.

***Heteranthidium dorsale* (Lepeletier)**

(Fig. 8)

Anthidium dorsale Lepeletier, 1841. Hist. Nat. Ins., Hym. 2, p. 384. ♂.

Anthidium dorsale Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 381. ♂.

Anthidium harbecki Crawford, 1910. Ent. News 21, p. 456. ♀.

FEMALE—Length 13 mm.; black, with yellow maculations; clypeus, a broad triangular part of supraclypeal area, lateral face marks extending narrowly nearly to top of eye, and a large area on cheeks, yellow; lateral margins of scutum and a pair of submedian, L-shaped, anterior marks directed posteriorly, axillae in large part, and the broad posterior margin of scutellum, all yellow; tubercles in large part yellow, a small yellow spot on tegulae and a large anterior yellow blotch on pleura; coxae, trochanters and femora largely ferruginous, but front femora margined below with a conspicuous yellow stripe, and mid-femora with a small but elongate yellow spot on lower margin; tibiae yellow on outer face, more ferruginous on inner and posterior faces; mid and hind basitarsi largely yellow, almost as wide as their tibiae, the front basitarsi and the more apical tarsal segments of all legs, ferruginous; spurs brownish-testaceous; terga 1-5 with transverse, yellow bands, broad laterally, gradually narrowed medially, being slightly interrupted on basal tergum, these subapical in position, the narrow, depressed apical margins black; tergum 6 with a pair of very small, lateral, yellow spots; face somewhat longer than distance between eyes; eyes subparallel; lateral ocelli rather widely removed from margin of vertex, but subequally distant from eyes and each other; cheeks about equal to eyes in width; mandibles broadly expanded apically, the dentate edge with one or two barely perceptible teeth; clypeus rather flat, apical margin with a pair of submedian denticles delimiting a narrow emargination; tegulae finely and densely punctate; wings faintly infuscated, veins piceous; pubescence very short,

thin and inconspicuous, entirely pale, barely evident on head above, dorsum of thorax, and abdominal terga, more evident around antennae, on cheeks below and on pleura; ventral scopa entirely yellowish-white; punctures deep and distinct, rather coarse, close and finer below ocelli, more distinct and coarse on maculated areas of face and on vertex, quite close on cheeks; close, deep and distinct on pleura; scutum and scutellum rather coarsely and densely rugoso-punctate; abdominal terga shining, punctures rather fine, somewhat separated along midline, becoming somewhat coarser and closer toward sides, tergum 6 very densely and finely rugoso-punctate, median area somewhat produced and broadly rounded; sternum 6 very broad, abruptly truncate apically.

MALE—Length 14 mm.; black, with yellow maculations; clypeus, mandibles except teeth, lower half of supraclypeal area, anterior surface of scape, lateral facial maculae extending nearly to top of eye, and a rather small spot back of upper end of eye, yellow; lateral margins of scutellum, a pair of longitudinal, submedian, L-shaped maculations on scutum anteriorly, axillae in part, and broad posterior margin of scutellum, all yellow; tubercles margined with yellow and anterior third of tegulae yellow; pleura with a rather small anterior yellow blotch; legs more ferruginous basally but front and mid femora margined with yellow below, hind pair with an apical, yellow spot; all tibiae bright yellow on outer face, more or less ferruginous on the remaining two faces, and all basitarsi yellow, middle pair elongate, hind pair no more than half this length, and front pair extremely short, barely evident; spurs testaceous; abdominal terga 1-5 with transverse yellow bands that are very broad laterally, occupying most of the disc, but strongly narrowed in center, that on 5 relatively broad across entire plate, and 6 almost entirely yellow, with only a very narrow basal margin dark; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, much farther from margin of vertex; cheeks slightly narrower than eyes; mandibles 3-dentate; clypeus rather flat, apical margin nearly straight, with a pair of submedian, dark denticles which delimit a shallow, median, emarginate area; tegulae deeply and quite closely punctate; wings subhyaline, veins and stigma more brownish-ferruginous; pubescence very short, thin and inconspicuous, entirely pale, somewhat ochraceous on head and thorax above, more whitish and dense around antennae, on cheeks below, on pleura and on upper portion of propodeum; punctures quite deep and distinct, very fine just below ocelli,

but becoming quite coarse and slightly separated on clypeus and other maculated areas, rather distinctly separated but still quite close on vertex and cheeks; punctures rather fine and close on pleura posteriorly and below, becoming somewhat coarser and more distinctly separated anteriorly and above; scutum and scutellum dull, densely and rather coarsely rugoso-punctate; abdominal terga somewhat shining, punctures deep and distinct, quite close in general, tergum 6 almost rugoso-punctate; tergum 7 largely yellow, with a median, triangular, produced area which overlies the relatively straight, apical margin, punctures very close but rather deep and distinct; abdominal sterna 1-4 rather fully exposed, basal tergum with a ventral, carinate projection which is bidentate apically, sterna 3 and 4 densely pubescent, hairs becoming more elongate on each extreme side; sterna 5-8 retracted, form as shown (fig. 8); gonostyli of genital armature rather gradually dilated apically, not quite equalling penis valves in length, the cuspis and digitus of the volsellae evident as elongate, spine-like parts interposed between the gonocoxites and base of the penis valves.

DISTRIBUTION—New Jersey to Alabama, August and September.

FLOWER RECORD—*Strophostyles*.

Heteranthidium fontemvitae Schwarz

(Figs. 9 & 10)

Heteranthidium fontemvitae Schwarz, 1926.
Amer. Mus. Novitates 218, p. 8. ♂ ♀

FEMALE—Length 13 mm.; black, with yellow maculations; clypeus, a spot on outer face of mandibles, lateral face marks extending very narrowly nearly to top of eye, an elongate stripe on cheeks just back of eye, and an oblong spot on each side of vertex, yellow; lateral margins of scutum, a spot on axillae, and posterior margin of scutellum, yellow; tubercles with a very small yellow spot and outer anterior third of tegulae yellow; pleura with a small, anterior, yellow spot; legs dark basally, more or less reddish, becoming more ferruginous apically, but lower posterior margin of front and mid femora narrowly yellow, a yellow stripe from base to near the tip on outer face of front tibiae, mid tibiae with a basal yellow spot and hind tibiae yellow along posterior margin from base to apex, hind basitarsi yellow in part; spurs testaceous; terga 1-5 with entire, transverse, yellow bands, these very narrow medially and with a rather conspicuous, anterior emargination toward each side; apical rims of terga slightly depressed and entirely black; tergum 6 with a broadly V-shaped, median, yellow mark; face considerably longer than distance between eyes;

eyes nearly parallel; lateral ocelli widely removed from posterior margin of vertex and somewhat nearer eyes than to each other; cheeks subequal to eyes in width; mandibles broadened apically, teeth barely evident; clypeus slightly convex, apical margin straight but minutely denticulate; tegulae very finely and closely punctate; wings lightly infuscated, somewhat more deeply so apically and in region of marginal cell, veins piceous; pubescence entirely pale, thin and quite short, very inconspicuous on upper portion of head, thorax and abdominal terga, more dense and conspicuous on thorax laterally and posteriorly, ventral scopa entirely yellowish-white; punctures rather deep but quite close and rather fine in general, slightly separated just below ocelli, and cheeks shining with minute and rather sparse punctures posteriorly, becoming closer toward eyes; pleura very finely and closely punctate, scutum and scutellum somewhat more coarsely but densely rugoso-punctate; abdominal terga somewhat shining, but punctures fine and uniformly close, those tergum 6 minute and densely crowded.

MALE—Length 14 mm.; black, with yellow maculations; clypeus, mandibles except the teeth, lateral facial maculae terminating very narrowly on eye just above antennae, a small spot on each side of vertex, and a narrow mark extending from upper third of eye to inferior limit of cheeks, yellow; tubercles with a very minute yellow spot laterally, scutum narrowly margined with yellow on each side and tegulae in large part yellow; coxae and trochanters largely black, femora and tibiae black in part, ferruginous beneath, tibiae yellow at base and apex, these two marks more or less connected by a narrow, yellow band, front femora yellow on lower margin, hind femora with a small yellow apical spot, all basitarsi yellow, the other tarsal segments becoming more reddish; abdominal terga with entire, narrow, transverse, subapical, yellow bands, the depressed margins narrowly black, bands abruptly broadened at each side, but quite narrow across the central expanse of each disc; tergum 6 largely yellow apically, black across base, the yellow area triangularly invaded with black on basal margin; face much longer than distance between eyes; eyes subparallel; lateral ocelli widely removed from margin of vertex, considerably nearer eyes than to each other; cheeks very slightly broader than eyes; mandibles 3-dentate; clypeus slightly convex, apical margin minutely denticulate; tegulae finely and quite closely punctate; wings faintly infuscated, veins piceous; all basitarsi rather slender and elongate; pubescence entirely pale, quite thin but rather elongate above except on the more

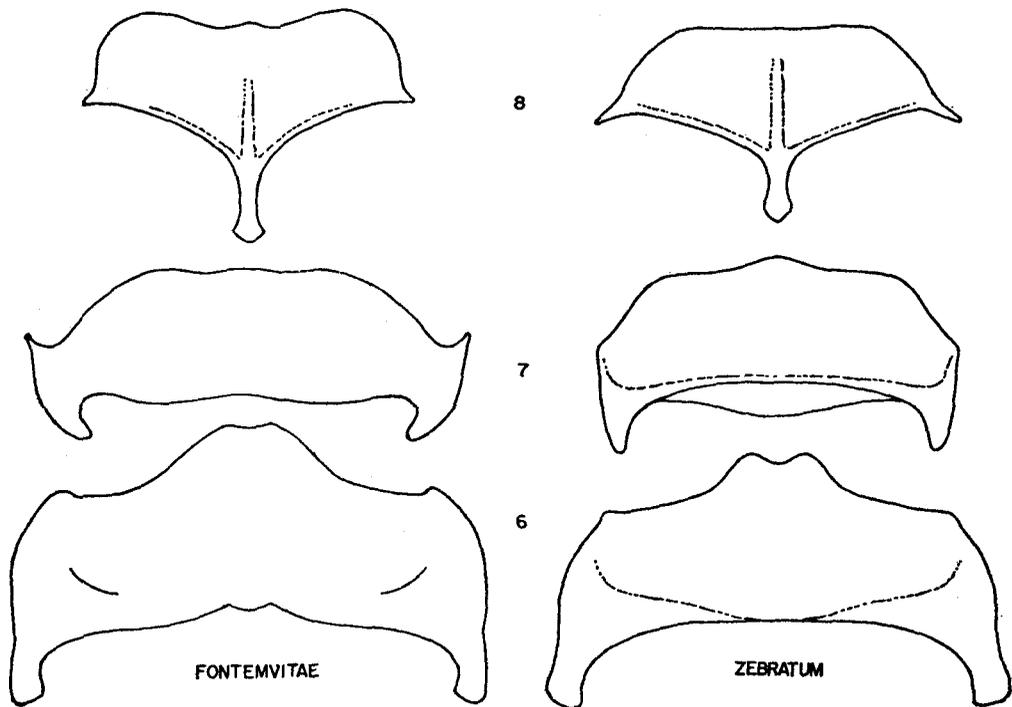


Figure 9—Sterna 6-8 in males of *Heteranthidium*.

apical abdominal terga, dense around antennae, on cheeks below and on pleura and venter of thorax, entirely whitish on legs and venter of abdomen; punctures quite deep and distinct, rather close in general, minute and rather sparse on cheeks posteriorly, but becoming quite close and coarse on vertex and on face below; punctures fine and quite close on pleura, the scutum and scutellum rather coarsely rugoso-punctate; punctures close on abdominal terga, rather coarse on basal tergum but rather fine and uniform on 2-5, 6 rather densely rugoso-punctate; tergum 7 rather coarsely rugoso-punctate, apical margin rather narrowly produced medially, this area obscurely tri-dentate; sterna 1-4 exposed, ferruginous, more or less pubescent, sternum 3 with a pair of short, dark, slender and distinct spines; sterna 5-8 retracted, form as shown (fig. 9); gonostyli of genital armature rather broadly dilated and angulate apically, as shown (fig. 10).

DISTRIBUTION—North Carolina to Florida, September and October.

FLOWER RECORDS—*Chrysopsis* and *Kuhnistera*.

Heteranthidium ridingsii (Cresson)

(Fig. 8)

Anthidium ridingsii Cresson, 1878. Amer. Ent. Soc. Trans. 7, proc. iii. ♀

Heteranthidium ridingsi Schwarz, 1926. Amer. Mus. Novitates 218, p. 5. ♂

FEMALE—Length 13 mm.; black; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, widely removed from margin of vertex; clypeus nearly flat, apical margin nearly straight, with a very shallow, median, emarginate area and two or three minute denticles on each side; mandibles 4-dentate, teeth quite low; cheeks slightly narrower than eyes; tegulae black, strongly narrowed anteriorly, closely and deeply punctate; wings subhyaline basally, somewhat clouded apically, veins piceous; legs piceous, tibiae with dense, appressed, silvery pubescence on outer face, spurs pale yellow; pubescence entirely pale, very short and inconspicuous on upper part of face, dorsum of thorax and abdominal terga, rather dense around antennae, on cheeks below, and on pleura and propodeum; ventral scopa entirely white; punctures quite deep and distinct, close below ocelli and on clypeus, the latter

with an indefinite, narrow, median line which is less closely punctate; punctures well separated but not sparse on vertex and upper part of cheeks, becoming very close below; punctures rather coarse and slightly separated on shining scutum, becoming dense around margins, those on scutellum somewhat closer and more irregular; pleura closely punctate; abdominal terga shining, apical margins deeply and abruptly depressed, the rims narrowly ivory, discs distinctly and quite evenly punctured, punctures slightly separated but deep, distinct and rather coarse, those on tergum 6 fine and densely crowded, surface partially obscured by dense, appressed, pale tomentum.

MALE—Length 12 mm.; black, clypeus, mandibles, scape, tarsi and tibiae, in part yellow; length of face considerably greater than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, distance to posterior margin of vertex much greater; cheeks much narrower than eyes; clypeus only slightly convex, entirely yellow, margin with a pair of minute, submedian tubercles that demark a slight emargination; mandibles 3-dentate, teeth black in contrast with the yellow outer face; restricted lateral face marks and apical margin of supraclypeal area yellow, this not extending above antennae; scape yellow anteriorly, dark posteriorly, pedicel and flagellum black; tegulae black, much narrowed anteriorly, closely, finely and deeply punctate; wings subhyaline, becoming somewhat clouded apically, veins piceous; coxae, trochanters and femora black, tibiae more ferruginous, becoming somewhat yellowish toward apex on outer surface, tarsi entirely yellow, spurs yellowish; pubescence entirely pale, rather bright ochraceous on upper part of face, vertex, and on dorsum of thorax, elsewhere more whitish or cream-colored, quite thin above, dense around tubercles, around antennae, on lower cheeks, pleura and propodeum, and quite dense on front legs posteriorly and on outer faces of mid and hind tibiae; punctures deep and distinct, quite close in general, rather fine on head, only slightly separated on vertex laterally above each eye, elsewhere very close except on maculated areas, close and rather fine on pleura, much coarser on scutum where they are slightly separated over central area of disc, becoming quite dense around the margins, close and coarse on scutellum; abdominal terga shining, deeply and distinctly punctate, punctures quite close on tergum 1, well separated on 2-5, densely crowded and fine on 6, apical margins abruptly and deeply depressed, these narrowly margined with ivory bands that are continuous across the segments; tergum 6 slightly depressed in center, apical mar-

gin opposite this depression narrowly produced and subcarinate; tergum 7 quite broad, a narrow area on each side of apical margin produced, intervening space nearly straight, surface in large part bare and shining; sterna 1-5 largely exposed, rather densely whitish pubescent, apical margin of 3 with a median tuft of very short, dense, reddish-fuscous pubescence or tomentum; terga 6-8 retracted, form as shown (fig. 8); aedagus of genital armature sclerotized apically, tips of gonostyli abruptly dilated and club-shaped.

DISTRIBUTION—North Carolina to Florida and Texas, April to September.

FLOWER RECORDS—*Crotalaria*, *Galactia*, *Hypericum*, *Melilotus* and *Rhus*.

Heteranthidium zebratum (Cresson)

(Figs. 9 & 10)

- Anthidium zebratum* Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 270. ♂.
Protanthidium cockerelli Titus, 1902. Ent. News 13, p. 170. ♂.
Anthidium (*Protanthidium*) *chippewaense* Graenicher, 1910. Canad. Ent. 42, p. 157. ♂ ♀.
Heteranthidium zebratum Schwarz, 1926. Amer. Mus. Novitates 218, p. 11.
Heteranthidium zebratum mississippi Michener, 1937. Amer. Midland Nat. 38, p. 449. ♂ ♀.

FEMALE—Length 14 mm.; black, with yellow maculations; clypeus, lateral face marks extending narrowly nearly to top of eye, and a pair of small, elongate spots back of eyes, creamy-yellow; scutum entirely black or with a pair of small antero-lateral, yellow maculations, axillae with small yellow spots and scutellum with a pair of ovate, subapical maculations which are slightly separated medially; legs black except for a small, basal, yellow spot on tibiae; spurs testaceous; abdominal terga 1-5 with transverse, yellow bands which are subapical, broad laterally, strongly narrowed medially, apical margins of the terga slightly depressed, entirely black; face somewhat longer than distance between eyes; eyes subparallel; lateral ocelli nearer eyes than to margin of vertex, subequally distant from eyes and each other; cheeks considerably broader than eyes; mandibles entirely black, broad apically, with a slight median incision near center of a long cutting edge which is otherwise without teeth; clypeus slightly convex, apical margin with a shallow, vague, median emargination, edge minutely crenulate; tegulae very finely, closely and regularly punctate, with a small, anterior, yellow spot; wings lightly infuscated, veins piceous; pubes-

cence entirely pale, very short and thin, especially above, more dense but still rather short on cheeks, pleura and propodeum; ventral scopa entirely pale ochraceous, sternum 6 with very short pubescence; punctures fine and close in general, but rather deep and distinct, rather well separated but still close at lower margin of supraclypeal area and over clypeus and lateral areas of face, very close across vertex and down the cheeks, fine and dense over entire thorax, the scutum and scutellum being finely rugoso-punctate; punctures close and rather fine on abdominal terga, becoming extremely fine on tergum 5, tergum 6 densely and finely rugoso-punctate, with an apical, ventral lip medially, a deep depression between this and the disc.

MALE—Length 14 mm.; black, with yellow maculations; clypeus, mandibles except teeth, lateral facial maculae extending narrowly nearly to top of eye, and margin of supraclypeal area, narrowly yellow; an elongate yellow mark back of upper half of eye and a pair of very small maculations on cheeks below, adjacent to mandible; thorax without maculations and legs black, but each tibia with a small, basal, and a pair of apical, yellow spots, basitarsi yellow on outer face, remaining tarsal segments brownish; spurs testaceous; abdominal terga 1-5 with entire, transverse, yellow bands, these broad laterally, strongly narrowed medially but not interrupted, the apical depressed margins entirely black; tergum 6 largely yellow, black only narrowly across base, this slightly invading the midline; sternum 7 entirely black; face considerably longer than distance between eyes; eyes subparallel; lateral ocelli much nearer eyes than to margin of vertex and slightly nearer eyes than to each other; cheeks slightly broader than eyes; mandibles without a distinct, median tooth between the apical and inner teeth; clypeus slightly convex, apical margin very nearly straight, with about five minute denticles; tegulae entirely black, closely and finely punctate; wings lightly infuscated, veins piceous; pubescence entirely pale, rather pale ochraceous on upper part of head and dorsum of thorax, becoming whitish on thorax beneath and on cheeks below; punctures fine and very close in general, close below ocelli and between antennae, more distinctly separated on clypeus, lateral maculated areas of face, and on vertex, becoming rather sparse on the shining cheeks posteriorly; punctures very fine and close on pleura, the scutum and scutellum dull and densely rugoso-punctate, pubescence rather dense and elongate; abdominal terga closely and rather uniformly punctate, but punctures rather coarse on 1 and 2, becoming finer on the more apical segments,

rather densely crowded on 6, apical margin of 6 slightly out-curved over median third, 7 short and broad, somewhat shining, with a distinct but low, median angle, lateral angles narrowly rounded, fringed with short, pale pubescence; sterna 1-4 quite fully exposed, 3 and 4 with rather copious, pale ochraceous pubescence, 5 somewhat excavated medially, becoming densely pubescent on each extreme side, 6-8 retracted, form as shown (fig. 9); gonostyli of genital armature broadly expanded and angulate apically, otherwise as shown (fig. 10).

DISTRIBUTION—Primarily western, but reaching Michigan and Mississippi in one or another of its forms, August to October.

FLOWER RECORDS—*Gaillardia* and *Helianthus*.

Although this species is primarily western in distribution, scattered records indicate that the range reaches across the Mississippi from Wisconsin and Michigan to the Gulf of Mexico, in Mississippi. It is quite variable with respect to the degree of maculation, and two subspecies have been proposed for the forms that occur in the East. In both of these the extent of maculation is reduced over that observed in the western material. There is so much variability in any extensive series collected in any given locality, as shown by the descriptions of Swenk, Schwarz and Michener, that the desirability of recognizing subspecies is questionable. It seems evident that in the West a higher percentage of any population shows extensive maculation than a similar sample of specimens taken in the East; but from the descriptions it would seem evident that almost all extremes could be expected from any given area. The following brief summary indicates the differences so far as they can be ascertained:

H. zebratum zebratum—**MALE**—Scutellum maculated; transverse band on basal abdominal tergum complete and tergal bands not emarginate anteriorly toward the sides. **FEMALE**—Scutellum 4-spotted; clypeus and lateral face marks whitish; maculations on cheeks more extensive.

H. zebratum chippewaense—**MALE**—Scutellum entirely black; transverse band on basal tergum interrupted medially; tergal bands emarginate on each side anteriorly; tergum 6 largely yellow; tubercles maculated and tibiae with two apical yellow spots.

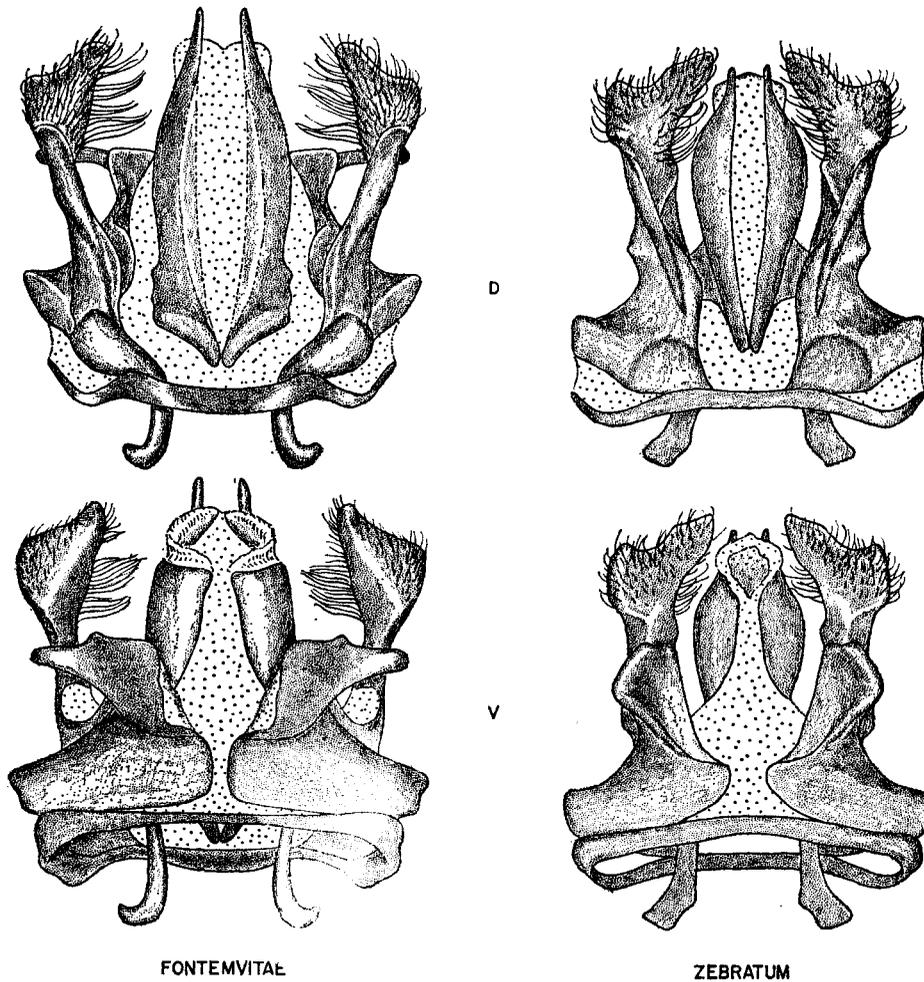


Figure 10—Dorsal and ventral views of genital armature in males of *Heteranthidium*.

FEMALE—Scutellum 2-spotted; facial maculae yellow; maculation of cheeks reduced.

H. zebratum mississippi—MALE—Tubercles entirely black; tibiae often with only one apical yellow spot; tergum 6 largely black. FEMALE—Yellow line back of eye absent or very small; scutum entirely black or with a small spot on each side adjacent to tegulae;

scutellum black or with two yellow spots; axillae spotted or not.

In the material at hand there is a paratype pair of *mississippi*, a male from Minnesota which seems to fit the description of *chippewaense*, and a male from Michigan which agrees better with *zebratum* s. str. than with either of the other two forms.

Table 1—Distribution of species of *Lithurgus*, *Anthidium*, *Dianthidium*, *Paranthidium*, *Anthidiellum* and *Heteranthidium* 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
Lithurgus																											
<i>bruesi</i>								X																			
<i>gibbosus</i>																						X				X	X
Anthidium																											
<i>maculifrons</i>								X										X		X	X		X		X	X	
<i>psoraleae</i>							X	X																			
Dianthidium																											
<i>curvatum</i>																						X	X		X	X	X
<i>floridiense</i>																											X
<i>simile</i>	X						X	X					X									X			X		
Paranthidium																											
<i>jugatorium</i>							X		X			X	X									X			X		
<i>j. lepidum</i>											X							X		X	X				X		
Anthidiellum																											
<i>notatum</i>				X	X			X					X									X	X	X		X	X
<i>n. boreale</i>								X																			
<i>n. rufimaculatum</i>																											X
<i>perplexum</i>																						X	X			X	X
Heteranthidium																											
<i>crassipes</i>																						X			X	X	
<i>dorsale</i>													X									X			X	X	
<i>fontemvitae</i>																						X	X			X	X
<i>ridingsi</i>																						X	X	X	X	X	X
<i>zebratum</i>																								X			

Heterostelis Timberlake

Stelis subg. *Heterostelis* Timberlake, 1941.
N. Y. Ent. Soc. Jour. 49, p. 125. Type:
Stelis anthidioides Timberlake. Orig. desig.

Species of *Heterostelis* are large, handsome bees with conspicuous yellow or red maculations on the head, thorax and abdomen. Being parasitic, the females lack the brush of scopal hairs beneath the abdomen. The scutellum is produced slightly over the posterior face of the propodeum which is entirely vertical, and lacks any development of a dorsal pitted area. The mesopleura are divided into anterior and lateral surfaces which are separated by a sharp carina. The mandibles in the female are broad and but feebly dentate. The second recurrent vein terminates beyond the tip of the second submarginal cell.

The males resemble the females closely in size, coloration and general structure. The genital armature closely resembles that in species of *Stelis*. It is very small, relative to the width of the abdomen, being less than half as broad as the fourth sternal plate (see fig. 11). Sternum 4 has a conspicuous apical fringe of elongate hairs that is interrupted medially by a rather narrow, apical comb of short, stout, black setae.

It seems probable that the hosts of these inquilines are other anthidiine bees, possibly *Heteranthidium*.

KEY TO SPECIES

Females

1. Larger (13 mm.); mandibles more elongate, 2nd tooth being midway between apex and inner angle; tergum 6 obtusely angulate on each side
..... *grossa* new species (p. 35)
Smaller (10 mm.); mandibles shorter, 2nd tooth much nearer apex than to inner angle; tergum 6 regularly rounded 2
2. Abdominal terga 1 and 2 broadly ferruginous medially, between the yellow lateral maculations
..... *australis floridensis* new subspecies
Terga 1 and 2 black medially
..... *australis australis* Cresson

Heterostelis australis australis (Cresson)

Stelis australis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 92. ♀.

FEMALE—Length 10 mm.; black, with yellow

maculations; head black except for the yellow, lateral, facial maculae which extend narrowly to top of eye; mandibles ferruginous in large part, and scape brownish, with a more testaceous base and apex, flagellum rather dark brown; tubercles, axillae, a small spot on metapleura beneath hind wing, triangular maculations on scutellum laterally, and lateral and anterior margin of scutum yellow, but median portion of margin of scutellum, black; abdominal terga 1-5 with large, transverse, lateral, yellow maculae, these widely separated on the more basal terga, becoming somewhat more approximate on tergum 5; face slightly longer than distance between eyes above; eyes slightly convergent below; ocelli very small, diameter about that of some of the coarse punctures of vertex, lateral pair slightly nearer each other than to margin of vertex, more distant from eyes; clypeus very slightly convex, apical margin nearly straight, with a dense fringe; mandibles 3-dentate, teeth black, middle tooth nearer the apical than to inner angle; cheeks somewhat narrower than eyes; wings rather deeply and quite uniformly infuscated, veins brownish-testaceous; tegulae brownish-testaceous, quite deeply, closely and rather coarsely punctate; legs reddish-piceous at base, the femora more or less yellowish at apex, tibiae and tarsi yellowish, with reddish infusions; spurs yellowish; pubescence very short and thin, entirely pale, somewhat more copious around antennae and below wing bases; 2nd recurrent vein ending beyond apex of 2nd submarginal cell; punctures deep and distinct, quite coarse, rather close over most of the body but sparse across vertex, very fine and rather sparse between ocelli; punctures close over lower portions of head and over most of thorax, coarser on scutellum and pleura; punctures rather distinctly separated but not sparse on abdominal terga medially, becoming rather fine toward apical margins, these narrowly impunctate and shining, entirely black; tergum 6 rounded, apical margin on each side finely denticulate, but this obscured by the short and rather dense pubescence; abdominal sterna shining, apical margins narrowly yellowish-hyaline, discs rather coarsely punctate at least laterally, but these becoming very fine toward midline on the more basal segments.

DISTRIBUTION—New Jersey to Georgia, in August.

FLOWER RECORD—*Helenium*.

Heterostelis australis floridensis new subspecies (Fig. 11)

FEMALE—Length 10 mm.; black, with yellow

low and ferruginous maculations; mandibles except teeth, clypeus laterally, scape, a narrow line across vertex, upper portion of pleura, metapleura in large part, basal portions of legs, posterior face of propodeum above, and median areas of abdominal terga 1 and 2, ferruginous; lateral facial maculae extending broadly to top of eye where they terminate abruptly, tubercles, axillae, lateral portions of scutellum, lateral marks of scutum produced along anterior margin, and large, transverse, lateral maculations on abdominal terga 1-5, bright yellow; tegulae ferruginous; apical portions of legs brownish-testaceous; general structure, puncturation and pubescence as in *australis* s. str.

MALE—Length 9 mm.; black, with yellow and ferruginous maculations; mandibles, scape, pronotum in large part, tegulae, a spot on metapleura below wing base, and median portion of basal segment of abdomen, ferruginous; lateral face marks ending abruptly near top of eye, tubercles, axillae, lateral triangular marks on scutellum, lateral margins of scutum extending up onto anterior margin, and lateral transverse maculations on abdominal terga 1-5, bright yellow; face slightly longer than distance between eyes above; eyes somewhat convergent below; ocelli very small, not much larger than the more coarse punctures, subequally distant from eyes and margin of vertex, slightly nearer each other; clypeus quite flat, apical margin straight, with a quite dense and elongate apical fringe; mandibles 3-dentate, teeth black, median tooth much nearer apical tooth than to inner angle; cheeks much narrower than eyes; wings pale fuliginous, slightly darker along outer margin and in marginal cell, veins brownish-testaceous; tegulae closely, deeply and distinctly punctate; legs yellowish-testaceous in large part; spurs testaceous; pubescence very short and thin, entirely pale, hardly evident dorsally, becoming somewhat more copious around antennae, on pleura below wing bases, and on tibiae and tarsi; punctures deep and distinct, rather coarse, close in general on head and thorax, but quite sparse across vertex, very fine and rather sparse between ocelli, quite coarse on pleura and scutellum; punctures distinctly separated but not sparse on abdominal terga medially, becoming somewhat finer toward the shining, narrow, impunctate, apical margins which are entirely dark; tergum 6 quite short, minutely denticulate on each side, slightly protuberant medially, this protuberance with a slight emargination; tergum 7 much smaller, but much broader than long, with a median, compressed, carinate projection; abdominal sterna 1-3 exposed, ferruginous, with rather close punctures and fine, pale pubescence; sterna 4-8 retracted, 4 with a

median, apical comb which is piceous in color in contrast with the other portions of the plate, apical margin on each side with an elongate fringe, other sternal plates as shown (fig. 11); genital armature very small, relative to breadth of abdomen, the gonostyli angulate and abruptly dilated, as shown.

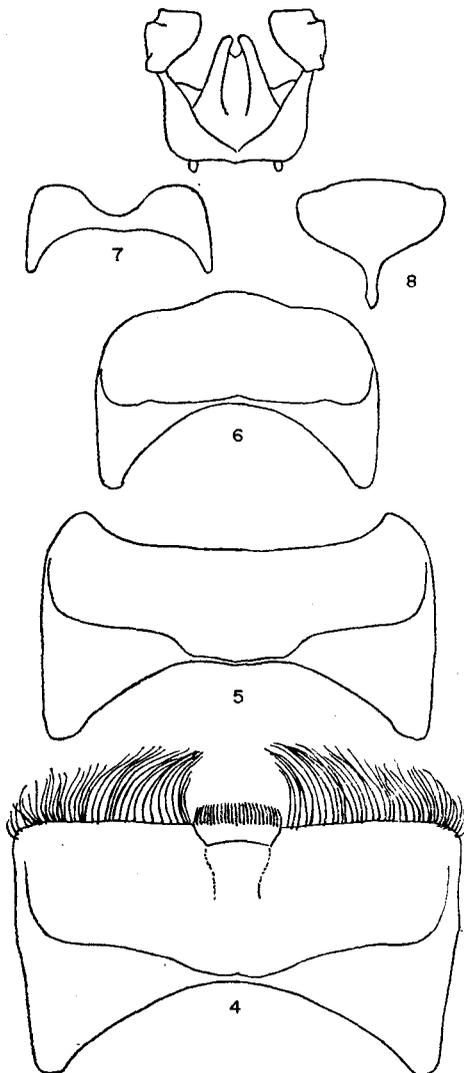


Figure 11
Genital armature and sterna 4-8 in males of
Heterostelis australis floridensis.

TYPES—Holotype: Female, Levy Co., Fla., July 13, 1954 (H. V. Weems, Jr., on *Eriogonum tomentosum*). Allotype: Topotypical. Paratypes: 1♂, topotypical; 2♀♀, Gainesville, Alachua Co., Fla., Aug. 26 and 27, 1953, (Weems, on *Rhus copallinum*) [all Fla. State Plant Board].

Heterostelis grossa new species

FEMALE—Length 13 mm.; black, with yellow maculations; lateral facial maculations ending broadly and abruptly near top of eye, adjacent margin of clypeus, a small transverse spot at each extreme side of vertex, tubercles, axillae, small subtriangular lateral spots on scutellum, lateral margin of scutum extending rather broadly onto anterior margin, and broad, lateral, transverse maculations on abdominal terga 1-5 which are rather widely separated medially, yellow; face somewhat longer than distance between eyes above; eyes slightly convergent below; ocelli very small, not much larger than the more coarse punctures, lateral pair subequally distant from eyes and margin of vertex, slightly nearer each other; clypeus very slightly convex, apical margin about straight, with a dense apical fringe of elongate yellowish hairs; mandibles largely ferruginous, teeth more piceous, 3-dentate, middle tooth subequally distant from apical and inner teeth; cheeks somewhat narrower than eyes; tegulae testaceous, coarsely, deeply and closely punctate; wings quite uniformly infuscated, veins more piceous; 2nd recurrent vein terminating beyond tip of 2nd submarginal cell; coxae and trochanters piceous in general, femora more reddish-testaceous, tibiae and tarsi becoming yellowish; spurs testaceous; pubescence very short and thin, entirely pale, hardly evident dorsally, with very short but rather dense tufts beneath posterior wing bases; punctures in general coarse, deep and distinct, rather sparse across vertex and on lateral portions of upper part of face, becoming close just below and around ocelli, clypeus with a rather indefinite, median line, punctures close on each side; punctures coarse, close, deep and quite uniform over scutum, somewhat coarser but close on scutellum, coarse and distinct but quite close on pleura; puncturation of abdomen much finer, rather coarse on basal tergum medially, but becoming fine toward apical margin and fine on terga 2-4 medially where they are well separated, becoming coarser and quite close laterally and on tergum 5, apical margins narrowly impunctate and somewhat shining, entirely dark; tergum 6 coarsely rugoso-punctate, apical margin obtusely angulate on each side, the margin finely crenulate, median area slightly produced; abdominal sterna smooth and shining, the more basal segments ferruginous, with fine, well separated and irregular punctures, these becoming more coarse, deep, distinct and close on the more apical segments, sternum 6 almost rugose, apical margins of these sternal plates narrowly yellowish-hyaline.

TYPES—Holotype: Female, Gainesville,

Fla., Oct. 19, 1918 (P. W. Fattig) [Cornell Univ.].

Stelis Panzer

Stelis Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, 2, p. 246.

Type: (*Apis aterrima* Panzer) = *Apis punctulatissima* Kirby. Monob.

Gyrodroma Klug, 1807. Mag. Insektenk. 6, p. 198. Type: (*Apis aterrima* Panzer) = *Apis punctulatissima* Kirby. Monob.

Gymnus Spinola, 1808 Insectorum Liguria, 2, p. 9. Type: (*Apis aterrima* Panzer) = *Apis punctulatissima* Kirby. Monob.

Ceraplastes Gistel, 1848. Naturgesch. Thierr. f. höh. Schul., p.x. Proposed unnecessarily to replace *Stelis*.

Chelynia Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 322. Type: *Chelynia labiata* Provancher. Monob.

Stelis subg. *Protostelis* Friese, 1895. Die Bienen Europas 1, p. 25. Type: *Stelis freygessneri* Friese. Desig. by Popov, 1938.

Stelis Cockerell, 1898. Entomologist 31, p. 166. (key)

Melanostelis Ashmead, 1898. Psyche 8, p. 283. Type: (*Melanostelis betheli* Ashmead) = *Chelynia rubi* Cockerell. Monob. and orig. desig.

Stelidium Robertson, 1902. Canad. Ent. 24, p. 323. Type: *Stelidium trypetinum* Robertson. Monob. and orig. desig.

Microstelis Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 170. Type: *Stelis lateralis* Cresson. Orig. desig.

Stelis subg. *Pavostelis* Sladen, 1916. Canad. Ent. 48, p. 313. Type: *Stelis montana* Cresson. Monob.

Stelis subg. *Stelidina* Timberlake, 1941. N. Y. Ent. Soc. Jour. 49, p. 131. Type: *Stelis hemirhoda* Linsley. Orig. desig.

Stelis is a genus of parasitic bees characterized usually by the presence of yellow, ivory or reddish maculations. The scopa is lacking in the females. As in the non-parasitic anthidiine bees, the stigma of the front wing is very short. The scutellum is rounded; the posterior face of the propodeum is vertical, but there is a narrow, coarsely pitted area along the upper margin that inclines to the horizontal; the mandibles are 3-dentate in both sexes; the mid basitarsi are shorter than their tibiae; and the gonostyli of the male genital armature are abruptly dilated apically, the resulting club strongly angulate. Typical *Stelis* is an Old World group of species characterized by acutely pointed axillae. In all of the Nearctic species the axillae are rounded.

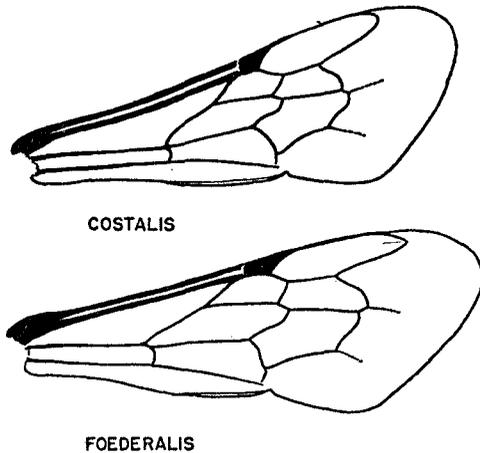


Figure 12
Venation of front wing in *Stelis costalis* and
S. foederalis.

The subgenus *Chelynia* has been elevated to generic rank in the Catalog of Hymenoptera (p. 1148) but is being reduced here to subgeneric rank. It is based on *Chelynia labiata* Provancher, and has been separated from *Stelis* by the supposed difference in the relation of the second recurrent vein to the second submarginal cell. In certain of the subgenera (*Protostelis*, *Microstelis* and *Pavostelis*) the second recurrent vein terminates very close to the second transverse cubitus, or somewhat beyond it, while in *Chelynia* it has been thought that both recurrent veins terminated well within the limits of the second submarginal cell. This is true of *S. (Stelidium) trypetina* Robertson, and in *S. foederalis* Smith and *S. nitida* Cresson. However, in *labiata* Provancher, the genotype of *Chelynia*, this character is lacking in constancy, and in the type specimen, at the Provincial Museum of Quebec, the second recurrent vein is practically contiguous with the second transverse cubitus. It more nearly resembles *Microstelis* than it does the other species that have been placed in *Chelynia*. Moreover, in the males the telescoped abdominal sterna of *labiata* (fig. 13) are nearly identical with those of *Microstelis lateralis*. It seems probable that *Microstelis* should be considered a synonym of *Chelynia*, while *nitida* and its allies should constitute a new subgeneric group. A revisional study of the New World species is needed, and the assignment of a name for the group is

avoided here in the belief that it is better that a future reviser draw his own conclusions and propose an appropriate name if it is needed.

Species of *Stelis* areinquilines in the nests of *Osmia*, *Hoplitis*, *Heriades*, *Anthidium* and allies and possibly *Ceratina*.

KEY TO SPECIES

Females

1. Sternum 6 with a robust, median, terminal spine 2
Sternum 6 not spinose 4
2. First recurrent vein nearly interstitial with 1st transverse cubital vein; basal abdominal tergum with a pair of widely separated lateral yellow spots, without a transverse band
..... *michiganensis* new species (p. 45)
First recurrent vein well removed from 1st transverse cubital; basal tergum with a transverse yellow band 3
3. Scutum closely punctate, interspaces not exceeding diameter of punctures; abdominal bands narrow, separated from rims of terga by wider black areas ..
..... *foederalis* (Smith) (p. 45)
Scutum more sparsely punctate; abdominal bands broader, slightly exceeding width of apical black area
..... *nitida* (Cresson) (p. 46)
- 4(1). Thorax conspicuously maculated; carina of prothoracic tubercles elongated, extended toward midline (*Protostelis*) .. 5
Thorax entirely black; pronotal tubercles not produced 6
5. Abdominal tergum 2 maculated medially ..
..... *costalis floridana* Graenicher (p. 38)
Tergum 2 with conspicuous, lateral maculations which are widely separated, otherwise black
..... *costalis costalis* Cresson (p. 37)
- 6(4). Sternum 6 broadly rounded, projecting much beyond tip of tergum 6; head with small but distinct maculations above each eye and along inner orbits
..... (*Stelidium*) *trypetina* Robertson (p. 44)
Sternum 6 projecting but very slightly beyond the tergum, if at all, head without maculations 7
7. Entirely black, lacking maculations even on abdomen (*Pavostelis*) 8
Abdomen to some degree maculated 9
8. Large (10 mm.); scutum more closely punctate, interspaces not equalling diameter of punctures
..... *ater* new species (p. 39)

- Smaller (8 mm.); scutum more sparsely punctate, interspaces exceeding diameter of punctures on posterior half of disc *diversicolor* Crawford (p. 39)
- 9(7). Tergum 6 rather short, breadth nearly twice the median length, its apical margin broadly triangular 10
Tergum 6 quite broadly rounded 11
10. Abdominal terga with transverse, submedian, yellowish bands, interrupted medially, and sometimes with more lateral interruptions as well; antennal segments more elongate
..... *labiata* Provancher (p. 40)
Abdominal terga 1-3 with widely separated, lateral, yellowish spots, terga 4 and 5 often with 2 or 4 more median spots *lateralis* Cresson (p. 42)
- 11(9). Tergum 6 more nearly vertical, with a deep, subapical groove; sternum 6 coarsely and deeply punctate
..... *vernalis* new species (p. 43)
Tergum 6 more nearly horizontal, not at all grooved; sternum 6 with minute, densely crowded punctures
..... *submarginata* Cresson (p. 47)
- Males**
1. Thorax conspicuously maculated; carina of prothoracic tubercles produced mesally (*Protostelis*) 2
Thorax entirely black; tubercles not produced 3
2. Abdominal tergum 2 ferruginous medially; legs ferruginous in large part;
..... *costalis floridana* Graenicher (p. 38)
Tergum 2 with conspicuous, lateral maculations which are widely separated, otherwise black; legs black or piceous at base, becoming testaceous apically
..... *costalis costalis* Cresson (p. 37)
- 3(1). Face with small, ivory maculations along inner orbits
..... (*Stelidium*) *trypetina* Robertson (p. 44)
Face not maculated 4
4. Abdomen entirely black, without maculations; sternum 5 with a median, apical comb
..... (*Pavostelis*) *diversicolor* Crawford (p. 39)
Abdomen to some degree maculated, sternum 4 with a median, apical comb . . 5
5. Both recurrent veins interstitial with transverse cubital veins; tegulae and legs ferruginous
..... *plenum* Provancher (p. 43)
Legs and tegulae black; no more than one recurrent vein interstitial with its corresponding transverse cubital 6
6. Both recurrent veins received well within base and apex of 2nd submarginal cell; terga 4 and 5 with uninterrupted, transverse bands 7
Second recurrent vein interstitial or nearly with 2nd transverse cubital 8
7. Larger (8 mm.); abdominal bands broader, covering fully half of each disc at extreme sides; tergum 6 distinctly maculated; sternum 3 nearly impunctate over median area of plate
..... ? *nitida* Cresson (p. 46)
Smaller (6-7 mm.); abdominal bands narrower, covering less than half of disc at extreme sides; tergum 6 not distinctly maculated; sternum 3 fully punctate
..... *foederalis* Smith (p. 45)
- 8(6) Terga 1-4 with narrow, transverse, median, yellowish bands
..... *labiata* Provancher (p. 40)
Terga 1-4 with widely separated, lateral, yellowish or whitish spots 9
9. Median third of sternum 3 thickened apically, this area with a fringe of short hairs, lateral areas not fringed
..... *vernalis* new species (p. 43)
Margin of sternum 3 not much thicker medially than toward sides, with a more extensive fringe of more elongate hairs
..... *lateralis* Cresson (p. 42)

***Stelis (Protostelis) costalis costalis*
Cresson**

(Figs. 12 & 13)

Stelis costalis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 274. ♀ ♂.

Stelis louisae Cockerell, 1911. U. S. Natl. Mus. Proc. 40, p. 247. ♂. New synonymy.

FEMALE—Length 8 mm.; black, with yellow maculations on head, thorax and abdomen; face with lateral yellow maculae along inner orbits from clypeus nearly to top of eye, with some intrusion on each side of clypeus, and vertex with a pair of transverse, yellow maculae along posterior margin; scutum narrowly yellow on each lateral margin, this extending more broadly along anterior margin, median portion black; axillae yellow, and posterior border of scutellum broadly yellow, median area black; mesopleura with a large, yellow blotch above, metapleura with a small yellow spot; abdominal tergum 1 with a continuous, broad, transverse, yellow band, this somewhat ferruginous on anterior and posterior borders, tergum 2 with widely separated, lateral, yellow spots, 3 and 4 with transverse bands, these more or less interrupted on each side anteriorly, 5 with a rather short, transverse, yellow band medially, 6 entirely black; face somewhat

longer than distance between eyes above; eyes slightly convergent below; lateral ocelli large, somewhat nearer eyes than to each other; clypeus rather flat, apical margin nearly straight; labrum with a low, basal protuberance; mandibles entirely black, 3-dentate, median tooth slightly nearer apex than to inner angle; cheeks very slightly narrower than eyes; tegulae brownish-testaceous, becoming more yellowish anteriorly; wings subhyaline, becoming lightly infuscated in region of marginal and submarginal cells, veins brownish; legs piceous to black basally, femora becoming testaceous apically, tibiae testaceous, each with a narrow yellow stripe on outer face near base, tarsi and spurs entirely testaceous; front and mid tibiae terminating apically with a distinct, rather slender, anterior spine which is quite elongate, and a shorter, posterior spine, hind tibiae with but a single anterior spine; pubescence uniformly very short, thin, entirely pale, hardly visible above, somewhat more dense near upper margin of lateral faces of propodeum; carina of prothoracic tubercles elongated, extending along anterior margin of scutum; punctures uniformly very coarse and deep, close in large part, but distinctly although not widely separated on scutum and scutellum, somewhat more widely separated on the more basal abdominal terga where they are not quite so coarse, becoming very close on tergum 6 which is coarsely rugose posteriorly; abdominal sterna smooth and shining, punctures somewhat finer and quite sparse, but sternum 6 deeply, closely and quite uniformly punctate.

MALE—Length 8 mm.; black, with yellow maculations on head, thorax and abdomen; clypeus yellow in large part, apical margin black; lateral, yellow, facial maculae broad, extending from clypeus to top of eye, ending abruptly above, and vertex with a transverse, yellow maculation along posterior border; scutum narrowly yellow laterally, this extending broadly onto anterior margin, the median portion of which is black; axillae entirely yellow and scutellum broadly yellow posteriorly, median area black; mesopleura with a large, yellow blotch above, and metapleura with a smaller yellow spot; legs black basally, femora becoming testaceous apically, tibiae yellow toward base and on outer margin, becoming more testaceous apically, tarsi entirely testaceous, spurs pale yellow; basal abdominal tergum with a broad, continuous, transverse, yellow band, tergum 2 with widely separated, lateral, yellow spots, 3 and 4 with rather narrow, transverse, yellow bands which are strongly narrowed toward sides and connected with somewhat larger lateral spots, 5 with a rather short, median, transverse, subapical spot, 6 and 7 entirely black; face considerably

longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli quite large, nearer margin of vertex than to eyes; clypeus broadly convex, apical margin straight; labrum very slightly protuberant at base; mandibles entirely black, 3-dentate, median tooth very low, located nearer apical tooth than to inner angle; cheeks much narrower than eyes; carina of prothoracic tubercles extended along anterior margin of scutum; tegulae quite expansive, somewhat brownish-testaceous, becoming yellowish anteriorly and laterally; wings subhyaline basally, becoming rather strongly infuscated in region of marginal and submarginal cells, veins more piceous; tibiae spinose at tip, front and mid pair with a more elongate, anterior spine and a short, posterior spine, hind tibiae lacking the posterior spine; pubescence uniformly very short, thin and inconspicuous, entirely pale; punctures very coarse, deep and distinct, rather close in general, more distinctly separated between ocelli and antennae, on scutum posteriorly, and on scutellum, rather fine on clypeus, those on the abdominal terga somewhat more widely separated medially, becoming close laterally, and very close on the more apical plates; basal abdominal sternum somewhat elevated medially, sternum 2 quite expansive, broadly rounded, margin elevated, covering sternum 3 in large part, apical margin of 3 broadly membranous and deeply incised medially; sterna 4 and 8 retracted, apical margin of 4 with a pair of robust, erect spines medially, a fringe of elongate hairs on each side, form of the remaining plates as shown (fig. 13); gonostyli broadly and angulately dilated apically, as shown.

DISTRIBUTION—Kentucky and Virginia, south to Texas and Florida, March to September.

FLOWER RECORDS—*Bidens*, *Ceanothus*, *Erigeron*, *Helianthus*, *Ilex*, *Melilotus*, *Polygonum*, *Psoralea*, *Pycnanthemum*, *Rhus*, *Senecio*, *Silphium* and *Solidago*.

Stelis (Protostelis) costalis floridana
Graenicher new combination

Stelis floridana Graenicher, 1928. Ent. News 39, p. 282. ♀ ♂.

This form differs from typical *costalis* in the somewhat larger size, being 8-9 mm. in length, and by the more extensive maculated areas which are in large part ferruginous rather than yellow; also the legs are entirely ferruginous or testaceous. In both sexes the clypeus is in large part maculated, the lateral facial maculations much

broader and more extensive and the posterior band on the vertex extends across the head and down to some degree behind the eyes. The maculations of the pleura and scutum are much as in typical *costalis* but are somewhat more extensive, the scutellum being almost entirely ferruginous. On the abdomen the basal tergum is almost entirely ferruginous and on tergum 2 the lateral marks are more or less broadly connected across the median part of the disc, while the maculations on 3-5 are not greatly different from the typical form.

DISTRIBUTION—Florida, March to July.

FLOWER RECORDS—*Bidens* and *Melilotus*.

Stelis (Pavostelis) ater new species

FEMALE—Length 10 mm.; entirely black, without maculations; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, considerably nearer margin of vertex; clypeus evenly convex, apical margin very slightly incurved on each extreme side; mandibles 3-dentate, middle tooth somewhat nearer apical tooth than to inner angle; cheeks considerably broader than eyes; transverse carina of prothoracic tubercles barely evident; tegulae smooth and shining, minutely and quite sparsely punctate; wings quite deeply infuscated, veins piceous; apical spines of front tibiae reduced to acute angles, those of mid tibiae well developed, hind tibiae with a pair of apical, triangular carinae but without distinct spines; spurs of front legs testaceous-hyaline, those on mid and hind tibiae blackish; pubescence entirely pale, very short and thin, somewhat more dense on each side of face and on pleura; abdominal terga 1-3 with thin, whitish and inconspicuous, apical fasciae, tergum 4 subfasciate toward sides; punctures quite deep and distinct, rather coarse, close in general, very fine and crowded over clypeus and lower portions of face, becoming somewhat coarser and more distinct on vertex and cheeks, coarse and close on pleura and scutellum, somewhat finer on scutum, distinctly but not widely separated over median portion of disc; posterior face of propodeum with a narrow, dorsal, deeply pitted area just beneath metanotum; punctures of abdominal terga deep and distinct, slightly separated on terga 1-3 medially, becoming slightly coarser and closer laterally, very close on 4, coarse and close on 5 and 6, apical margin of 6 forming a rather distinct, apical lip; abdominal sterna coarsely

and rather closely punctate toward apical margin, the margins very narrowly testaceous-hyaline, sternum 5 quite coarsely and very closely punctate over entire disc, and 6 finely and closely punctate, apical margin angulate.

TYPES—Holotype: Female, 2 miles west of Archer, Florida, March 23, 1953 (H. F. Howden) [authors coll.]. Paratypes: 1♀, Cork Screw Swamp, Collier Co., Fla., April 9, 1958 (H. V. Weems, Jr., on *Cirsium*) [Florida Plant Board]; 1♀ Sarasota, Florida, January 1937 (F. Pelton) [U.S.N.M.].

Stelis (Pavostelis) diversicolor
Crawford

(Fig. 14)

Stelis diversicolor Crawford, 1916. Insector Inscitiae Menstruus 4, p. 106. ♂.

FEMALE—Length 8 mm.; entirely black, with no maculations, even on abdomen; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli considerably nearer margin of vertex than to each other, subequally distant from eyes and each other; clypeus nearly flat, apical margin quite straight; mandibles 3-dentate, middle tooth about mid way between apical and inner teeth; cheeks considerably broader than eyes; carina of prothoracic tubercle barely evident; tegulae rather small, shining, sparsely and minutely punctate; wings lightly infuscated, veins piceous; apical spines of front tibiae reduced to minute angles, the mid tibiae with distinct, acute, apical spines, hind tibiae with a short, more anterior spine and a posterior rounded carina; anterior spurs more testaceous, mid and hind spurs blackish; pubescence entirely pale, short and rather thin, but quite copious on sides of face, on lower cheeks, on thorax laterally, and on basal portions of legs; abdominal terga 1-4 with thin but evident, apical, whitish fasciae; punctures deep and distinct, quite coarse and close in large part, finer on sides of face and on clypeus apically, very close just above eyes but becoming more distinct on cheeks below and on vertex, coarse on pleura, becoming rather sparse below, well separated over posterior half of scutum, and very coarse and slightly separated on scutellum; propodeum with a very narrow, dorsal, pitted area; punctures of abdominal terga quite coarse, deep and distinct, rather well separated on median portions of terga 1-3, becoming closer and somewhat coarser laterally and on the more

apical terga, 5 and 6 being rather coarsely rugoso-punctate laterally and across apical margin of 6; tergum 6 broadly rounded, apical margin very slightly produced and flange-like; abdominal sterna 2-4 rather coarsely and sparsely punctate across median areas of disc, 4 rather broadly incurved apically, 5 and 6 closely, deeply and distinctly punctate, 6 obtusely pointed medially.

MALE—Length 7 mm.; entirely black, with no maculations; head considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli nearer margin of vertex than to each other, subequally distant from eyes and each other; clypeus rather strongly convex, apical margin nearly straight; mandibles 3-dentate, middle tooth subequally distant from inner and apical teeth; cheeks considerably broader than eyes; carina of prothoracic tubercle barely evident; tegulae rather small, shining, rather deeply and distinctly but sparsely punctate; wings subhyaline, veins more brownish-testaceous, 1st recurrent vein nearly interstitial with the 1st transverse cubitus, 2nd recurrent terminating just beyond tip of 2nd submarginal cell; apical spines of front tibiae reduced to sharp angles, those on mid tibiae well developed, hind tibiae without apical spines; spurs of front tibiae more testaceous-hyaline, mid and hind spurs piceous to black; pubescence short and thin, entirely pale, rather copious but not hiding surface on face around antennae, on cheeks and over most of thorax, very short and thin on abdominal terga; punctures quite deep and distinct in general, rather coarse and distinctly separated around ocelli, on scutum and scutellum, and over much of pleura, becoming densely crowded on clypeus and face below level of antennae; punctures rather fine but deep and distinct, well separated in median area of abdominal terga 1-4, becoming somewhat finer and closer toward the apical margins, these not at all depressed or impunctate; pubescence forming rather indistinct, apical fasciae toward sides of the more basal terga, tergum 5 very closely punctate, 6 and 7 with densely crowded punctures; sterna 1-3 exposed, somewhat shining, basal sternum slightly elevated medially, apical margin straight, narrowly hyaline, 2 rather coarsely and sparsely punctate across disc, with a central, shallow impression, margin straight and narrowly hyaline, 3 rather dull but smooth, largely impunctate, shallowly impressed medially and with a quite prominent, apical fringe of pale hairs; sterna 4-8 retracted, apical margin of 4 with a median comb of very short, robust setae, 5 also with a similar but much more restricted comb, remaining sterna as shown

(fig. 14); genital armature much as in *costalis* (fig. 13).

DISTRIBUTION—Texas to Tennessee and North Carolina, April to June.

FLOWER RECORD—*Rubus*.

***Stelis (Chelynia) labiata* (Provancher)
new combination**

(Fig. 13)

Chelynia labiata Provancher, 1888. Addit.

Corr. Faune Ent. Canada Hym., p. 322. ♀ ♂
? *Stelis birkmanni* Cockerell, 1909. Ann. Mag. Nat. Hist. (8) 4, p. 29. ♂.

FEMALE—Length 8 mm.; head, thorax and legs entirely black, abdomen black, with transverse, submedian, narrow, yellow maculations; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; clypeus only slightly convex, apical margin very slightly produced medially, having a pair of very low submedian angles delimiting a shallow, median emargination; mandibles 3-dentate, middle tooth subequally distant from apex and inner angle; labrum shining over most of median length, not at all protuberant toward base, apex more distinctly punctured, the punctures extending narrowly up each side toward base; cheeks considerably broader than eyes; transverse carina of prothoracic tubercle very low and barely evident; tegulae shining, with very minute and rather sparse punctures; wings lightly infuscated, veins piceous, 1st recurrent vein distant from base, but 2nd recurrent vein nearly interstitial with the 2nd transverse cubitus; front and mid tibiae with a pair of acute, apical angles but hardly spine-like, hind tibiae with a similar apical angle; pubescence over head and thorax entirely pale, quite short but copious over face, on cheeks, pleura and on propodeum laterally, very short and thin, almost inevident on abdominal terga, becoming more evident on the more apical terga, tergum 6 with rather numerous, erect, fuscous, seta-like hairs; punctures coarse, deep and distinct over head and thorax, becoming densely crowded on lower portion of face and clypeus, crowded elsewhere on head, coarse and crowded on pleura, more distinctly separated on scutum and scutellum; posterior face of propodeum shining above, without a distinct, transverse, dorsal, pitted area; abdominal terga shining, punctures coarse, close and deep, apical margins very narrowly impunctate but black, terga 1-4 with narrow, transverse, yellowish bands which are slightly interrupted medially, 5 with a pair of submedian, yellow spots which are slightly

separated, 6 rather coarsely rugoso-punctate, nearly twice as broad basally as the median length, apical margin broadly triangular; abdominal sterna uniformly, closely and deeply punctate throughout, punctures coarse on the more basal sterna, becoming very fine and densely crowded toward apex, sternum 6 rather broadly rounded.

MALE—Length 8 mm.; head, thorax and legs entirely black, abdomen black, with narrow, transverse, submedian, cream-colored maculations; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, considerably nearer margin of vertex; clypeus slightly convex, apical margin with a median, slightly produced area which is shallowly emarginate; mandibles 3-dentate, middle tooth equally distant from inner and apical teeth; labrum polished and impunctate medially and toward base, finely punctate at tip and along sides toward base; cheeks somewhat broader than eyes; transverse carina of prothoracic tubercles low but distinct; tegulae shining, with fine, evenly distributed punctures, but these becoming close anteriorly; wings subhyaline, veins piceous to dull testaceous, 2nd recurrent vein joining 2nd submarginal cell near its

apex; front and mid tibiae each with a pair of short and acute, apical spines, hind tibiae at most triangularly pointed apically; pubescence entirely pale, rather copious on head and thorax, obscuring surface over lower part of face, elongate on cheeks and over most of thorax, very short and barely evident on abdominal terga; punctures deep and distinct, coarse and quite close over most of head and thorax, finer and densely crowded on lower part of face, more coarse, and distinct on cheeks, vertex, pleura and dorsum of thorax; punctures distinctly but not widely separated on dark areas of abdominal terga, but maculated areas nearly impunctate, these quite narrow, submedian in position, very slightly interrupted medially on terga 1-5, terga 6 and 7 entirely black, coarsely, deeply and very closely punctate, punctures becoming crowded on 6 apically and on 7; abdominal sterna 1-3 exposed, coarsely and quite closely and uniformly punctate, but sternum 3 with a median, impunctate, impressed area which becomes somewhat elevated toward apical rim, these sterna with quite distinct, apical fringes of elongate, whitish hairs; sterna 4-8 retracted, modified as shown (fig. 13) lateral areas of 3-5 with a dense covering of pale ochraceous tomentum; genital armature much as in *costalis* (fig. 13).

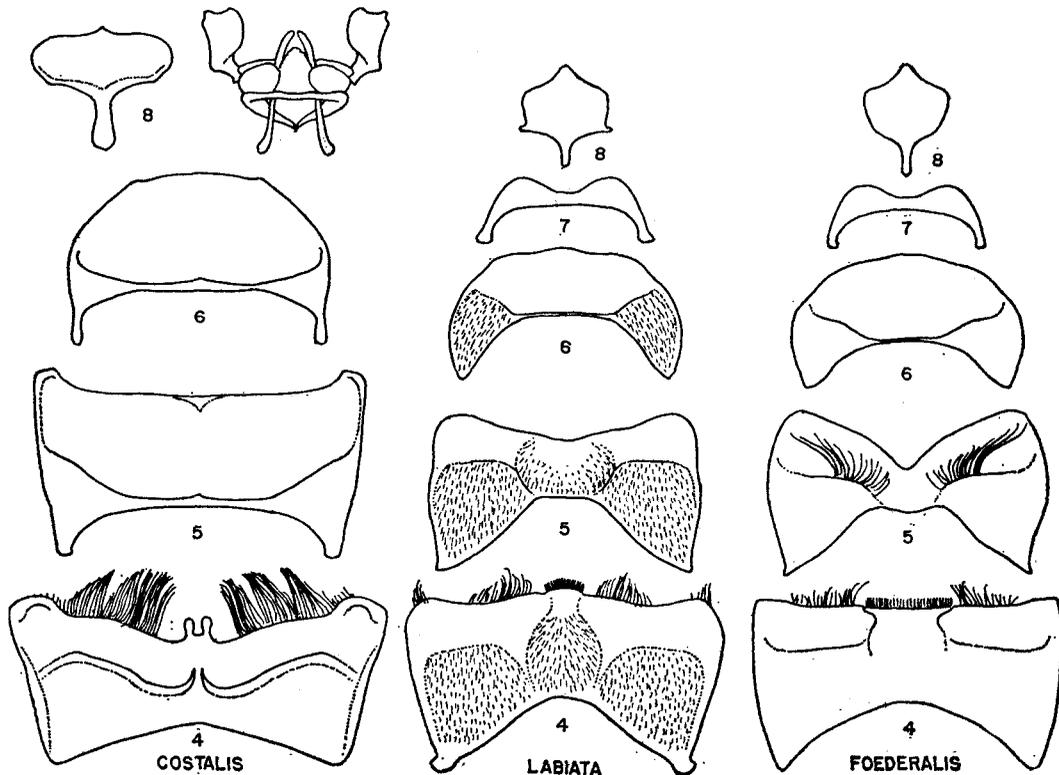


Figure 13—Genital armature and sterna 4-8 in males of *Stelis*.

DISTRIBUTION—Wisconsin to Quebec, south to North Carolina, April to August.

FLOWER RECORDS—*Ranunculus* and *Rubus*.

Stelis (Microstelis) lateralis Cresson

(Fig. 14)

Stelis lateralis Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 410. ♀.

Stelis lateralis Robertson, 1898. Acad. Sci. St. Louis, Trans., 8, p. 48. ♂ ♀.

Stelis sexmaculatus Graenicher, 1905. Wis. Nat. Hist. Soc. Bul. 3, p. 153. (biology)

Stelis (Microstelis) lateralis Swenk, 1914. Univ. Nebr. Studies 14, p. 5. (host)

Stelis lateralis Hicks, 1926. Colo. Univ. Studies 15, p. 217. (biology)

Stelis lateralis Rau, 1928. Psyche 35, p. 100. (biology)

Microstelis lateralis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Stelis lateralis Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1048. (larva)

Stelis lateralis Michener, 1955. Kans. Ent. Soc. Jour. 28, pp. 83-86. (biology)

FEMALE—Length 5-6 mm.; head, thorax and legs entirely black, abdomen black, with small, cream-colored maculations; face slightly longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli much nearer margin of vertex than to each other and nearer each other than to eyes; clypeus slightly convex, apical margin with a very slight angle on each side of center; mandibles 3-dentate, middle tooth slightly nearer apical tooth than to inner angle; cheeks subequal to eyes in width; transverse carina of prothoracic tubercles very low and inconspicuous; tegulae rather small, shining, finely and rather closely punctate; wings subhyaline, veins brownish-testaceous; tibiae not spinose apically; spurs pale yellowish; pubescence entirely pale, short, rather copious over head and thorax, very fine and inconspicuous on abdominal terga; punctures quite coarse, deep and distinct, close in general over head and thorax, crowded below antennae, more distinctly separated but still close on scutum, scutellum and pleura, somewhat finer on abdominal terga; apical margins of terga 2-5 very narrowly yellowish-hyaline and impunctate, terga 1-3 with widely separated, lateral, whitish or pale yellowish maculae, 4 and 5 with a pair of more median, very small spots, sometimes with a very small, lateral spot in addition; tergum 6 very broad and short, fully twice as broad as the median length, apical margin broadly angulate, punctures very close, becoming densely crowded across

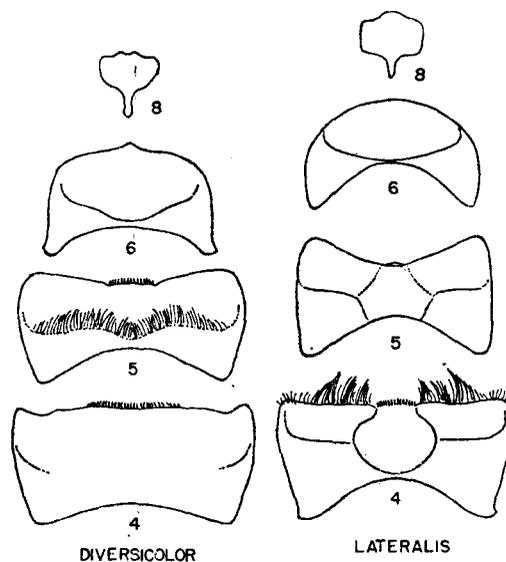


Figure 14
Sterna 4-6 and 8 in males of *Stelis*.

apical margin; abdominal sterna closely, deeply and distinctly punctate, punctures becoming finer and more densely crowded on the more apical sterna, apical margins of 2-5 with a quite dense, apical, greyish fascia.

MALE—Length 6-7 mm.; head, thorax and legs entirely black, abdomen black, with lateral, yellowish maculations; face slightly longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli nearer margin of vertex than to each other and slightly nearer each other than to eyes; clypeus quite strongly convex, apical margin slightly and rather broadly produced medially; mandibles 3-dentate, middle tooth about equidistant from inner and apical teeth; cheeks subequal to eyes in width; transverse carina of prothoracic tubercle very low and inconspicuous; tegulae rather small, shining between rather coarse, deep and distinct punctures; wings subhyaline, veins testaceous; front and mid tibiae with very short, barely evident apical angles, these not evident on hind tibiae; spurs pale yellowish; pubescence entirely pale, rather short but quite copious over head and thorax, very short and inconspicuous on abdominal terga; punctures quite coarse, deep and distinct, close in general over head and thorax, slightly separated only over posterior half of scutum, rather fine and close, quite deep and distinct on abdomen; terga 2-5 with very narrow, yellowish-hyaline, impunctate, apical rims; terga 1 and 2 with rather large and conspicuous, widely separated, lateral, pale yellowish maculations, those on 3 more elon-

gate and transverse but still widely separated, 4 and 5 with a pair of submedian but slightly separated, transverse, yellow marks, 6 and 7 without maculae, with coarse, crowded punctures; abdominal sterna 1-3 exposed, black, rather conspicuously whitish fasciate apically, sternum 2 slightly protuberant near middle, punctures quite coarse, deep, distinct and close, 4-8 retracted, 4 with a median, circular, depressed area at apex of which is a rather narrow apical comb, remaining sterna as shown (fig. 14); genital armature much as in *costalis* (fig. 13).

DISTRIBUTION—North Dakota to Ontario and Maine, south to Georgia, March to July.

FLOWER RECORDS—*Chrysanthemum* and *Rubus*. Recorded by Robertson (1929) on *Apocynum*, *Cerastium*, *Coreopsis*, *Eriogon*, *Geranium*, *Krigia*, *Potentilla*, *Rhus* and *Zizia*.

HOSTS—(*Alcidamea simplex*) = ? *Robertsonella simplex* (Cresson); *Hoplitis pilosifrons* and *H. producta*.

Stelis (Microstelis) plenum
(Provancher)

Heriades plenum Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym. p. 425. ♂.

This has been synonymized with *lateralis*, but examination of the type suggests the probability that it is not that species. It does not quite agree with any of the eastern species of *Stelis*, but it is possible that it is a variant of one of them, or of some western species. The following brief description was made of the type specimen:

MALE—Length 4 mm.; head and thorax entirely black, tegulae and legs ferruginous; abdominal terga 1-3 with small, lateral, yellow maculae, 4 and 5 with a median pair which are slightly separated at midline; both recurrent veins interstitial with the transverse cubital veins; puncture close and deep on head and thorax, scutellum somewhat triangular, punctures separated by about their own diameters; abdominal terga more finely and sparsely punctate, interspaces two or three times their diameter, tergum 6 closely punctate, entirely black, 7 short, transverse; sternum 3 with a conspicuous apical fringe.

DISTRIBUTION—? Quebec.

Stelis (Microstelis) vernalis
new species

FEMALE—Length 6-7 mm.; head, thorax

and legs entirely black, abdomen black, with a pair of very small, lateral, cream-colored maculations on terga 1 and 2; face very slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, much nearer margin of vertex; clypeus quite flat, apical margin straight; mandibles rather flat, slightly reddened toward teeth, 3-dentate, middle tooth very low, subequally distant from inner and apical teeth; labrum not at all protuberant basally, quite evenly, closely and finely punctate throughout; cheeks slightly broader than eyes; transverse carina of prothoracic tubercles short but distinct; tegulae rather large, shining, finely and quite closely punctate; wings hyaline basally, becoming slightly smoky apically and in region of marginal cell, veins piceous, 2nd recurrent vein nearly interstitial with 2nd transverse cubitus; hind tibiae with a triangular, acute, apical projection, the front and mid tibiae each with pair of short, acute, spine-like projections; spurs pale yellowish; pubescence entirely pale, very short and thin, somewhat more copious but not hiding surface around antennae, on cheeks below and on thorax laterally; punctures deep and distinct, quite coarse, uniformly close over head and thorax, being fine and densely crowded on clypeus, much more coarse on pleura, uniformly close but not crowded on scutum and scutellum; posterior face of propodeum polished, shining and impunctate, with a narrow, distinct, dorsal, pitted area; abdominal terga shining, punctures deep and distinct, rather coarse, slightly separated medially on terga 1-5, becoming somewhat closer at extreme sides, apical margins very narrowly yellowish-hyaline and impunctate; terga 1 and 2 with very small, cream-colored, lateral spots; tergum 6 with a quite deep, subapical groove, disc with coarse, crowded punctures; abdominal sterna closely punctate, the more basal sterna coarsely so, punctures becoming finer but distinct on the following sterna, those on 5 uniformly deep, distinct and close.

MALE—Length 5 mm.; head, thorax and legs entirely black, abdomen black, with small, lateral, yellowish maculations on the more basal terga; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, considerably nearer margin of vertex; clypeus slightly convex, apical margin nearly straight; mandibles slightly reddened toward apex, 3-dentate, middle tooth about equidistant from inner and apical teeth; labrum smooth and shining, not at all protuberant basally, with scattered, deep and distinct but fine punctures; cheeks very

slightly narrower than eyes; transverse carinae of prothoracic tubercles low but distinct; tegulae rather small, smooth and shining, but with rather close, deep and distinct punctures; wings subhyaline, becoming somewhat infuscated in region of marginal cell, veins piceous to testaceous, 2nd recurrent vein about interstitial with 2nd transverse cubitus; front and mid tibiae with a pair of very short, acute, apical spines, the hind tibiae at most with an apical angle; spurs pale yellow; pubescence entirely pale, very short, thin and inconspicuous, not obscuring surface in any part of body; punctures coarse, deep and distinct, rather uniformly close and coarse over most of head and thorax, being somewhat coarser on vertex, pleura and scutellum where they are not quite so crowded; posterior face of propodeum smooth and shining, with a few shallow, scattered punctures and with a distinct, narrow, dorsal, pitted area; abdominal terga smooth and shining, punctures deep and distinct, well separated medially on terga 1-3, becoming somewhat closer laterally, apical margins narrowly yellowish-hyaline and impunctate, with lateral, widely separated yellowish maculae, a similar vestigial pair on 4; sterna 5-7 closely, deeply and uniformly punctate; abdominal sterna 1-3 exposed, very coarsely, closely and deeply punctate, 3 with a rather broad, concave, median area which is thickened along its apical margin, and has a very short, apical fringe, this practically lacking laterally, 1 and 2 with very narrow, apical fringes; sterna 4-8 retracted, form very similar to *labiata* (fig. 13); gonostyli much as in *costalis* (fig. 13).

Types—Holotype: Female, Holly Shelter Game Refuge, Pender Co., N. C., April 25, 1953 (Mitchell). Allotype: Hillsgrove, Pa., July 23, 1931 [both author's coll.]. Paratypes: MICHIGAN: 1♀, Douglas Lake, Cheboygan Co., (? June 7 or July 6), 1930 (C. J. D. Brown); 1♂, Mason Co., (date obliterated) (Dreisbach); 1♀, Huron Co., June 29, 1922 (R. F. Hussey); 1♂, Charlevoix Co., July 3, 1939 (Bullock and Dreisbach); MINNESOTA: 1♂, Climax July 8, 1935 (D. G. Denning).

Paratypes are in collections of the University of Michigan, the U. S. National Museum, the University of Minnesota and R. R. Dreisbach.

Stelis (Stelidium) trypetina
(Robertson)

Stelidium trypetinum Robertson, 1902. Canad. Ent. 34, p. 232. ♀.

Stelis (Stelidium) ontariana Sladen, 1916. Canad. Ent. 48, p. 312. ♀ ♂.

Stelis (Stelidium) trypetina Cockerell, 1922. Canad. Ent. 54, p. 143.

Stelidium trypetinum Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 5 mm.; black, with very small, cream-colored maculations on head and abdomen; a pair of narrow, slightly separated maculations along inner orbits and a narrow, transverse maculation back of each eye, near margin of vertex; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli slightly nearer margin of vertex than to each other, and slightly nearer each other than to eyes; clypeus nearly flat, apical margin nearly straight; mandibles 3-dentate, middle tooth slightly nearer inner angle than to apical tooth; labrum with a median, basal, triangular, polished and impunctate area, densely and finely punctate on each side and apically; cheeks subequal to eyes in width; transverse carina of prothoracic tubercles very low, barely evident; tegulae shining, uniformly, closely and deeply punctate; wings faintly smoky, veins piceous, recurrent veins received well within base and apex of 2nd submarginal cell; front tibiae without distinct, apical spines, mid tibiae with a pair of very short, acute spines, and hind tibiae with single, triangular, spine-like, apical projection; spurs yellowish, mid tibial spur very short; pubescence entirely pale, very short and thin, rather dense but not hiding surface around antennae and over lower half of face, somewhat more copious on pleura, thin on abdominal terga, but forming rather definite, apical fasciae toward sides on terga 1-4; punctures coarse, deep and distinct in large part, close and coarse over most of face and cheeks, but becoming finer and more dense on clypeus and sides of face; punctures coarse and close over most of thorax, posterior face of propodeum polished, shining and impunctate, with a narrow, pitted area across dorsal margin; discs of abdominal terga quite coarsely and deeply punctate, punctures slightly separated medially, becoming densely crowded toward sides, apical margins narrowly depressed, shining, impunctate and yellowish-hyaline; terga 3-6 gradually narrowed, resulting in a conical form of the abdomen, tergum 6 triangular posteriorly, coarsely and deeply punctate, much exceeded by the elongate and broadly rounded 6th sternum; sterna 1-5 coarsely and closely punctate, with quite dense, apical fringes of elongate white hairs, 6 very minutely and closely punctate except around the dull testaceous, more nearly impunctate margin.

DISTRIBUTION—Illinois to Virginia, August and September.

FLOWER RECORD—*Pycnanthemum*. Recorded by Robertson (1929) on *Aster*, *Erigeron*, *Rudbeckia* and *Solidago*.

Stelis foederalis Smith

(Figs. 12 & 13)

Stelis foederalis Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 275. ♀ ♂.

Chelynia foederalis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8 mm.; head, thorax and legs entirely black, abdomen with transverse, narrow, submedian, yellowish bands on terga 1-5, that on 1 very slightly interrupted medially, the others complete; face slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli slightly nearer margin of vertex than to each other, more distant from eyes; clypeus slightly convex, apical margin nearly straight; mandibles 3-dentate, the teeth low and about equally distant from each other; labrum smooth and shining, little if any protuberant at base; cheeks slightly broader than eyes; prothoracic tubercles with a low, inconspicuous carina; tegulae rather expansive, shining, minutely and rather sparsely punctate, largely black; wings subhyaline, veins piceous; spurs of front legs yellowish-hyaline, those on mid and hind pair blackish; front and mid tibiae each with a pair of rather short, acute, apical spines, hind tibia with a single spine; pubescence very short, thin and inconspicuous, apparently entirely pale, the more apical abdominal terga with considerable erect, seta-like pubescence; punctures rather deep and distinct in general, very fine and close over face, becoming somewhat coarser above and on vertex, close and rather coarse on cheeks, slightly separated on the shining scutum and scutellum, somewhat coarser on scutellum, very close and coarse on pleura; abdominal terga shining, very sparsely punctate across median area of discs, becoming more closely punctate toward basal and apical margins, without a distinct, impunctate, apical rim, tergum 6 rather finely and shallowly reticulate; abdominal sterna uniformly, very finely and closely punctate, the apical sternum with a robust, median, elongate spine which protrudes conspicuously from tip of abdomen, superficially resembling a sting.

MALE—Length 7-8 mm.; head, thorax and legs entirely black, abdomen with transverse, narrow, submedian, yellow bands on terga 1-5, these slightly interrupted on 1-3; face some-

what longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from margin of vertex and each other, more distant from eyes; clypeus quite flat, apical margin nearly straight, but with a pair of barely perceptible protuberances on each side of center; cheeks somewhat broader than eyes; prothoracic tubercles with a very low but distinct carina; tegulae black, shining, minutely and rather sparsely punctate wings subhyaline, veins piceous; front and mid tibiae each with a pair of short but acute, apical spines, hind tibiae angulate apically but hardly spinose; spurs of front tibiae yellowish-hyaline, mid and hind pair more blackish; pubescence entirely pale, rather copious over head and thorax, nearly hiding the surface of lower part of face, quite elongate on cheeks below, copious over dorsum and venter of thorax and basal portions of legs, very thin and inconspicuous on abdominal terga, but apparently entirely pale, somewhat more copious on tergum 6; punctures quite deep and distinct in general, rather coarse on cheeks and upper part of face and vertex, becoming minute and densely crowded on clypeus and lower portions of face; punctures deep, distinct and quite coarse and close over entire thorax, being almost crowded on entire scutum and scutellum; abdominal terga largely impunctate across median area of each disc, these becoming more distinctly, closely and coarsely punctate toward base and apex, tergum 6 closely punctate throughout, more finely so toward basal margin, tergum 7 with fine, almost crowded punctures; abdominal sterna 1-3 exposed, not much modified, punctures quite close, deep and distinct, 2 and 3 with rather elongate, posterior fringes of white pubescence, 3 with a median, elevated, protuberant area at mid point; sterna 4-8 retracted and highly modified, 4 with a median, apical comb, margin on each side with a fringe of more elongate pubescence, other sternal plates as shown (fig. 13); genital armature much like that of *costalis* (fig. 13).

DISTRIBUTION—Minnesota to New Brunswick, south to Georgia, May to July.

FLOWER RECORD—Recorded by Robertson (1929) on *Chrysanthemum leucanthemum*.

Stelis michiganensis new species

FEMALE—Length 6 mm.; head, thorax and legs entirely black, abdomen with transverse, yellow maculations; face very slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant

from eyes; clypeus somewhat convex, apical margin nearly straight; mandibles 3-dentate, middle tooth subequally distant from inner angle and apical tooth; cheeks subequal in width to eyes; labrum polished and impunctate, not noticeably protuberant at base; carina of prothoracic tubercle low but quite distinct; tegulae piceous, shining, only very minutely and sparsely punctate; wings subhyaline, veins rather pale testaceous except for the more piceous marginal veins; front and mid tibiae each with a pair of short, acute, apical spines, hind tibia with a single, short, triangular spine; anterior spurs testaceous-hyaline, mid and hind spurs more piceous; pubescence entirely pale on head and thorax, quite copious but rather thin and not completely hiding the surface; punctures coarse, deep and distinct, quite coarse over upper part of face and on cheeks, becoming densely crowded and rather fine on clypeus and sides of face below antennae, coarse and well separated over most of scutum and on scutellum, very close on pleura, and close, minute and shallow on propodeum laterally, posterior face of propodeum dull, tessellate, with a dorsal very narrow, pitted area; abdominal terga shining, 1-4 finely and sparsely punctate medially, becoming somewhat closer toward sides, 5 more closely punctate, 6 reticulate; tergum 1 with a pair of small, widely separated, lateral, yellow spots, 2-4 with transverse, narrow, submedian maculae which are distinctly but not widely separated medially, 5 with a pair of short, transverse, submedian maculations; pubescence sparse and erect, pale on the more basal terga, becoming blackish on 3-6, quite dense and erect on 6; abdominal sterna closely, finely and uniformly punctate, sternum 6 with minute and densely crowded punctures, apical margin nearly straight, and with a median, elongate, robust, black spine.

TYPE—Holotype: Female, Luce Co., Mich., July 8, 1946 (Dreisbach).

This species is closely related to *foederalis* and *nitida*, and would be included with them in any subgeneric grouping.

Stelis nitida Cresson

Stelis ? *nitida* Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 92. ♀.

Chelynia nitida Titus, 1905. Ent. Soc. Wash. Proc. 7, p. 162.

FEMALE—Length 11 mm.; head, thorax and legs entirely black, abdomen with median, transverse, uninterrupted yellow bands on terga 1-5; face slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more

distant from eyes; clypeus slightly convex, apical margin nearly straight, but with a very shallow emarginate area on each side; mandibles 3-dentate, middle tooth slightly nearer inner angle than to apical tooth; cheeks much broader than eyes; prothoracic tubercle with a barely discernable carina; tegulae quite expansive, smooth and shining, with very sparse and minute punctures, these becoming somewhat closer toward anterior margin; wings subhyaline, veins piceous, recurrent veins entering 2nd submarginal cell well within the base and apex; tibiae with short, apical spines, front and mid pair with two spines, hind pair with one very short, triangular, spine-like projection; front spurs somewhat brownish, with hyaline margin toward base, mid and hind spurs more piceous; pubescence entirely pale, quite copious on head and thorax, somewhat thinner above, quite dense on face, cheeks below, pleura and venter of thorax, pale and very thin on the more basal abdominal terga, becoming more copious, long, erect and black toward the apex, tergum 6 quite densely covered with erect, black setae; punctures quite deep and distinct over most of head and thorax, close and coarse on cheeks, upper part of head, pleura and scutellum, very fine and densely crowded below antennae, quite sparse and irregular on shining scutum; terga 1-5 with very sparse and rather fine punctures across central portions of discs, these becoming more closely punctate toward base and apex, tergum 6 rather coarsely reticulate beneath the pubescence; abdominal sterna somewhat shining, punctures minute and rather well separated but not sparse, becoming more densely crowded toward apical segments; sternum 6 deeply emarginate apically, with an elongate, erect, robust, blackish spine protruding from mid point of this emargination.

MALE—Length 8-8.5 mm.; head, thorax and legs entirely black, abdominal terga 1-5 with median, transverse, yellow bands, those on the more basal terga very slightly interrupted medially, tergum 6 with a pair of small, subapical, yellow spots; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli very slightly nearer margin of vertex than to each other, more distant from eyes; clypeus rather flat, apical margin with a very slight, median, emargination; mandibles 3-dentate, middle tooth slightly nearer inner angle than to apical tooth; labrum smooth and shining, with no perceptible basal protuberance; cheeks much broader than eyes; transverse carina of prothoracic tubercle very poorly developed; tegulae rather expansive, smooth and shining, with minute, sparse punctures; wings subhyaline,

veins more brownish-testaceous, recurrent veins entering 2nd submarginal cell within base and apex; front and mid tibiae each with a pair of short, acute, apical spines, hind tibia angulate but not spinose at tip; front spurs more testaceous, mid and hind pair piceous; pubescence entirely pale, quite copious over head and thorax, being elongate even on dorsum of thorax, dense and obscuring the surface on face below antennae, very sparse and inconspicuous on abdominal terga, but becoming more copious and conspicuous on the more apical segments; punctures rather coarse and deep over most of head and thorax, close but distinct on cheeks, vertex and upper part of face, becoming minute and densely crowded on clypeus and face below, close on pleura and on scutum anteriorly, but becoming rather distinctly separated in center of scutum posteriorly and on scutellum; discs of abdominal terga very sparsely punctate across median area, punctures becoming more distinct basally and apically on each disc, rather fine toward the apical margin, well separated, becoming quite close but distinct on tergum 6, tergum 7 finely and very closely punctate; abdominal sterna 1-3 exposed, somewhat shining, punctures close and rather distinct laterally, but becoming quite sparse, minute and well separated or absent in the median area, sternum 3 with a median, apical, protuberant area which does not project beyond the apical margin; sterna 4-8 retracted, much modified, closely resembling those of *foederalis*, (fig. 13); genital armature much as in *costalis*.

DISTRIBUTION—Described from New York. Collected in North Carolina, in June.

FLOWER RECORD—*Chrysanthemum*.

***Stelis submarginata* Cresson**

Stelis ? *submarginata* Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 93. ♀.

Stelis submarginata Swenk, 1915. Nebr. Univ. Studies 15, p. 191. ♂.

Stelis submarginata Graenicher, 1935. Ent. Soc. Am. Ann. 28, p. 300. (host)

FEMALE—Length 8mm.; head, thorax and legs entirely black, abdomen black, with transverse, yellow maculae; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli sub-

equally distant from margin of vertex, eyes and each other; clypeus rather flat, apical margin with a pair of conspicuous tubercles delimiting a shallow, median, emarginate area; mandibles 3-dentate, middle tooth quite low, slightly nearer inner angle than to apical tooth; cheeks somewhat broader than eyes; basal half of labrum polished and impunctate, apical part quite deeply and distinctly punctate, this area extending narrowly along sides toward base; transverse carina of prothoracic tubercles low but distinct; tegulae rather small, shining, minutely and rather sparsely punctate; wings faintly infuscated, veins more testaceous, recurrent veins received by 2nd submarginal cell well within base and apex, hind tibiae not spinose apically, front and mid tibiae each with a pair of very short, acute, spine-like projections; front spurs pale testaceous, mid and hind spurs piceous; pubescence of head and thorax rather short but copious, pale in general, but face, vertex and dorsum of thorax with scattered, erect, blackish hairs intermixed in the white, abdominal terga with erect and rather sparse but conspicuous, blackish hairs; punctures of head and thorax quite deep and distinct, very close on cheeks and over most of face, slightly separated between eyes and ocelli, close and coarse on pleura, coarse and slightly separated on scutum and scutellum; posterior face of propodeum shining above, with a rather indefinite, transverse, rugose area, but without distinct pits; abdominal terga smooth and shining, with rather fine, sparse punctures, these becoming slightly closer toward the depressed apical margins which are largely impunctate and black; terga 1-5 with bright yellow, narrow, transverse bands which are very slightly interrupted medially, tergum 6 almost as long as the base is broad, with rather fine, somewhat separated punctures which become densely crowded at tip; abdominal sterna finely, densely and distinctly punctate, the punctures becoming minute and densely crowded apically, sternum 6 quite broadly rounded.

DISTRIBUTION — According to the Catalog of Hymenoptera (1951, p. 1149) this occurs from Idaho and Wyoming, to Wisconsin, Ontario and New Brunswick. It has been collected by this writer in Colorado in July, at an elevation of 9,500 ft.

HOST — *Osmia similima*.

Table 2—Distribution of species of *Stelis* and *Heterostelis* by states.

Stelis	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
ater																											X
costalis												X							X			X				X	X
c. floridana																											X
diversicolor																					X	X					
foederalis																										X	
labiata						X	X	X							X								X				
lateralis	X	X		X			X	X		X		X		X	X		X	X				X				X	
michiganensis								X																			
nitida												X											X				
plenum (Quebec)																											
submarginata							X																				
trypetina									X										X								
vernalis								X							X								X				
Heterostelis																											
australis														X									X			X	
a. floridensis																											X
grossa																											X

Heriades Spinola

(Fig. 1)

Heriades Spinola, 1808. Insectorum Liguriae 2, p. 7. Type: *Apis truncorum* Linnaeus. Desig. by Latreille, 1810.

Trypetes Schenck, 1859. Nassau Ver. f. Naturk. Jahrb. 14, p. 32. Preocc. Type: *Apis truncorum* Linnaeus. Monob.

Neotrypetes Robertson, 1918. Ent. News 29, p. 92. Type: (*Trypetes productus* Robertson) = *Megachile variolosa* Cresson. Monob. and orig. desig.

Heriades subg. *Physostetha* Michener, 1938. Ent. Soc. Amer. Ann. 31, p. 523. Type: *Heriades carinata* Cresson. Orig. desig.

Heriades subg. *Neotrypetes* Michener, 1954. Kans. Ent. Soc. Jour. 27, p. 68. (key)

Heriades is a group of small, compact, more or less parallel-sided, black bees which are very coarsely and deeply punctate. The basal abdominal tergum is broadly concave anteriorly, the margin of this concavity

sharply carinate; the posterior face of the propodeum is perpendicular, but with a narrow, distinct, dorsal area which is deeply pitted; the metanotum forms a part of the dorsal surface of the thorax, posterior to the rounded scutellum; and the axillae are small and inconspicuous. The notaulices of the scutum are linear, and the pleura are not carinate anteriorly, but the prothoracic tubercles have distinct, transverse carinae. In the front wings both recurrent veins are received well within the base and apex of the 2nd submarginal cell, and the stigma is quite large. Arolia are present; the maxillary palpi are 3-segmented; the female mandibles are tri-dentate, those of the males bi-dentate; and the abdominal terga have distinct, white apical fasciae. In the males the apical abdominal terga are strongly flexed, the margin of tergum 7 meeting that of sternum 3, with sterna 4-8 retracted and modified.

KEY TO SPECIES

Females

1. Carinae of mandibles united basally, a slight angle at this point of union
 *carinata* Cresson
 Carinae of mandibles separate to the base 2
2. Punctures of tergum 2 noticeably finer than those of 3; wings relatively clear, darkened only in region of marginal cell *variolosa* Cresson (p. 51)
 Punctures of terga 2 and 3 not noticeably different; apical half of wings becoming rather deeply infuscated
 *leavitti* Crawford (p. 50)

Males

1. Abdominal sternum 1 truncate apically, with a robust, conical, median protuberance *carinata* Cresson
 Sternum 1 produced apically, either rounded or angulate, only very slightly protuberant 2
2. Sternum 1 angulate apically, and with a low protuberance at about a third of the median length from apex
 *variolosa* Cresson (p. 51)
 Sternum 1 more rounded apically, protuberance nearer mid point of plate
 *leavitti* Crawford (p. 50)

Heriades (Physostetha) carinata
Cresson

(Fig. 15)

Heriades carinatum Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 383. ♀ ♂.*Heriades glomerans* Schletterer, 1889. Zool. Jahrb., Abt. f. System. Geog. u. Biol. Tiere 4, p. 681. ♀.*Heriades carinatus* Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7), p. 39. (biology)

FEMALE—Length 7mm.; entirely black; face much longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus less than half as long as its greatest breadth, median portion of apical margin straight, this area bordered on each side by a distinct and more or less erect tubercle; labrum with a median, apical, more or less erect, acute tubercle; mandibles tri-dentate, middle tooth approximate to the apical tooth, outer margin with a slight, median angle where the lower mandibular carinae unite; cheeks somewhat broader than eyes; wings hyaline basally becoming lightly infuscated apically, stigma brownish, veins more testaceous; tegulae brownish, somewhat shining, very minutely and obscurely punctate; legs entirely dark, spurs pale yellowish; pubescence short, thin,

entirely pale, somewhat more dense on clypeus and along inner orbits, on cheeks below and thorax laterally and posteriorly, elsewhere exceedingly sparse, short and thin; abdominal terga 1-4 with white apical fasciae evident laterally on the more basal plates, entire on 3 and 4; discal pubescence very short, thin, sparse, barely visible except on the more apical terga; scopa pale yellowish; punctures very coarse, deep and distinct, close in general, coarsely crowded on face just below ocelli, becoming very fine and densely crowded on clypeus, coarse and close on cheeks, scutum, and over much of pleura, being somewhat more distinctly separated on mesopleura posteriorly and on scutellum; punctures very coarse and quite close on abdominal terga laterally and toward basal margin medially, 4-6 more uniformly, coarsely and very closely punctate, 6 almost rugoso-punctate.

MALE—Length 7 mm.; entirely black; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, somewhat more distant from margin of vertex; clypeus only slightly broader than its median length, somewhat swollen medially, apical margin nearly straight, slightly produced at each side; labrum with a low, median, basal protuberance; mandibles bi-dentate; cheeks somewhat narrower than eyes; wings hyaline basally, becoming rather deeply infuscated apically and in marginal cell, veins and stigma piceous; tegulae smooth and shining, nearly black; legs entirely black, spurs pale yellowish; basal abdominal sternum with a robust, median protuberance, apical margin broadly produced and truncate; sternum 2 fully exposed, somewhat swollen medially on each side, apical margin rather broadly out-curved, smooth and shining; sternum 3 largely hidden, and sterna 4-8 entirely retracted, form as shown (fig. 15); genital armature as shown; pubescence short, thin, entirely pale, somewhat more copious on lower inner orbits and clypeus, quite dense and elongate on cheeks below, and with a rather distinct, erect, whitish fringe around lateral and posterior margins of scutum and scutellum; abdominal terga 2-4 with very narrow but entire, whitish, apical fasciae, tergum 1 fasciate toward the sides; discal pubescence of terga very short, thin and sparse, apparently entirely pale; punctures coarse, close and deep in general, much finer but densely crowded below antennae and on clypeus, rather coarse on lateral faces of propodeum, posterior face shining, with scattered, irregular and much finer punctures; punctures very coarse and close over most of abdominal terga, somewhat finer and more distinctly separated on median area of

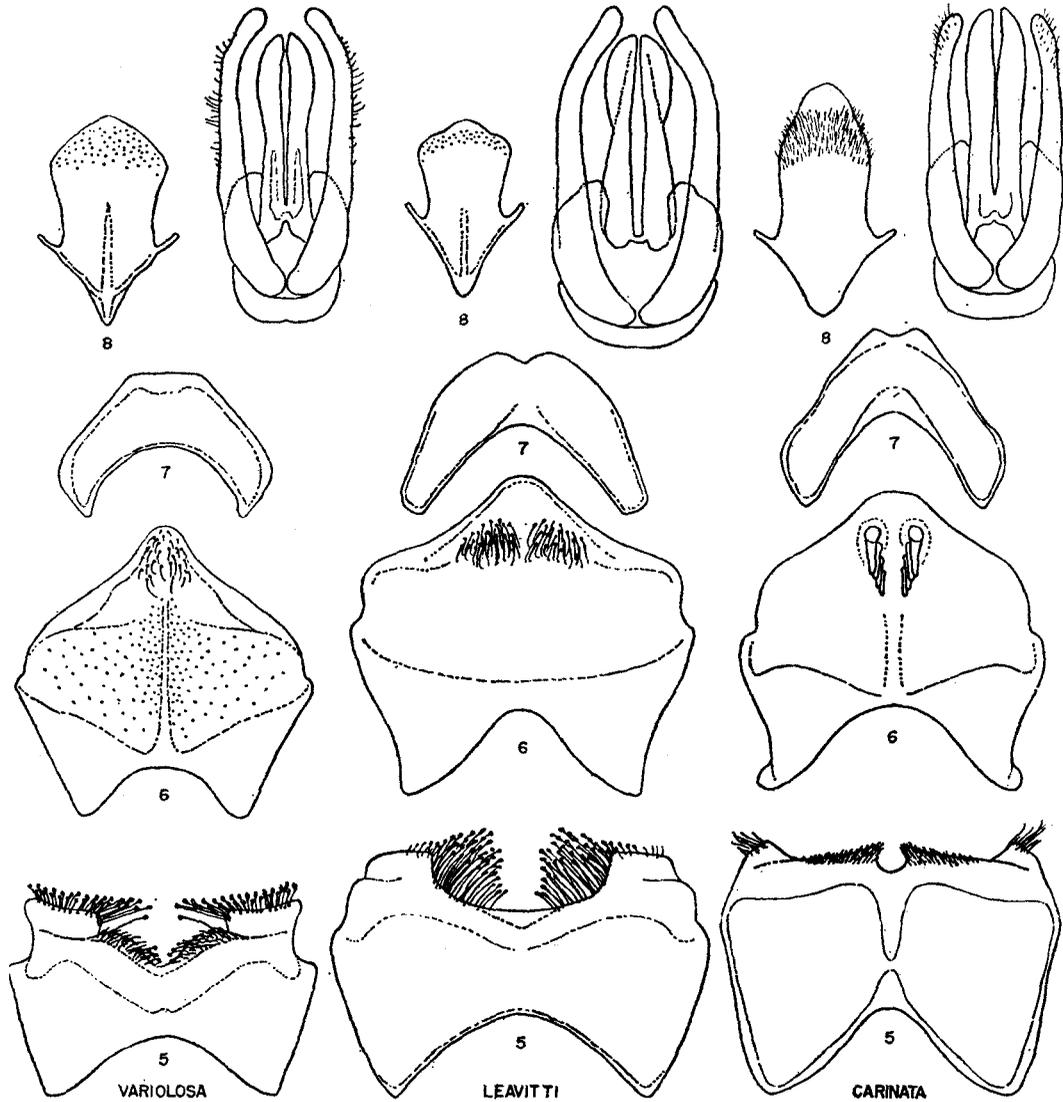


Figure 15—Genital armature and sterna 5-8 in males of *Heriades*.

2 and 3, 4 and 5 with densely crowded punctures, 5 becoming more rugose apically, 6 somewhat shining, punctures distinctly but not widely separated; sternum 2 dull, coarsely rugoso-punctate at extreme sides but becoming very finely so medially.

DISTRIBUTION — British Columbia to Maine, south to Florida, April to Aug.

FLOWER RECORDS — *Apocynum*, *Aronia*, *Asclepias*, *Erigeron*, *Fagopyrum*, *Ilex*, *Melilotus*, *Potentilla*, *Rubus*, *Senecio* and *Trifolium*.

Heriades (Neotrypetes) leavitti
Crawford
(Fig. 15)

Heriades leavitti Crawford, 1913. *Canad. Ent.* 45, p. 270. ♂.

Heriades crawfordi Graenicher, 1928. *Ent. News* 39, p. 281. ♀ ♂.

? *Neotrypetes truncatus* Robertson, 1929. *Flowers and Insects*, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 7 mm.; entirely black; face much longer than distance between eyes above; eyes very slightly convergent below;

lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; clypeus broadly convex, apical margin shallowly concave medially, minutely crenulate on each side; mandibles slightly broadened apically, with a low, subapical tooth which is considerably removed from the inner angle; cheeks subequal to eyes in width; wings hyaline basally, becoming lightly infuscated apically, veins and stigma piceous; tegulae piceous, smooth and shining; legs entirely black, spurs pale yellowish; pubescence very short and thin, entirely pale, somewhat more copious at sides of face, cheeks below, around tubercles and wing bases; abdominal terga 1-5 with narrow, entire, whitish, apical fasciae, discal pubescence hardly evident toward base, becoming somewhat more distinct toward apex; scopa entirely pale; punctures of head and thorax very coarse, close and distinct, but clypeus and face below antennae more finely rugoso-punctate, thoracic punctures more definitely separated but still very close; posterior face of propodeum sharply differentiated from the narrow, dorsal, pitted area and lateral faces by a distinct marginal carina, surface rather dull, closely but rather finely punctate; punctures of abdominal terga not quite so coarse, well separated on discs of 2-4 medially, but becoming closer and coarser toward sides, quite close over most of 5, 6 more finely and densely punctate; abdominal sterna yellowish-hyaline apically, discs closely and deeply punctate, rather finely so toward apical margin of each, those on 6 quite close and fine but distinct.

MALE—Length 7 mm.; entirely black; face much longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex, eyes, and each other; apical margin of clypeus straight, the thickened edge smooth; mandibles bi-dentate; cheeks somewhat narrower than eyes; wings hyaline basally, becoming lightly infuscated apically, veins and stigma piceous; tegulae piceous, smooth and shining, with only microscopic punctures evident; legs largely black, spurs yellowish, front femora and tibiae ferruginous along upper and anterior surfaces; abdominal sterna 1 and 2 exposed, sternum 1 produced medially nearly to margin of 2, this area rounded or obscurely angulate, with considerable short and dense pubescence at center; sterna 3-8 retracted, form as shown (fig. 15); genital armature as shown; pubescence very short, thin, entirely pale, quite dense along sides of face, on cheeks below and over lateral portions of clypeus; scutellum with a rather conspicuous, erect fringe of whitish hairs posteriorly; terga 1-4 with narrow, whitish, apical fasciae, that on 1 rather widely interrupted medially, 5 not

fasciate; punctures very coarse, close and deep over most of head and thorax, but face below antennae more finely rugoso-punctate, clypeus very finely so apically; punctures of abdominal terga not quite so coarse, very close in large part, tergum 5 and median area of 6 rather densely rugoso-punctate but these becoming more distinct laterally and toward apex.

DISTRIBUTION — Illinois to Maine and New Brunswick, south to Florida, March to October.

FLOWER RECORDS — *Anthemis*, *Bidens*, *Chrysopsis*, *Erigeron*, *Galax*, *Helennium*, *Ilex*, *Jussiaea*, *Oenothera*, *Polygonum*, *Senecio*, *Solidago* and *Stokesia*. Robertson (1929) includes a long list of plants visited by *Neotrypes truncatus* MS. This was never described, but he indicates that there was some confusion with *N. productus* (= *variolosa*) as to the identity of the females. It seems probable, therefore, that *leavitti* is the species he had before him.

Heriades (Neotrypetes) variolosa
variolosa (Cresson)

(Fig. 15)

Megachile variolosa Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 270. ♀.

Heriades odontophora Schletterer, 1889. Zool. Jahrb. Abt. f. System. Geog. u. Biol. Tiere 4, p. 679. ♀.

Heriades asteris Cockerell, 1897. Ann. Mag. Nat. Hist. (6) 20, p. 135. ♂.

Trypetes barbatus Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 171. ♂. (♀ misdet.)

Trypetes productus Robertson, 1905. Canad. Ent. 37, p. 236. ♂.

Neotrypes barbatus and *N. productus*, Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Heriades variolosus Fischer, 1955. Canad. Ent. 87, p. 33. (biology)

FEMALE—Length 6 mm.; entirely black; face much longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, somewhat more widely removed from each other; clypeus almost flat, median third of apical margin rather strongly concave or shallowly emarginate, with a low tubercle on each side of this area; mandible with a low, subapical, inner tooth which is considerably removed from inner angle; cheeks much narrower than eyes; wings subhyaline, only very faintly dusky toward marginal cell, veins and stigma piceous; tegulae piceous, smooth and shining; legs entirely black, spurs pale yellow; pubescence very short, thin, en-

tirely pale, somewhat more copious along inner margin of eyes, on cheeks below, on tubercles, behind wing bases, and an erect, posterior fringe around scutellum; terga 1-6 with narrow, entire, whitish, apical fasciae, discal pubescence hardly evident, but becoming somewhat more definite toward the apex; scopa entirely white; punctures very coarse, close and deep over entire head and thorax, but face below antennae more irregularly and finely rugoso-punctate; posterior face of propodeum below the narrow, pitted, upper margin somewhat smooth and shining, with scattered, shallow punctures; punctures of abdominal terga 1 and 2 rather fine but quite close medially, becoming coarse and close laterally, those on 3 conspicuously coarser and quite close, those 4 and 5 not quite so coarse but very close, 6 rather finely rugoso-punctate.

MALE—Length 5 mm.; entirely black; face much longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, much more widely removed from each other; surface of clypeus obscured by a dense brush of elongate, white pubescence, apical margin about straight; mandibles bi-dentate; cheeks about half width of eyes; wings hyaline basally, becoming very faintly smoky apically, veins and stigma more brownish-testaceous; tegulae brownish-piceous, smooth and shining; legs largely black, but front femora and tibiae more or less ferruginous on upper and anterior faces; spurs pale yellow; sternum 1 somewhat swollen, strongly produced apically, acutely pointed medially, without pubescence; sterna 3-8 retracted, form as shown (fig. 15); genital armature as shown; pubescence short, thin, entirely pale, short and dense along lower inner orbits between eyes and clypeus, very dense and elongate on clypeus; terga 1-4 with narrow, whitish, apical fasciae, discal pubescence hardly evident on the more basal terga, but becoming rather dense but still very thin on terga 4-6; punctures very coarse, close and deep over most of head and thorax, becoming finer, dense and irregular below antennae; posterior face of propodeum, below the carinate upper margin, smooth and shining, with scattered, irregular punctures; abdominal terga 1 and 2 rather finely but closely punctate medially, becoming coarsely so toward sides, 3 and 4 conspicuously more coarsely punctate, punctures becoming closely crowded on 4-6.

DISTRIBUTION — British Columbia to Maine, south to Texas and Florida, March to October.

FLOWER RECORDS — *Apocynum*, *Berteroa*, *Brassica*, *Ceanothus*, *Coreopsis*, *Sen-*

ecio, *Solidago* and *Toxicodendron*. Robertson (1929) records this species (as *Neotrypes barbatus* and *N. productus*) on the following additional genera: *Asclepias*, *Aster*, *Bidens*, *Blephilia*, *Erigeron*, *Houstonia*, *Parthenium* and *Trifolium*.

The occurrence of another form of *variolosa* in Mexico and southern Texas makes the subspecific designation of this typical form necessary.

Prochelostoma Robertson

(Fig. 1)

Prochelostoma Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 167. Type: *Heriades philadelphia* Robertson. Monob. and orig. desig. *Prochelostoma* Michener, 1938. Ent. News 69, p. 131.

The single species in this genus is a small, narrow and elongate, rather finely punctured, black bee. The basal abdominal tergum is sulcate anteriorly; the posterior face of the propodeum is sloping, the dorsal area coarsely reticulate and forming a part of the dorsal surface of the thorax, with the metanotum also dorsal, just posterior to the rounded scutellum. The axillae are small and poorly differentiated from the lateral margins of the scutellum; the notaulices are linear; neither the pleura nor the tubercles are carinate; arolia are present; and the front wings have a large stigma, with both recurrent veins received well within the base and apex of the 2nd submarginal cell. The maxillary palpi are 4-segmented; the female mandibles are tri-dentate, those of the males bi-dentate; and the abdominal terga are not fasciate. Tergum 7 of the male is conspicuously bi-dentate apically, and sterna 5-7 are retracted.

Prochelostoma philadelphia (Robertson)

(Fig. 16)

Heriades philadelphia Robertson, 1891. Amer. Ent. Soc. Trans. 18, p. 64. ♀ ♂.
Prochelostoma philadelphia Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 167.
Prochelostoma philadelphia Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Prochelostoma philadelphia Krombein, 1959. Ent. News 70 (5), p. 135. (biology)

FEMALE—Length 8 mm.; entirely black; face much longer than distance between eyes;

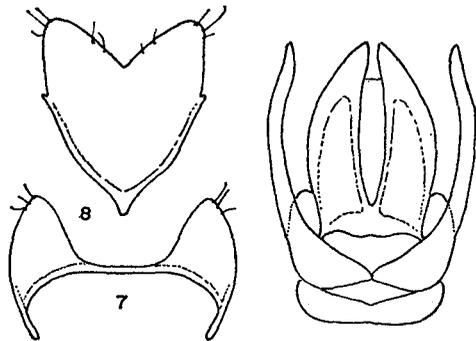


Figure 16
Genital armature and sterna 7 and 8 in males
of *Prochelostoma philadelphia*.

eyes subparallel; lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; clypeus fully twice as broad as its median length, somewhat sloping medially, margin slightly protuberant at each extreme side; mandibles narrow and elongate, 3-dentate, with a narrow, median, apical protuberance; wings subhyaline basally, becoming lightly infuscated apically, stigma piceous, veins more brownish-testaceous; tegulae smooth and shining, testaceous-hyaline; legs entirely black, basitarsi slender, spurs testaceous; pubescence uniformly very short and thin, entirely pale, scopa yellowish-white; punctures rather fine but deep and distinct, quite close over most of head and on scutum anteriorly, becoming somewhat more widely separated on scutum posteriorly and on scutellum, well separated but hardly sparse on pleura, close and rather coarse on the more basal, abdominal terga, well separated medially but close laterally on terga 2-4, much finer and quite close on 5 and 6, apical margins not appreciably depressed and only very narrowly impunctate and somewhat yellowish; abdominal sterna quite coarsely and closely punctate beneath the scopal hairs, apical margins yellowish-hyaline.

MALE—Length 6-7 mm.; entirely black; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other and to margin of vertex; median length of clypeus somewhat greater than half the maximum width, somewhat thickened apically, margin above this gently bowed; labrum only slightly longer than broad, apical margin not protuberant; mandibles slender but rather short, bi-dentate; cheeks subequal to eyes in width; wings subhyaline basally, becoming lightly infuscated apically, stigma piceous, veins more brownish-testaceous to piceous; tegulae smooth and shin-

ing, testaceous-hyaline; legs entirely black, spurs brownish-testaceous; apex of abdomen curved ventrally, tergum 7 triangularly emarginate medially between a pair of triangular projections, lateral margins obtusely angulate; sterna 1-4 exposed, black, surface shining between rather coarse but shallow punctures, 2 and 3 somewhat swollen across center, apical margins depressed, yellowish-hyaline, 4 with a broadly V-shaped thickening beyond which the margin is testaceous-hyaline, 5-8 retracted, 5 transverse, apical margin broadly yellowish-hyaline and slightly incurved, 6 broadly outcurved, the margin more narrowly yellowish-hyaline, 7 and 8 retracted, as shown (fig. 16); genital armature as shown.

DISTRIBUTION — Illinois and Michigan to Connecticut, south to Georgia, March to July.

FLOWER RECORDS — *Ilex*, *Philadelphus* and *Rubus*. Robertson (1929) records this species on the following additional genera: *Capsella*, *Crataegus*, *Ellisia*, *Geranium* and *Hydrophyllum*.

Ashmeadiella Cockerell

(Fig. 1)

Ashmeadiella Cockerell, 1897. Ent. News 8, p. 197. Type: *Heriades opuntiae* Cockerell. Orig. desig.

Titusella Cockerell, 1906. Amer. Mus. Nat. Hist. Bul. 22, p. 445. Type: *Titusella pronitens* Cockerell. Monob.

Ashmeadiella Michener, 1936. Amer. Mus. Novitates 875, pp. 1-16.

Ashmeadiella subg. *Arogochila* Michener, 1939. Amer. Midland Nat. 22, p. 58. Type: *Ashmeadiella timberlakei* Michener. Orig. desig.

Only two species of *Ashmeadiella* have been recorded in the Eastern United States, but it is represented in the west by nearly 50 species, in 6 subgenera.

The basal abdominal tergum is concave anteriorly but the margin is not carinate; the posterior face of the propodeum is perpendicular, its dorsal margin more sloping, narrowly pitted, with the metanotum posterior to the rounded scutellum. The axillae are very small, not at all protuberant; the notaulices of the scutum are linear; the pleura have an anterior, relatively smooth face which is demarked from the lateral surface by a low carina; and the tubercles are small, with a low, inconspicuous carina. In the front wings both recurrent veins are received well within the base and apex

of the 2nd submarginal cell, and the stigma is large. Arolia are present; the maxillary palpi are 4-segmented; and the abdominal terga have conspicuous, entire, apical, pale fasciae. In the males, tergum 6 is conspicuously quadri-dentate, tergum 7 very short, transverse, largely hidden; and sterna 5-8 are retracted and more or less markedly modified.

KEY TO SPECIES

Males and Females

1. Lateral ocelli much nearer to eyes than to edge of vertex, the vertex and cheeks broad *bucconis* Say
- Lateral ocelli subequally distant from eyes and edge of vertex, the vertex and cheeks narrow
..... *floridana* Robertson (p. 55)

Ashmeadiella (Ashmeadiella) bucconis bucconis (Say)

(Fig. 17)

Osmia bucconis Say, 1837. Boston Jour. Nat. Hist. 1, p. 400. ♀ ♂.

Megachile osmioides Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 267. ♀ ♂.

Ashmeadiella bucconis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

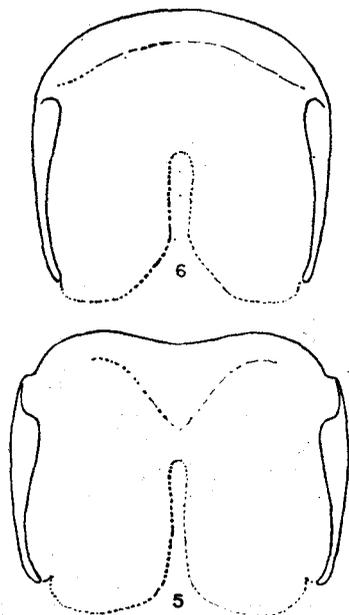


Figure 17

Sterna 5 and 6 in males of *Ashmeadiella bucconis*.

FEMALE—Length 8-9 mm.; entirely black; face much longer than distance between eyes; eyes subparallel; space between lateral ocelli and margin of vertex about twice that between ocelli and eyes, the inter-ocellar space shorter; clypeus very slightly convex, its breadth fully twice the median length, apical margin somewhat produced medially, this area nearly straight; labrum broadly rounded apically, basal area slightly concave, median length slightly greater than basal width; mandibles somewhat broadened apically, distinctly tri-dentate; cheeks slightly broader than eyes; wings subhyaline, veins and stigma piceous; tegulae dark, smooth and shining; legs entirely dark, hind coxae somewhat swollen, and hind femora somewhat swollen medially; front spurs yellowish, mid and hind spurs piceous to black; pubescence entirely pale, very short and thin, somewhat more copious and elongate between antennae and along lower inner orbits, the pleura and propodeum margined with lines of denser and more elongate pubescence, posterior face of propodeum and scutellum posteriorly with rather elongate but sparse, whitish hairs; terga 1-4 with narrow, white, apical fasciae, discal pubescence hardly evident, but becoming more definite on 5 and 6, 6 with a quite dense, apical, more yellowish fringe, scopa yellowish, quite dense; punctures coarse, deep and distinct over most of body, close on face below ocelli, cheeks, and on thorax laterally, rather sparse on vertex posterior to ocelli, very coarse and quite close on scutum and scutellum; abdominal terga shining between deep and distinct punctures, these well separated and somewhat finer on the more basal terga medially, becoming somewhat coarser laterally, uniformly rather coarse and close on tergum 5, crowded on 6, sterna with coarse, densely crowded punctures beneath the scopal hairs.

MALE—Length 7 mm.; entirely black; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli sub-equally distant from eyes and each other, widely removed from margin of vertex; median length of clypeus about half the breadth, slightly convex, apical margin nearly straight; labrum little if any longer than basal width, rounded apically; mandibles bi-dentate; cheeks slightly narrower than eyes; wings subhyaline, veins and stigma brownish; tegulae brownish-hyaline, smooth and shining; legs entirely dark, hind coxae somewhat swollen, hind femora only slightly so, front spurs pale yellowish, middle pair more testaceous, hind spurs brownish-testaceous; tergum 6 conspicuously quadri-dentate, median teeth narrowly rounded or subtruncate apically, lateral teeth triangularly acute;

tergum 7 very short, transverse, apical margin nearly straight; sterna 1-4 exposed, black, 5 and 6 as shown (fig. 17); genital armature and sterna 7 and 8 similar to *floridana* (fig. 18); pubescence entirely pale, rather loose and thin in general, but quite copious and elongate around antennae and lower part of face, on cheeks below, pronotum laterally, scutellum posteriorly, along each margin of mesopleura, and along lateral margins of posterior face of propodeum; terga 1-4 with dense, white, apical fasciae, these somewhat narrower medially, becoming more dense and conspicuous laterally, 5 not definitely fasciate, discal pubescence very short, thin and inconspicuous, barely visible, entirely pale; sterna 2 and 3 fringed apically with long, whitish pubescence; punctures coarse, deep and distinct, quite close in general, but somewhat more widely separated on vertex medially, on scutum near median part of disc posteriorly, and on scutellum, with an area on lower part of pleura where they are more definitely separated; tergum 1 closely and coarsely punctate, 2 and 3 with somewhat finer and more widely separated punctures medially, these becoming quite coarse, deep and close laterally, 4-6 closely, deeply and rather coarsely punctate throughout; exposed sterna closely, deeply and coarsely punctate.

DISTRIBUTION — This species is chiefly western, but has been collected in Wisconsin, Illinois and Georgia, in May and August.

FLOWER RECORD — *Helianthus*. Robertson (1929) records *bucconis* on the following genera: *Brauneria*, *Coreopsis*, *Solidago*, *Verbena* and *Verbesina*.

Another subspecies, *denticulata* Cresson, is western in distribution.

***Ashmeadiella (Ashmeadiella) floridana* (Robertson)**

(Fig. 18)

Heriades floridanus Robertson, 1897. Acad. Sci. St. Louis Trans. 7, p. 348. ♀.

FEMALE—Length 7-8 mm.; entirely black; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and each other, slightly more removed from margin of vertex; clypeus slightly convex, about a third broader than median length, apical margin outcurved on each side, median third slightly incurved; labrum nearly as broad as long, broadly rounded apically; mandibles somewhat broadened apically, distinctly 3-dentate, median tooth very slightly nearer apex than to inner angle; cheeks somewhat narrower than eyes; wings subhyaline, veins and stigma brownish-testa-

ceous; tegulae fuscous, smooth and shining; legs entirely black, spurs on front legs yellowish-hyaline, middle pair more testaceous, hind spurs fuscous; pubescence quite short, entirely pale, rather dense around antennae and along inner orbits, cheeks below, anterior and posterior margins of mesopleura, and lateral areas of propodeum, with a fringe around posterior margin of the scutellum; abdominal terga 1-4 with rather narrow, whitish, apical fasciae, these somewhat narrowed medially, becoming very dense and somewhat broader laterally, discal pubescence very short, thin and entirely pale; tergum 5 fringed with a single row of whitish hairs; scopa entirely pale; punctures quite coarse, close and deep, but slightly separated on vertex, closer on face below, rather fine and densely crowded on supraclypeal area, the clypeus more rugosopunctate, coarsely so above, becoming very finely so toward apical margin; punctures only slightly separated on scutum and scutellum, surface shining, almost crowded on pleura, very fine and close on lateral surfaces of propodeum, the posterior face polished and largely impunctate; punctures rather fine and well separated on the more basal abdominal terga medially, becoming coarse and close laterally, and quite coarse and uniformly close on 4 and 5, 6 coarsely rugosopunctate.

MALE—Length 6-7 mm.; entirely black; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and each other,

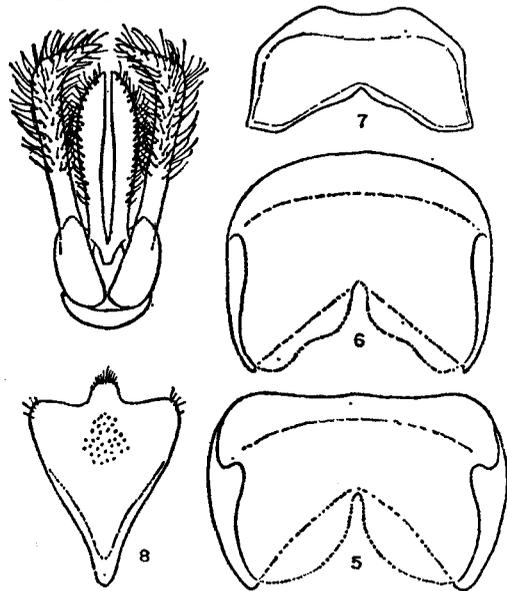


Figure 18
Genital armature and sterna 5-8 in males of *Ashmeadiella floridana*.

slightly more distant from margin of vertex; clypeus slightly convex, apical margin very slightly outcurved, with a slight, median emargination; basal width of labrum subequal to its median length, broadly rounded apically; mandibles rather slender, bi-dentate; wings hyaline, veins and stigma brownish-testaceous; tegulae dark, smooth and shining; legs entirely black, basitarsi slender and rather short, front spurs yellowish, middle spurs brownish-testaceous, hind spurs blackish or piceous; tergum 6 conspicuously quadri-dentate apically, teeth about equally spaced, middle pair rather broadly truncate, lateral teeth triangularly acute; sterna 1-4 exposed, black, 5-8 retracted, form as shown (fig. 18); genital armature as shown; pubescence entirely pale, rather short, copious around and below antennae, on cheeks below and on anterior and posterior margins of mesopleura, with a long dense fringe on scutellum posteriorly; terga 1-4 with narrow, white, apical fasciae, these much more dense toward sides on the more basal terga; punctures rather coarse, close and deep in general, somewhat more distinctly separated on vertex and around ocelli, on cheeks above and on scutum medially, rather fine on the more basal terga medially but becoming close and somewhat coarser laterally, entirely close and coarse on terga 5 and 6.

DISTRIBUTION — North Carolina to Florida, April to July.

FLOWER RECORD — *Lupinus*.

Hoplitis Klug

(Fig. 1)

- Hoplitis* Klug, 1807. Mag. Insectenk. 6, p. 225. Type: *Apis adunca* Panzer. Monob.
Osmia subg. *Ctenosmia* Thomson, 1872. Hym. Scand. 2, p. 233. Type: *Apis adunca* Panzer. Desig. by Michener, 1941.
Andronicus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 384. Type: *Andronicus cylindricus* Cresson, Monob.
Alcidamea Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 385. Type: *Alcidamea producta* Cresson. Desig. by Michener, 1941.
Monumetha Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 387. Type: (*Monumetha argentifrons* Cresson) = *Chelostoma albifrons* Kirby. Desig. by Titus, 1904.
Robertsonella Titus, 1904. N. Y. Ent. Soc. Jour. 12, p. 22. Type: *Robertsonella gleasoni* Titus.
Hoplitella Cockerell, 1910. Canad. Ent. 42, p. 169. Preocc. Type: (*Hoplitella pentamera* Cockerell) = *Ashmeadiella howardi* Cockerell. Monob.
Hoplitina Cockerell, 1913. Canad. Ent. 45, p. 34. (new name)

Formicapis Sladen, 1916. Canad. Ent. 48, p. 271. Type: *Formicapis clypeata* Sladen. Monob.

Autochelostoma Sladen, 1916. Canad. Ent. 48, p. 270. Type: (*Autochelostoma canadensis* Sladen) = *Alcadamea producta* Cresson. Monob.

Chlorosmia Sladen, 1916. Canad. Ent. 48, p. 270. Type: *Osmia fulgida* Cresson. Monob.

Chlorosmia Michener, 1936. Amer. Mus. Novitates 875, p. 29, (key)

Formicapis Michener, 1938. Ent. News 49, p. 129.

Robertsonella Michener, 1938. Ent. News 49, p. 130.

Hoplitis Michener, 1947. Amer. Mus. Nat. Hist. Bul. 89, pp. 261-317. (revision)

Hoplitis Hurd and Michener, 1955. Calif. Ins. Surv. 3, pp. 44-94. (Calif. spp.)

Hoplitis is a genus of rather small, slender and parallel-sided species of bees, usually entirely black in color, although a few metallic species are found in the West. Characters common to both sexes are as follows: Basal abdominal tergum sulcate anteriorly; posterior face of propodeum sloping, without a dorsal pitted area, the metanotum partially forming the dorsal surface of the thorax posterior to the rounded scutellum; axillae very small and inconspicuous, not at all protuberant; notaulices of scutum linear; pleura and tubercles not carinate; recurrent veins usually received well within base and apex of 2nd submarginal cell, the stigma large; arolia present; maxillary palpi usually 5-segmented. In the females the mandibles are either tri- or quadri-dentate, but are bi-dentate in all males. The abdominal sterna in the males are variously modified, 6-8 usually retracted.

KEY TO SPECIES

Females

1. Clypeus modified, with a conspicuous, median, erect, apical tubercle
 (*Formicapis*) *clypeata* Sladen (p. 57)
 Clypeus little if any modified, apical margin relatively straight 2
2. Mandibles 4-dentate 3
 Mandibles 3-dentate 4
3. Pleura, legs and abdominal terga 4-6 black pubescent
 (*Monumetha*) *albifrons* Kirby (p. 58)
 Abdominal terga, legs and pleura white pubescent
 (*Andronicus*) *cylindrica* Cresson (p. 59)
 spolicta
- 4.(2). Clypeus very finely and densely ru-

- gose, without distinct punctures (*Robertsonella*) 5
- Clypeus with distinct, though possibly closely crowded punctures (*Alcidamea*) 7
- 5. Punctures of abdominal terga 1 and 2 usually quite coarse and close *gleasoni* Titus (p. 65)
- Terga 1 and 2 very sparsely and minutely punctate 6
- 6. Scutum shining, punctures well separated between notaulices and tegulae *micheneri* new species (p. 64)
- Scutum rather dull, punctures close, almost crowded, between notaulices and tegulae *simplex* Cresson (p. 66)
- 7(4). Punctures of clypeus densely crowded, usually with a slightly elevated, median ridge *truncata* Cresson (p. 63)
- Punctures of clypeus more distinctly separated, with no median ridge 8
- 8. Puncturation fine, especially on basal abdominal tergum which is polished and rather sparsely punctate *producta* Cresson (p. 62)
- Puncturation coarser; basal tergum with rather coarse and close punctures *pilosifrons* Cresson (p. 61)

Males

- 1. Abdominal tergum 7 undulate apically, having a median and a pair of lateral, shallow emarginations *(Formicapis) clypeata* Sladen
- Tergum 7 either rounded, truncate or acute apically 2
- 2. Tergum 7 narrow, medially acute, its median length fully equal to basal width (*Alcidamea*) 3
- Tergum 7 broadly rounded or truncate apically, usually quite short 4
- 3. Protuberance of second sternum conical, acute *producta* Cresson (p. 62)
- Protuberance of second sternum transverse, rounded, less conical *pilosifrons* Cresson (p. 61)
- 4(2). Small (8 mm. or less); antennae filiform, median segments narrow and elongate (*Robertsonella*) 5
- Larger (9 mm. or more); antennae modified, median segments not much longer than broad 7
- 5. Clypeal pubescence very short, and appressed, punctures beneath fine; mandibular fringe long and dense; sternum 3 with a shallow median emargination which is fringed with short hairs *gleasoni* Titus (p. 65)

- Clypeal pubescence elongate, more or less erect; mandibular fringe short and thin; sternum 3 variable 6
- 6. Apical margin of sternum 3 nearly straight, emargination very obscure; small (6 mm.) *simplex* Cresson (p. 66)
- Sternum 3 with a narrow and very deep median emargination which is occupied by a dense fringe of pale hairs; larger (8 mm.) *micheneri* new species (p. 64)
- 7(4). Segments 3-5 of flagellum very short and broadly dilated, much broader than the other segments *(Andronicus) cylindrica* Cresson (p. 59)
- Segments 3-5 of flagellum little if any broader than long, not noticeably dilated 8
- 8. Subapical segments of flagellum much shorter, broader than long; clypeus densely pubescent *(Alcidamea) truncata* Cresson (p. 63)
- Subapical antennal segments not noticeably shortened; clypeus largely bare, or with appressed pale tomentum *(Monumetha) albifrons* Kirby (p. 58)

Hoplitis (Formicapis) clypeata
(Sladen)

(Figs. 19 & 20)

Formicapis clypeata Sladen, 1916. *Canad. Ent.* 48, p. 271. ♀.

Hoplitis (Formicapis) clypeata Hurd and Michener, 1955. *Calif. Ins. Surv.* 3, p. 54.

FEMALE—Length 7 mm.; entirely black; length of face about equal to distance between eyes; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex, much nearer to each other; clypeus very short

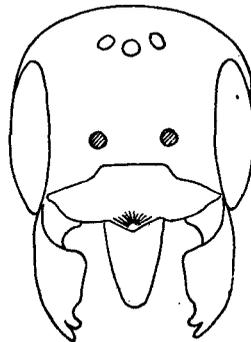


Figure 19
Facial view of head in female of *Hoplitis clypeata*.

and broad, median length hardly more than half the breadth, with a median, apical, triangularly acute and upturned tubercle, slightly emarginate on each side of this (fig. 19); mandibles robust, broadly expanded apically, with a subapical inner tooth which is widely removed from inner, rounded angle; cheeks nearly twice as broad as eyes; wings very faintly infuscated, stigma brownish, veins more brownish-testaceous; 1st recurrent vein interstitial with 1st transverse cubitus; tegulae piceous, smooth and shining; legs entirely black, spurs pale yellow; pubescence entirely pale, elongate but rather thin over most of head and thorax, rather copious on vertex and across face just above antennae, thin and elongate over most of thorax, entirely pale on legs; abdominal terga 1-4 with narrow, whitish, apical fasciae, this widely interrupted on 1, discal pubescence hardly evident but becoming more definite on 4 and 5, 6 with a quite dense covering of subappressed, whitish tomentum; scopa yellowish-white; punctures quite deep and distinct over most of head and thorax, quite close across upper part of face between antennae and ocelli, but more sparse and fine below and on clypeus, rather sparse on cheeks below but quite close above and on vertex, rather well separated but not sparse on the shining scutum, somewhat closer on scutellum, those of pleura about as on scutum; posterior face of propodeum dull and rather densely tessellate, punctures hardly evident; abdominal terga shining, punctures minute and rather widely separated, becoming somewhat closer on the more apical segments, sterna closely and finely punctate beneath the scopal hairs.

MALE—Length 8 mm.; entirely black; face considerably longer than distance between eyes above; eyes slightly convergent below; antennal scape rather short, only slightly broader than flagellum, pedicel entirely exposed, segments of flagellum of uniform width, only slightly longer than broad; lateral ocelli considerably nearer each other than to eyes, subequally distant from margin of vertex and each other; clypeus quite flat, rather densely pubescent, apical margin considerably produced but relatively straight, finely crenulate; mandibles bi-dentate; cheeks broader than eyes; wings subhyaline basally, becoming faintly infuscated toward apex, veins and stigma brownish-piceous, 1st recurrent vein entering 1st submarginal cell; tegulae shining, brownish-piceous, punctures exceedingly minute, hardly evident; legs entirely black, spurs yellow; apical half of abdominal tergum 7 exposed, the margin undulate, with a median and a pair of lateral, shallow emarginations (fig. 20); sternum 1 truncate apically, 2 quite

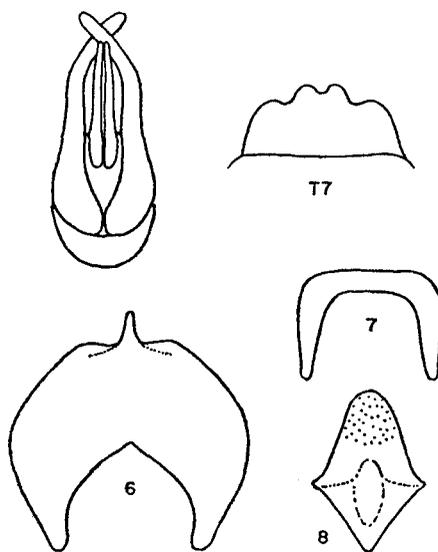


Figure 20
Genital armature, sterna 6-8, and tergum 7 in males of *Hoplitis clypeata*.

expansive, broadly rounded apically, 3-5 unmodified, largely exposed, 6-8 retracted, form as shown (fig. 20); genital armature as shown; pubescence entirely pale, rather elongate and copious over most of head and thorax; punctures quite deep and distinct over most of head and thorax, close in general, becoming rather coarse on vertex and dorsum of thorax, fine and close on cheeks, finer and densely crowded on clypeus, close but rather shallow on pleura, indistinct on propodeum; abdominal terga somewhat shining, punctures minute and well separated medially, becoming close laterally.

DISTRIBUTION — California to Alaska, east to Quebec.

Although this has not been recorded in any of the eastern states, its occurrence in Quebec suggests the possibility that it will be found in some of the bordering states.

Hoplitis (Monumetha) albifrons
albifrons (Kirby)

(Figs. 23 & 24)

Chelostoma albifrons Kirby, 1837. In Richardson, Fauna Bor.-Amer., 4, p. 270. ♂.

Monumetha borealis Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 388. ♀

Monumetha obsoleta Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 388. ♂.

Megachile oblonga Provancher, 1882. Nat. Canad. 13, p. 230. ♀.

Hoplitis (Monumetha) albifrons albifrons Michener, 1947. Evolution 1, p. 172.

FEMALE—Length 11-13 mm.; entirely black; face much longer than distance between eyes; eyes subparallel; lateral ocelli nearer each other than to eyes, and much nearer eyes than to margin of vertex; clypeus broadly convex, apical margin quite strongly outcurved, but median third or fourth narrowly produced and very slightly incurved, the margin of this area polished and impunctate; mandibles broad apically, 4-dentate; width of cheeks about twice that of eyes; wings subhyaline basally, becoming lightly infuscated apically, veins and stigma piceous; tegulae brownish-piceous, smooth and shining; legs entirely black, front spurs hyaline in part, mid and hind spurs black; pubescence rather thin but somewhat elongate, rather copious and pale around antennae, becoming somewhat blackish on vertex and clypeus, cheeks below, on pleura and over most of legs; pubescence largely pale on scutum, scutellum and posterior face of propodeum; abdominal tergum 1 largely pale pubescent, 2 pale pubescent in part, 3-6 largely black pubescent, 1 and 2 subfasciate apically toward sides; scopa entirely blackish; punctures fine and rather close over most of head and thorax, becoming somewhat more widely separated on vertex medially and on scutum posteriorly; abdominal terga shining, punctures minute and widely separated medially, interspaces being many times diameter of punctures, these becoming much closer toward the extreme lateral margins, tergum 5 more closely punctate, 6 with fine, crowded punctures, with a narrow, rounded, apical lip; sternum 6 triangularly pointed medially.

MALE—Length 9 mm.; entirely black; face nearly twice as long as distance between eyes; eyes subparallel; lateral ocelli slightly nearer eyes than to each other, slightly nearer each other than to margin of vertex; median segments of flagellum about as broad as long, apical segment more elongate, tapering apically (fig. 23); clypeus only slightly convex, broadly produced apically, nearly as long as the greatest breadth, apical margin nearly straight; mandibles bi-dentate; cheeks somewhat broader than eyes; wings hyaline at extreme base, becoming lightly infuscated apically, veins and stigma piceous; tegulae piceous, smooth and shining, with scattered, minute puncture evident; legs entirely black, anterior spurs more yellowish-hyaline, mid and hind spurs piceous or black; tergum 7 much broader than long, rather broadly rounded apically, with a submedian, depressed area; sterna 1-5 exposed, smooth and shining in large part, 1 and 2 each with a median, apical, spine-like projection, with only a few scattered punctures, 6-8 retracted, form as shown

(fig. 24); genital armature as shown; pubescence of head and thorax largely pale, rather thin but somewhat elongate, subappressed between antennae and eyes, clypeus with dense, appressed tomentum; legs with short, black pubescence except for the pale posterior fringe on front tarsi; abdomen not fasciate, discal pubescence of the terga extremely short, thin and inconspicuous, tergum 6 sometimes obscurely fasciate apically.

DISTRIBUTION—British Columbia to Maine and Nova Scotia, north to Hudson Bay and Alaska, May to August.

FLOWER RECORD — *Phacelia*.

There are two additional forms of *albifrons* occurring in the West, *argentifrons* (Cresson) and *maura* (Cresson)

Hoplitis (Andronicus) cylindrica (Cresson)

(Figs. 21-23)

Andronicus cylindricus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 384. ♂.

Osmia spoliata Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 327. ♀.

Hoplitis monardae Cockerell, 1914. Ann. Mag. Nat. Hist. (8) 14, p. 363. ♀.

Hoplitis hicksi Cockerell, 1932. Brooklyn Ent. Soc. Bul. 27, p. 203. ♀.

Hoplitis cylindricus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records).

FEMALE—Length 10-12 mm.; entirely black; face slightly longer than distance between eyes above; eyes very slightly converging below; lateral ocelli very slightly nearer each other than to eyes, much more widely removed from margin of vertex; clypeus broadly and slightly convex, apical margin considerably produced, median half nearly straight, with a rather narrow, shining, impunctate area; mandibles broadened apically, quadri-dentate, but third tooth often very low and inconspicuous (fig. 22); cheeks very much broader than eyes; wings subhyaline basally, becoming faintly infuscated toward apex, veins and stigma piceous; tegulae black, shining, with scattered, deep and quite distinct but rather fine punctures; legs entirely black, front spurs testaceous, mid and hind spurs black; pubescence entirely pale, rather thin but quite copious around antennae and over lower portions of face, on cheeks and on thorax laterally; abdominal terga 1-4 and sometimes 5 with white, apical fasciae, these more or less interrupted on the more basal terga, discal pubescence very short and thin, entirely pale, becoming more evident on the more apical terga quite dense on tergum 6;

scopa entirely whitish; punctures deep and distinct, but rather fine and close in general, somewhat more distinctly separated on vertex medially, rather sparse and irregular in center of scutum toward posterior margin; scutum and scutellum shining, the pleura and propodeum dull and tessellate, pleura very closely punctate, the propodeum velvety, its posterior face completely devoid of punctures, dorsal area with a few faint, short striations just beneath metanotum; abdominal terga somewhat shining, but punctures quite close in general, slightly separated medially on terga 1-4, becoming almost crowded laterally and on terga 5 and 6, apical margins of the terga slightly depressed, that on 1 narrowly impunctate, but with very minute and close punctures on the others.

MALE—Length 9-12 mm.; entirely black; face slightly longer than distance between eyes above; eyes very slightly convergent below; antennal scape quite broadly dilated apically, partially enclosing pedicel, segments 3-5 of flagellum dilated, considerably broader than long, segments 8-11 elongated and quite narrow (fig. 23); lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus very slightly convex, densely long pubescent, apical margin considerably produced but relatively straight, with a narrow, shining, impunctate area; mandibles bidentate; cheeks only slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated toward apex, veins and stigma brownish-piceous; tegulae shining, brownish-piceous, with scattered, fine punctures; legs entirely black, front spurs pale testaceous, mid and hind spurs brownish-piceous, middle pair very much reduced; abdominal tergum 7 fully exposed, broadly rounded apically, somewhat impressed just before the margin, median portion thickened, its edge shining and impunctate; sternum 1 triangularly pointed apically, 2 quite expansive, with a subapical, semicircular ridge beyond which

the margin is testaceous-hyaline and with a median, broad, whitish fringe; sternum 3 quite expansive, apical margin produced to cover median area of 4, lateral areas of 4 exposed, the margin slightly incurved; apical margin of sternum 5 straight, with a median, apically directed fringe of long hairs and a subapical broader fringe of ventrally directed hairs; sterna 6-8 retracted, form as shown (fig. 21); genital armature as shown; pubescence entirely pale, rather elongate and copious over most of head and thorax, but becoming very thin on propodeum, both laterally and posteriorly, quite elongate on front and mid femora, forming rather copious, posteriorly directed fringes; abdominal terga 1-4 white fasciate apically, at least in part, the fasciae more or less widely interrupted on terga 1-2, entire on 3 and 4, and sometimes evident on 5, discal pubescence rather long and copious on 1 and 2, short and inconspicuous but evident on remaining terga; punctures fine and close over most of head and thorax, being more distinct on shining surfaces of vertex and dorsum of thorax, pleura and propodeum dull and densely tessellate, punctures extremely close, minute on pleura, very shallow and obscure on propodeum; abdominal terga somewhat shining, punctures slightly separated medially on terga 1-7, becoming closely crowded laterally, tergum 7 shining and with an area of rather sparse, irregular punctures medially.

DISTRIBUTION — British Columbia to Quebec and Maine, South to Texas and Florida, April to August.

FLOWER RECORDS — *Rubus*, *Senecio* and *Specularia*. Robertson (1929) records this species on *Amorpha*, *Blephilia*, *Celastrus*, *Dianthera*, *Hydrophyllum*, *Labelia*, *Petalostemum*, *Trifolium*, *Verbena* and *Veronica*.

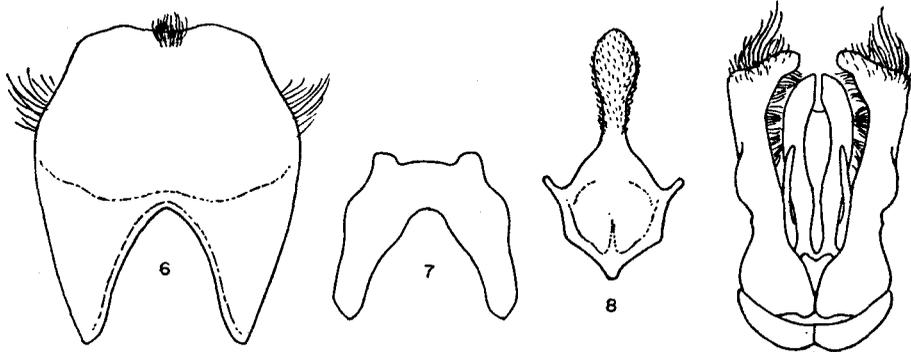


Figure 21—Genital armature and sterna 6-8 in male of *Hoplitis cylindrica*.

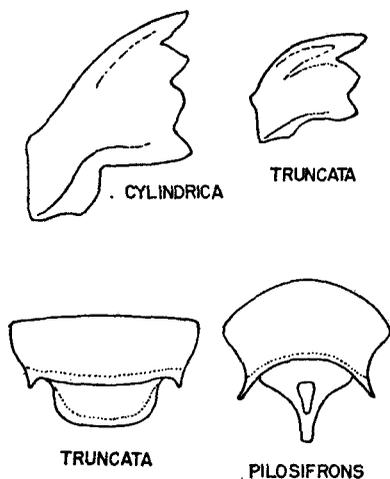


Figure 22

Mandibles in females and tergum 7 in males of *Hoplitis*.

Hoplitis (Alcidamea) pilosifrons
(Cresson)

(Figs. 22-24)

Alcidamea pilosifrons Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 386. ♂.

Hoplitis graceae Cockerell, 1923. Ann. Mag. Nat. Hist. (9) 11, p. 263. ♀.

Alcidamea simplex Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Alcidamea mucronata Cockerell, 1934. Brooklyn Ent. Soc. Bul. 29, p. 18. ♂.

Hoplitis pilosifrons Michener, 1955. Kans. Ent. Soc. Jour. 28, p. 81. (biology)

FEMALE—Length 6.5-8.5 mm.; entirely black; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus broadly convex, apical margin considerably produced, median portion slightly incurved, margin narrowly shining, without definite punctures; labrum rather flat, median length subequal to its basal width, broadly rounded apically; mandibles distinctly 3-dentate, not much broadened apically, middle tooth approximate to apical tooth; cheeks slightly broader than eyes; wings faintly infuscated, somewhat more deeply so along outer margin, veins and stigma brownish-piceous; tegulae shining, black, with scattered minute punctures; legs entirely black, front spurs testaceous, mid and hind spurs piceous; pubescence entirely pale, rather short and thin in general, somewhat more elongate around antennae, on cheeks below, pleura, propodeum,

and on dorsum of thorax anteriorly and posteriorly; abdominal terga 1-4 with white, apical fasciae, these rather widely interrupted on 1 and 2, entire on 3 and 4, tergum 5 with only an inconspicuous fringe of fine, pale hairs, discal pubescence extremely short and obscure, hardly evident except on the more apical terga; tergum 6 with a quite pronounced, apical rim, at right angles to the more vertical disc; ventral scopa yellowish-white; punctures rather coarse and deep, close in general, more distinctly separated on vertex toward each side, and over scutum and scutellum, fine and close on cheeks, crowded on pleura, propodeum dull and tessellate, punctures fine, shallow and rather indefinite; abdominal terga shining, punctures more definitely separated but still rather close on terga 1-5 medially, becoming quite coarse and close laterally, crowded on tergum 6.

MALE—Length 7-8.5 mm.; entirely black; face somewhat longer than distance between eyes above; eyes rather strongly convergent below; antennal scape robust but not dilated apically, apex excavated and enclosing pedicel; subapical segments of flagellum much broader than long, apical segment more elongate, tapering and slightly curved (fig. 23); lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus slightly convex, apical margin somewhat produced, the produced area very slightly incurved, angulate at each extreme side and narrowly shining and impunctate, surface usually obscured by dense, erect and rather elongate pubescence; labrum flattened, somewhat shining, length about equal to basal width; mandibles distinctly bi-dentate; cheeks subequal to eyes in width; wings subhyaline, veins and stigma brownish-testaceous; tegulae shining, brownish-piceous, with minute, scattered punctures; legs entirely black, spurs pale testaceous; tergum 7 quite broad at base but narrowly produced medially, almost spine-like, with a narrow and rather deep, median excavation (fig. 22); sterna 1-5 exposed, 2 with a conspicuous, erect, transverse protuberance, 6-8 retracted, form as shown (fig. 24); genital armature as shown; pubescence entirely pale, elongate and rather dense over most of head and thorax, extremely dense around antennae and over lower portions of face and on clypeus, cheeks below with a short but dense fringe, this becoming more elongate posteriorly; pubescence elongate over most of thorax but not hiding surface, terga 1-4 with white, apical fasciae, this widely interrupted on 1 and more or less so on 2, usually entire on 3 and 4, discal pubescence rather copious but short on 1, very short but evident on remaining terga; punctures deep

and distinct, quite close over most of head and thorax, being densely crowded on the more densely pubescent areas of face, more distinctly separated on the shining scutum and scutellum, very close on pleura, propodeum dull but rather smooth, punctures very shallow and indefinite; punctures on abdominal terga 1-4 rather fine and well separated medially, becoming closer and somewhat coarser at sides, uniformly quite coarse and close on 5 and 6, crowded across base of 7.

DISTRIBUTION—Alberta to Quebec and the New England States, south to Texas and Florida, April to August.

FLOWER RECORDS — *Barbarea*, *Geranium*, *Linaria*, *Melilotus*, *Oenothera*, *Pedicularis*, *Pentstemon*, *Potentilla*, *Rubus*, *Senecio*, *Specularia*, *Tephrosia*, *Trifolium* and *Vicia*. Robertson (1929) records this species (as *Alcidamea simplex*) on the following additional genera: *Amorpha*, *Blephilia*, *Cardamine*, *Chrysanthemum*, *Coreopsis*, *Desmodium*, *Dianthera*, *Erigeron*, *Gillenia*, *Heracleum*, *Houstonia*, *Hydrophyllum*, *Krigia*, *Lepachys*, *Lobelia*, *Lythrum*, *Malva*, *Nepeta*, *Oxalis*, *Petalostemum*, *Polygonium*, *Psoralea*, *Pycnanthemum*, *Radicula*, *Scutellaria*, *Stachys*, *Taenidia*, *Teucrium*, *Verbena*, *Veronica* and *Zizia*.

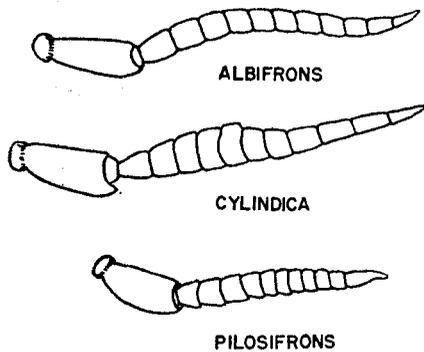


Figure 23
Antennae in males of *Hoplitis*.

***Hoplitis (Alcidamea) producta producta* (Cresson)**

(Fig. 24)

- Alcidamea producta* Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 386. ♂.
Autochelostoma canadensis Sladen, 1916. Canad. Ent. 48, p. 270 "♂" = intersex
Alcidamea producta Rau, 1928. Psyche 35, p. 100. (biology)
Alcidamea helenae Cockerell, 1934. Amer. Mus. Novitates 732, p. 6. ♂.

FEMALE—Length 8 mm.; entirely black; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, very slightly more distant from eyes; clypeus slightly convex, apical margin broadly produced, this area nearly straight and with a shining, impunctate margin; mandibles only slightly broadened apically, tri-dentate, median tooth subapical in position; cheeks considerably broader than eyes; wings very lightly infuscated, veins and stigma brownish-piceous; tegulae piceous, shining, with minute, scattered punctures; legs entirely black, front spurs testaceous-hyaline, mid and hind spurs piceous to black; pubescence entirely pale, rather short but copious over most of head and thorax, rather thin on vertex and on dorsum of thorax; abdominal terga 1-4 with quite dense, whitish, apical fasciae, these rather widely interrupted on 1 and 2, 5 not definitely fasciate, discal pubescence extremely short, hardly evident on the more basal terga, becoming more definite and conspicuous on the more apical terga, 6 with a quite abrupt, apical lip, almost at right angles to the more basal portion of the disc; scopa whitish; punctures deep and distinct over most of head and thorax, quite close in general, but with evident intervening spaces on dorsum of thorax which is shining, very close but not crowded over most of face above, cheeks and pleura, quite coarse over most of clypeus above, but becoming finer and densely crowded toward apical margin; abdominal terga shining, basal tergum with very fine and well separated punctures medially, becoming fine and close laterally, those on 2 and 3 rather fine and well separated medially, coarser and closer on 4, those on 5 almost crowded, surface not so shining, and 6 with fine, densely crowded punctures throughout.

MALE—Length 6-7 mm.; entirely black; face only slightly longer than distance between eyes above; eyes slightly convergent below; antennal scape robust but not dilated apically, apex excavated and almost completely enclosing pedicel, the more apical flagellar segments much broader than long, apical segment elongate, tapering and slightly curved; lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; clypeus slightly convex, apical margin only slightly produced, nearly straight, margin narrowly shining and impunctate; mandibles bi-dentate; cheeks subequal to eyes in width; wings subhyaline, veins and stigma brownish-testaceous; tegulae shining, piceous, with scattered, fine punctures; legs entirely black, front spurs pale testaceous, mid and hind spurs somewhat more brownish; abdomi-

nal tergum 7 broad at base, narrowly produced apically to a spine-like tip, with a narrow, sub-basal excavation; sterna 1-5 exposed, 2 produced below into a rather acute, robust prominence, 3 and 4 somewhat rounded apically, each with a subapical, slightly elevated ridge, 6-8 retracted, form as shown (fig. 24); genital armature as shown; pubescence entirely pale, rather long and copious over most of head and thorax, being very dense around antennae and on face below, quite long and copious on cheeks below and over most of pleura and propodeum, quite dense and elongate on front and mid femora posteriorly; abdominal terga 1-4 with narrow, white, apical fasciae, these widely interrupted medially on 1 and 2, usually entire on 3-5, 6 not fasciate, discal pubescence extremely short and thin on the more basal terga, becoming more evident on the more apical terga; punctures quite deep and distinct, close and rather fine over most of head and thorax, crowded beneath pubescence on face below antennae, more distinct but close on vertex and over most of dorsum of thorax, but slightly more widely separated on scutellum medially, distinctly but not widely separated on upper part of pleura, the propodeum rather dull and tessellate, punctures shallow and obscure but very fine and close; abdominal terga shining, punctures well separated medially but not sparse on 1-3, becoming almost crowded at extreme sides, rather coarse on 2-4, almost crowded on 5-7.

DISTRIBUTION — California to Quebec and Maine, south to Georgia and Texas, April to August.

FLOWER RECORDS — *Apocynum*, *Azalea*, *Baptisia*, *Barbarea*, *Chrysanthemum*, *Melilotus*, *Potentilla*, *Rubus*, *Salix* and *Trifolium*.

The occurrence of several subspecies in the West make this subspecific designation of *producta* necessary.

***Hoplitis (Alcidamea) truncata truncata* (Cresson)**

(Figs. 22 & 24)

Alcidamea truncata Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 108. ♂.

Alcidamea truncata Robertson, 1929. Flowers and Insects, Lancaster Pa., Science Press. (flower records)

FEMALE—Length 8.5-9.5 mm.; entirely black; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer to each other; clypeus slightly convex,

apical margin somewhat produced, nearly straight and slightly impressed, a quite distinct, median, impunctate ridge extending from base to near the apex; mandibles distinctly 3-dentate, only slightly expanded apically, middle tooth nearer apex than to inner angle (fig. 22); cheeks very slightly broader than eyes; wings faintly infuscated, veins and stigma brownish-piceous; tegulae shining, blackish, with scattered, minute punctures; legs entirely black, front and mid spurs testaceous, hind spurs somewhat darker; pubescence entirely pale, quite short and thin in general but rather copious around antennae and down sides of face, cheeks below with a fringe of much elongated hairs that nearly meet beneath; pleura and propodeum with rather copious pubescence, that on legs short in general, somewhat elongated on front femora posteriorly; abdominal terga 1-5 with white, apical fasciae, these widely interrupted on 1 and 2, entire or subentire on 3-5, discal pubescence extremely short, hardly evident, becoming quite copious on 6 but not hiding surface; scopa entirely yellowish-white.

MALE—Length 8-8.5 mm.; entirely black; face slightly longer than distance between eyes above; eyes considerably converging below; antennal scape somewhat enlarged but not dilated apically, subapical segments of flagellum considerably broader than long, apical segment more elongate, slightly curved, tapering nearly to a point; lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus slightly convex, densely pubescent, apical margin somewhat produced but nearly straight; mandibles distinctly bi-dentate; median length of labrum not much greater than basal width, basal half shining, slightly excavated, apical portion strongly convex, shining but with distinct punctures; cheeks subequal to eyes in width; wings very lightly infuscated, veins and stigma more brownish-piceous; tegulae shining, brownish-hyaline in part, with scattered, fine punctures; legs entirely dark, spurs pale testaceous; tergum 7 exposed, broad, apical margin rather broadly truncate (fig. 22); sterna 1-5 at least partially exposed, 1 slightly thickened toward apical margin but not at all produced, 2 broad and rather expansive, apical margin slightly outcurved, disc slightly swollen across median area, 3 and 4 with broad and rather shallow, incurved, or emarginate areas which are densely fringed, slightly swollen on each side, 6-8 retracted, form as shown (fig. 24); genital armature as shown; pubescence entirely pale, rather short in general, dense and copious around antennae and over lower half of face and clypeus, quite dense on cheeks below posteriorly, copious over pleura and around

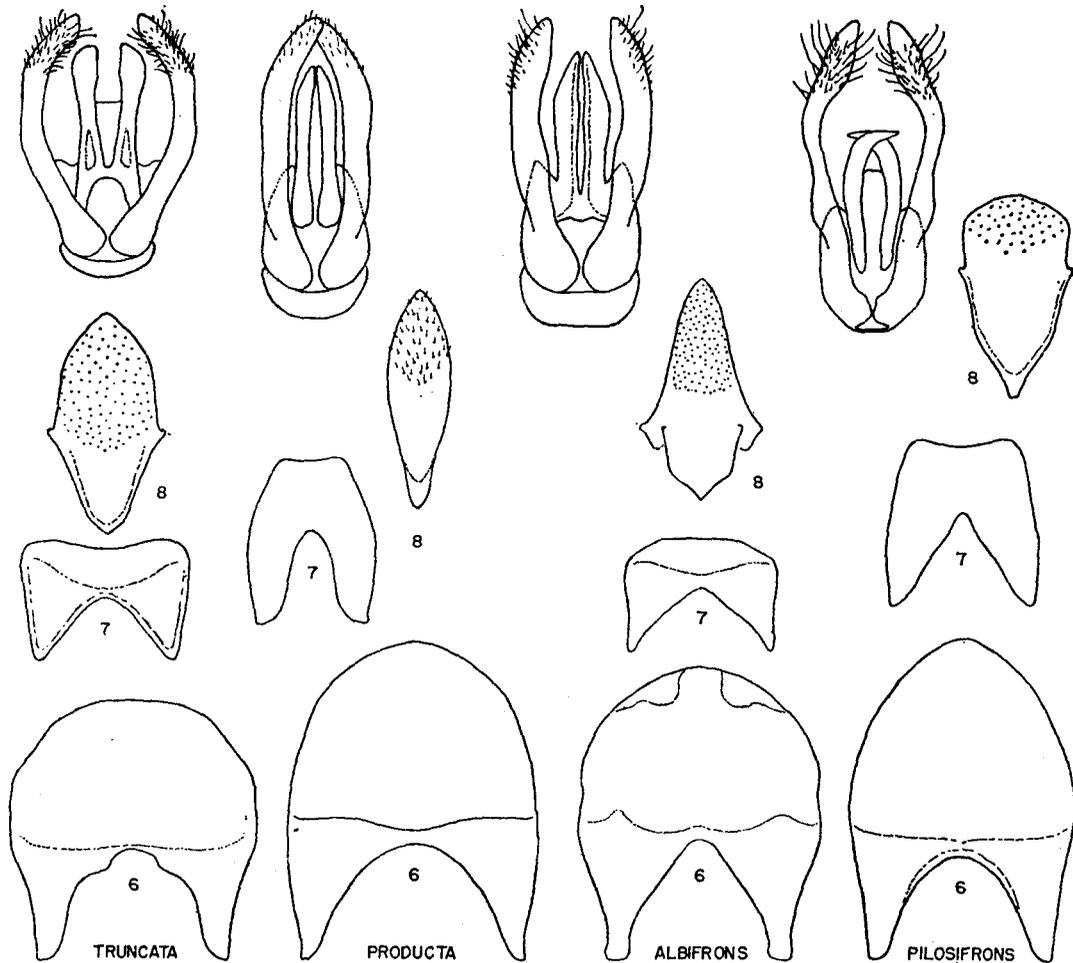


Figure 24—Genital armature and sterna 6-8 in males of *Hoplitis*.

wing bases, and quite dense on front femora posteriorly; terga 1-5 with white apical fasciae, these widely interrupted on 1 and 2, more or less entire on 3-5, discal pubescence very short and thin, but becoming somewhat more evident on the more apical terga; punctures fine and close in general, more distinctly separated on vertex and dorsum of thorax where surface is shining, densely crowded on cheeks, lower part of face and pleura; propodeum dull and tessellate, with very shallow and obscure but densely crowded punctures laterally, posterior surface somewhat more shining, abdominal terga more shining, punctures slightly separated medially on terga 1-4 becoming crowded laterally, quite uniformly close on 5 and 6, 7 rather coarsely, irregularly rugose or reticulate.

DISTRIBUTION—North Dakota to Que-

bec and Maine, south to Florida, March (in Florida) to July.

FLOWER RECORDS—*Baptisia*, *Berlandiera*, *Ceanothus*, *Erigeron*, *Ilex*, *Melilotus*, *Oenothera*, *Pentstemon*, *Rubus*, *Trifolium*, *Vaccinium* and *Vicia*. Robertson (1929) records it on *Convolvulus* and *Gillenia*.

Another form of *truncata*, *mescalerium* Cockerell, occurs in Colorado and New Mexico.

***Hoplitis (Robertsonella) micheneri*
new species
(Fig. 25)**

FEMALE—Length 7-8 mm.; entirely black; face considerably longer than distance between eyes above; eyes slightly convergent below;

lateral ocelli slightly nearer each other than to eyes, still nearer margin of vertex; clypeus very slightly convex, apical margin somewhat produced, practically straight, mandibles only slightly broadened apically, distinctly tridentate, median tooth only slightly nearer apex than to inner angle; cheeks slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated apically, stigma brownish-piceous, veins more brownish-testaceous; tegulae shining, piceous, with punctures hardly evident; legs entirely black, spurs pale yellow; pubescence entirely pale, rather short and thin, but quite copious around antennae, on face below, and over much of thorax, the dorsal pubescence elongate but very thin; abdominal terga 1-4 with narrow, whitish, apical fasciae, these widely interrupted medially on 1 and 2, usually entire on 3 and 4, 5 only sub-fasciate, discal pubescence exceedingly short and inconspicuous, hardly visible on the more basal terga, but becoming quite dense and subappressed on tergum 6, apical margin on 6 very slightly reflexed and shelf-like; scopa entirely yellowish-white; punctures quite deep and distinct, rather coarse and close in general, very close and somewhat finer on most of face, including vertex, becoming densely crowded on clypeus, close and fine on cheeks, but lower surface shining and impunctate, the two areas separated by a row of long, curled, whitish hairs directed toward the hypostome; scutum and scutellum shining between deep and distinct punctures, these finer and rather sparse in center of scutum, otherwise quite close, almost crowded on pleura; propodeum dull and tessellate, punctures very shallow and indefinite; abdominal terga shining, punctures minute and sparse on terga 1 and 2 medially, becoming close at extreme sides, somewhat coarser and closer on 3 and 4, uniformly fine and close on 5 and 6.

MALE—Length 6-8 mm.; entirely black; face considerably longer than distance between eyes above; eyes slightly convergent below; antennal scape slender and rather short, not much if any exceeding diameter of flagellum, pedicel completely exposed, flagellar segments slender and simple, considerably longer than broad; lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus slightly convex, apical margin slightly produced, nearly straight, disc covered with relatively elongate, erect, whitish pubescence; labrum shining, rather flat and unmodified, median length somewhat less than basal width; mandibles bi-dentate; cheeks subequal in width to eyes; wings subhyaline, veins and stigma brownish-testaceous; tegulae shining, piceous to black, with minute, scattered punctures; legs entirely black, spurs pale

yellow; tergum 7 exposed apically, margin rather broadly rounded, with a slight, subapical impression; sterna 1-5 exposed, apical margin of 2 broadly outcurved, with a low but distinct, subapical ridge, 2 with a quite deep, median emargination which is conspicuously fringed, 4 nearly straight apically, 6-8 retracted, form as shown (fig. 25); genital armature as shown; pubescence entirely pale, rather thin in general, somewhat more copious over head and thorax, rather dense on lower half of face and on cheeks below; abdominal terga 1-5 white fasciate apically, these interrupted medially, but dense at sides; punctures rather fine but deep and distinct over most of head and thorax, densely crowded over most of head, but lower surface of cheeks shining and more minutely punctate and more densely pubescent; scutum and scutellum shining, punctures slightly separated in center of discs, otherwise rather close, quite close over most of pleura, becoming rather sparse on a limited area just beneath wing base; propodeum dull and tessellate, punctures indistinct; abdominal terga 1-5 shining, punctures minute and quite sparse medially, becoming somewhat closer on the more apical terga, rather close at sides, even on basal tergum; tergum 6 rather closely but irregularly punctate.

TYPES—Holotype: Male, Douglas Co., Kans., May 11, 1949 (R. H. Beamer, on *Amorpha fruticosa*). Allotype: topotypical [both Univ. Kans.]. Paratypes: 6 ♂♂, 1 ♀, topotypical 3 ♂♂, 5 ♀♀, Miami Co., Kans., May 20 & 27, and June 1, 1951 (C. D. Michener, on *Amorpha fruticosa*); 2 ♀♀, 5 mi. south and 6 mi. SW of Lawrence, Kans., June 10 & 12, 1950 (C. D. Michener and J. R. White, on *Amorpha fruticosa*); 1 ♂, Hamilton, Ga., May 19, 1931 (P. W. Fatig). Paratypes are in collections of the University of Kansas, the U. S. National Museum and the author.

The author is indebted to C. D. Michener not only for the material upon which the description of *micheneri* is based, but for critical observations concerning the characters, distribution and correlation of the sexes in the related species of *Robertsonella*.

Hoplitis (Robertsonella) gleasoni

Titus

(Fig. 25)

- Robertsonella gleasoni* Titus, 1904. N. Y. Ent. Soc. Jour. 12, p. 23, ♀ ♂.
Robertsonella crataegina Cockerell, 1909. Ann. Mag. Nat. Hist. (8) 4, p. 28.

Robertsonella simplex crataegina Michener, 1938. Ent. News 49, p. 131.

FEMALE—Agrees with description of *simplex* (below), and reliable characters to separate the two are lacking.

MALE—Length 6.5 mm.; entirely black; face slightly longer than distance between eyes above; eyes considerably converging below; antennal scape slender and unmodified, the pedicel fully exposed, flagella narrow and elongate, segments somewhat longer than broad; lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus nearly as long as the maximum width, apical margin slightly produced, nearly straight, entire disc densely covered with short, cream-colored pubescence which completely hides the surface; mandibles distinctly bi-dentate; cheeks subequal to eyes in width; wings subhyaline, veins and stigma brownish testaceous; tegulae shining, piceous, with scattered, very fine punctures; legs entirely black, spurs pale yellow; tergum 7 exposed, rather broadly rounded; sterna 1-5 exposed, apical margin of 1 slightly outcurved and becoming testaceous along rim, 2 quite expansive, slightly swollen on each side of center toward apical margin, but depressed between these two areas, apical margin of 3 very slightly incurved, with a dense, triangular tuft of short, yellowish pubescence medially, apical margins of 4 and 5 relatively straight, but little modified, 6-8 retracted, form as shown (fig. 25); genital armature as shown; pubescence entirely pale, rather thin and inconspicuous except on clypeus (as described above), elongate and rather thin on cheeks below and along lower margin of mandibles, thin and elongate over most of thorax; front femora with a rather conspicuous, posterior fringe of longer, white hairs; abdominal terga 1-4 with whitish, apical fasciae, these evident only at sides of 1, considerably interrupted medially on 2, usually entire on 3 and 4, discal pubescence very short and inconspicuous, hardly evident on the more basal terga but becoming rather copious on 5-7; punctures rather deep and distinct, crowded over most of head, very close on pleura, but becoming sparse on hypopimeral area just beneath wing base; scutum and scutellum shining, punctures well separated medially, propodeum somewhat shining laterally, with shallow and rather vague punctures, posterior face dull and tessellate, triangular area more or less shining, upper margin vaguely striate just beneath metanotum; abdominal terga 1-4 with fine and rather well separated punctures medially, these becoming quite close at extreme sides, more uniformly fine and close across 5, rather fine and irregular on 6, tergum 7 shining, with a few

vague and irregular punctures or striations toward apical margin.

DISTRIBUTION—Texas to Illinois and New Jersey, March to May.

FLOWER RECORDS—*Geranium*, *Phacelia* and *Rubus*.

The description of the male of *gleasoni* does not agree with the male "type" of the original series, nor will it fit either of the other two species now recognized. It states "pubescence of face white, dense, appressed, that of clypeus long, very dense and snowy-white." That would imply that the pubescence above the clypeus is dense and appressed, which is not true of any of these males. The male designated as type agrees with *crataegina*, having the pubescence of the clypeus very short, dense and appressed, while the hair over the upper half of the face is erect. Apparently the female, which was described first, was made the type. This is unfortunate, as it is indistinguishable from the female of *simplex*.

Hoplitis (Robertsonella) simplex (Cresson)

(Fig. 25)

Heriades simplex Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 384. ♀.

Robertsonella simplex Michener, 1938. Ent. News 49, p. 130.

FEMALE—Length 6.5-8 mm.; entirely black; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus very slightly convex, apical margin somewhat produced, practically straight, mandibles only slightly broadened apically, distinctly tri-dentate, median tooth only slightly nearer apex than to inner angle; cheeks slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated apically, stigma brownish-piceous, veins more brownish-testaceous; tegulae shining, piceous, with punctures hardly evident; legs entirely black, spurs pale yellow; pubescence entirely pale, rather short and thin, but quite copious around antennae, on face below, and over much of thorax, the dorsal pubescence elongate but very thin; abdominal terga 1-4 with narrow, whitish, apical fasciae, these widely interrupted medially on 1 and 2, usually entire on 3 and 4, 5 not fasciate, discal pubescence exceedingly short and inconspicuous, hardly visible on the more basal terga, but becoming quite dense and subappressed on

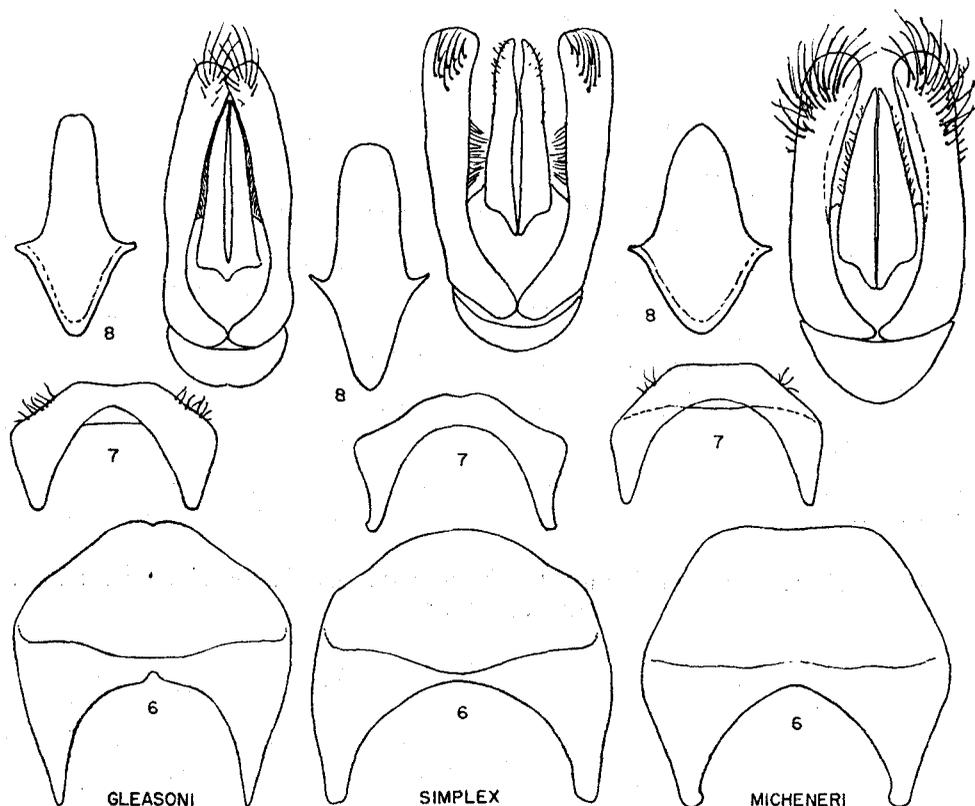


Figure 25—Genital armature and sterna 6-8 in males of *Hoplitis*.

tergum 6, apical margin of 6 very slightly reflexed and shelf-like; scopa entirely yellowish-white; punctures quite deep and distinct, rather coarse and close and somewhat finer on most of face, including vertex, becoming densely crowded on clypeus, close and fine on cheeks, but lower surface shining and impunctate, the two areas separated by a row of long, curled, whitish hairs directed toward the hypostome; scutum and scutellum shining between deep and distinct but quite close punctures, these almost crowded on pleura, the propodeum dull and tessellate, punctures very shallow and indefinite; abdominal terga shining, punctures fine and slightly separated on basal tergum, well separated medially on 2 and 3, uniformly close and fine on 4-6.

MALE—Length 6 mm.; entirely black; face considerably longer than distance between eyes above; eyes very slightly convergent below; antennal scape slender and rather short, not much if any exceeding diameter of flagellum, pedicel completely exposed, flagellar segments slender and simple, considerably longer than broad; lateral ocelli subequally distant

from eyes and each other, somewhat nearer margin of vertex; clypeus slightly convex, apical margin slightly produced, nearly straight, disc covered with relatively elongate, more or less erect, whitish pubescence; labrum shining, rather flat and unmodified, median length somewhat less than basal width; mandibles bidentate; cheeks subequal in width to eyes; wings subhyaline, veins and stigma brownish-testaceous; tegulae shining, brownish-testaceous, with minute, scattered punctures; legs entirely black, spurs pale yellow; tergum 7 exposed apically, margin rather broadly rounded, with a slight, subapical impression; sterna 1-5 exposed, apical margin of 2 somewhat outcurved, the disc rather expansive, 3-5 more nearly straight apically, 6-8 retracted, form as shown (fig. 25); genital armature as shown; pubescence entirely pale, rather thin in general, somewhat more copious over head and thorax, rather dense over lower half of face and on cheeks below, abdominal terga 1-5 only vaguely white fasciate apically, and then only at sides; punctures rather fine but deep and distinct over most of head and thorax, densely crowded over most of face, quite close

on vertex and cheeks, becoming somewhat more shallow on cheeks below, lower surface shining and more minutely punctate and more densely pubescent; scutum and scutellum shining, punctures slightly separated in center of discs, otherwise rather close, quite close over most of pleura, becoming rather sparse on a limited area just beneath wing base; lateral faces of propodeum dull and tessellate, without distinct punctures, posterior face also quite dull, relatively impunctate, without a distinct striate area beneath metanotum; abdominal terga 1-5 shining, punctures very fine and well separated medially, becoming somewhat closer on the more apical terga, rather close at sides even on basal tergum, 6 rather closely but irregularly punctate.

DISTRIBUTION—Texas to Connecticut, March to May.

FLOWER RECORDS—*Phacelia* and *Salix*.

Apparently this is the first description of the male of *simplex*, although future studies may indicate that this is not the correct association of the two sexes. It has been pointed out (p. 65) that *crataegina* Cockerell is a synonym of *gleasoni* Titus. The females of *gleasoni* and *simplex* cannot be separated with any degree of certainty, hence the reliance for distinguishing the two species rests upon the males. Therefore, if the male of *gleasoni* proves to be the correct one to associate with *simplex*, the male described above must be given a new name. A study of the distribution of these two forms, as shown by the males, may give the answer to this problem.

Table 3—Distribution of species of *Prochelostoma*, *Heriades*, *Ashmeadiella* and *Hoplitis* by states.

Species	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>Prochelostoma philadelphia</i>						X	X	X		X		X		X				X	X	X	X	X	X			X	
<i>Heriades carinata</i>	X	X	X	X		X	X	X					X					X	X			X			X	X	X
<i>leavitti</i>	X							X	X													X			X	X	X
<i>variolosa</i>	X	X		X				X		X	X								X			X				X	X
<i>Ashmeadiella buconis</i>								X	X																		X
<i>floridana</i>																						X					X
<i>Hoplitis albifrons</i>	X							X																			
<i>clypeata</i> (Quebec)																											
<i>cylindrica</i>	X	X				X	X	X			X						X						X				X
<i>gleasoni</i>									X					X		X							X				
<i>micheneri</i>																											X
<i>pilosifrons</i>				X	X	X	X	X		X			X	X		X			X			X					X
<i>producta</i>	X	X				X	X	X		X			X	X	X				X			X	X				X
<i>simplex</i>						X																X					X
<i>truncata</i>	X			X			X	X					X	X				X				X	X	X		X	X

Osmia Panzer

(Fig. 1)

- Osmia* Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 230. Type: (*Apis bicornis* Linnaeus) = *Apis rufa* Linnaeus. Desig. by Latreille, 1810.
- Amblys* Klug, 1807. Mag. Insektenk. 6, p. 198. Type: *Apis rufa* Linnaeus. Desig. by Latreille, 1810.
- Osmia* subg. *Ceratosmia* Thomson, 1872. Hym. Scand., 2, p. 232. Type: *Apis rufa* Linnaeus. Monob.
- Osmia* subg. *Aceratosmia* Schmiedeknecht, 1885? Apidae Europaeae, 2, p. 19. Type: *Osmia emarginata* Lepeletier. Desig. by Sandhouse, 1939.
- Osmia* subg. *Chalcosmia* Schmiedeknecht, 1885? Apidae Europaeae, 2, p. 886. Type: *Osmia fulviventris* Latreille. Desig. by Sandhouse, 1939.
- Osmia* subg. *Melanosmia* Schmiedeknecht, 1885? Apidae Europaeae, 2, p. 885. Type: *Osmia fuciformis* Latreille. Desig. by Sandhouse, 1939.
- Nothosmia* Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 75. Type: *Osmia distincta* Cresson. Orig. desig. and monob.
- Acanthosmioides* Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 76. Type: *Osmia odontogaster* Cockerell. Orig. desig. and monob.
- Osmia* subg. *Pachyosmia* Ducke, 1900. Ber. naturw.-med. Ver. Innsbruck 25, p. 18. Type: *Osmia rufa* (Linnaeus). Desig. by Sandhouse, 1939.
- Centrosmia* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 165. Type: *Osmia bucephala* Cresson. Orig. desig. and monob.
- Gnathosmia* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 165. Type: *Osmia georgica* Cresson. Orig. desig. and monob.
- Leucosmia* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 166. Type: *Osmia albiventris* Cresson. Orig. desig. and monob.
- Xanthosmia* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 166. Type: *Osmia cordata* Robertson. Orig. desig. and monob.
- Monilosmia* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 166. Type: (*Osmia canadensis* Cresson) = *Osmia simillima* Smith. Orig. desig. and monob.
- Diceratosmia* Robertson, 1904. Amer. Ent. Soc. Trans. 29, p. 166. Type: (*Osmia quadridentata* Cresson) = *Osmia conjuncta* Cresson. Monob. and orig. desig.
- Cephalosmia* Sladen, 1916. Canad. Ent. 48, p. 270. Type: (*Osmia armaticeps* Cresson) = *Osmia montana* Cresson. Monob.
- Osmia* Sandhouse, 1924. Calif. Acad. Sci. Proc. (4) 13, p. 357-364.
- Osmia* Sandhouse, 1925. Canad. Ent. 57, pp. 35-41. (key)
- Acanthosmioides* Michener, 1936. Amer. Mus. Novitates 875, pp. 27-28. (key)
- Osmia* Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, pp. 1-167. (revision)
- Diceratosmia* Michener, 1949. Ent. Soc. Amer. Ann. 42, p. 258. (revision)
- Osmia* subg. *Acanthosmioides* White, 1952. Univ. Kans. Sci. Bul. 35, pp. 219-307. (revision)
- Osmia* Sinha, 1958. Univ. Kans. Sci. Bul. 39, pp. 211-261. (subgeneric revision)
- Osmia* subg. *Chenosmia* Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 233. Type: *Osmia pentstemonis* Cockerell. Orig. desig.
- Osmia* subg. *Centrosmia* Sinha and Michener, 1958. Univ. Kans. Sci. Bul. 39, pp. 275-303. (revision)

This genus is a group of metallic green, blue or blue-green bees, with a short, robust body form. The basal abdominal tergum is flattened anteriorly but hardly concave, sometimes with a vague median sulcus. The metanotum and posterior face of the propodeum are perpendicular, forming the posterior surface of the thorax, and the scutellum is rounded, with rather large axillae. The notaulices are punctiform and obscure. In the front wings both recurrent veins are received well within the limits of the 2nd submarginal cell. Arolia are evident between the claws, and the maxillary palpi are 5-segmented. Usually the abdominal terga are not fasciate. In the males tergum 6 usually has a small median apical emargination, and 7 is more deeply emarginate but is largely covered by 6. Sterna 1, 2 and 4 are exposed, but 3 is commonly hidden beneath sternum 2, while 5-8 are retracted and variously modified.

There is a considerable diversity of nesting habits in *Osmia*, some of them excavating burrows in the soil, others using plant stems, vacated burrows of other bees, and empty snail shells. Sometimes these are lined with a paste made from plant tissue, and partitions between cells, or plugs closing the ends of the burrows, may be of this same material.

KEY TO SPECIES

Females

- | | |
|------------------------------|---|
| 1. Malar space present | 2 |
| Malar space absent | 6 |

2. Clypeus with a deep, quadrate, median emargination ... (*Osmia lignaria* Say (p. 72)
Apical margin of clypeus thickened or otherwise modified 3
3. Clypeal margin somewhat excavated on each side of a median, elevated process (*Chalcosmia*) 4
Clypeal margin greatly thickened, but neither excavated nor emarginate (*Centrosmia*) 5
4. Larger (13-14 mm.); front wings deeply infuscated, median clypeal process more robust, not noticeably emarginate *chalybea* Smith (p. 84)
Smaller (11-12 mm.); front wings only lightly infuscated; median process of clypeus relatively low and inconspicuous, its margin quite deeply emarginate *texana* Cresson (p. 87)
- 5(3). Entirely black; clypeus with a rather short, median, raised line toward apical margin, gradually thickened toward the margin *nigriventris* (Zetterstedt) (p. 77)
Black, with bluish-green reflections; clypeus without a median raised line, the margin abruptly thickened *bucephala* Cresson (p. 76)
- 6(1). Mandible with a robust superior tooth projecting above clypeal margin..... (*Chalcosmia*) *georgica* Cresson (p. 86)
Mandibles simple 7
7. Abdominal terga with distinct, apical fasciae .. (*Chalcosmia*) *ogerulescens* Linnaeus (p. 85)
Abdomen not distinctly fasciate 8
8. Scopa black (*Chenoscia* in part) 9
Scopa white 18
9. Front basitarsus compressed, outer face slightly concave (*Monilosmia*) *simillima* Smith (p. 80)
Front basitarsus but slightly compressed, outer face not at all concave 10
10. Black, non-metallic; clypeus with conspicuous black pubescence *inermis* Zetterstedt (p. 98)
Color metallic greenish or bluish 11
11. Abdominal terga 2-5 with broad, impunctate, apical margins, these equal to about a third or fourth of the total median length of the plate 12
Apical bands of terga either very narrow or to some degree invaded by punctures 13
12. Head, pleura, legs and abdominal terga largely pale pubescent *?tersula* Cockerell (p. 100)
- Head, pleura, legs and abdominal terga 2-6 conspicuously black pubescent (*Acanthosmioides*) *integra* Cresson (p. 73)
- 13(11) Abdominal terga 3-5 with conspicuous, erect black pubescence; clypeus fuscous or black pubescent 14
Pubescence of abdominal terga and clypeus entirely pale, or with only very inconspicuous darker hairs 17
14. Color brilliant blue or green; abdominal terga completely punctate to the apical rims *illinoensis* Robertson (p. 97)
Color dark olive or blue-green; abdominal terga with narrow but distinct, apical, impunctate bands 15
15. Mandibles very broad apically, the dentate margin much broader than the base (*Cephalosmia*) *subaustralis* Cockerell (p. 75)
Apical dentate margin of mandible no broader than base 16
16. Front basitarsi slender, about four times longer than broad; 1st recurrent vein entering 2nd submarginal cell about twice the distance from its base as 2nd does from apex *proxima* Cresson (p. 99)
Front basitarsi broader, hardly three times as long as broad; 1st recurrent vein entering 2nd submarginal cell three or four times as far from base as 2nd does from apex *collinsiae* Robertson (p. 96)
- 17(13) Pubescence of abdomen dorsally entirely pale; front basitarsi slender, entirely pale pubescent *atriventris* Cresson (p. 95)
Abdomen dorsally with some short, inconspicuous, darker hairs in the generally pale pubescence; front basitarsi broader and more robust, with long, more or less curled, brownish hairs ... (*Monilosmia*) *felti* Cockerell (p. 79)
- 18(8). Tergum 6 thinly pubescent, with a distinct, dense, white, apical fascia, the punctures close and coarse (*Diceratosmia*) 19
Tergum 6 more finely punctate, the pubescence gradually becoming more dense to the apical margin (*Nothosmia*) .. 21
19. Front between antennae with two small but distinct tubercles; inner mandibular tooth more truncate *conjuncta* Cresson (p. 81)
Front without distinct tubercles; inner mandibular tooth acute 20

20. More robust (abdominal width 3 mm.); purplish-blue; clypeus rather finely rugoso-punctate
subfasciata miamiensis new subspecies (p. 84)
 Less robust (abdominal width 2.5 mm.); greenish-blue; clypeal punctures contiguous but distinct.....
subfasciata subfasciata Cresson (p. 83)
- 21(18). Clypeus with a median, triangular, polished, impunctate area on dorsal margin
inspergens Lovell and Cockerell (p. 91)
 Clypeus uniformly punctured 22
22. Intercellar pubescence long and proclinate, meeting tips of the more erect hairs between antennae; area below ocelli suffused with purplish-black.....
distincta Cresson (p. 90)
 Intercellar pubescence short and erect; area below ocelli little if any darkened 23
23. Punctures coarse and confluent over most of scutum and scutellum 24
 Punctures of scutum and scutellum relative fine and distinct, not confluent, at least in center of disc. 25
24. Abdominal terga with narrow but definite, apical, impunctate bands
cordata Robertson (p. 89)
 Abdominal terga completely punctate to the apical rims, without impunctate bands .. *sandhouseae* Mitchell (p. 94)
- 25(23). Wings clouded apically; punctures of abdominal terga deep and distinct to the apical margin ... *pumila* Cresson (p. 93)
 Wings not clouded apically; apical margins of abdominal terga rather broadly impunctate
albiventris Cresson (p. 88)
- Males*
1. Tergum 6 with broad, lateral emarginations, tergum 7 bidentate (*Diceratasmia*) 2
 Tergum 6 with but a single, median emargination or none 4
2. Tergum 6 with acute lateral angles.....
conjuncta Cresson (p. 81)
 Tergum 6 with broadly rounded lateral angles 3
3. Greenish-blue
subfasciata subfasciata Cresson (p. 83)
 Purplish-blue
subfasciata miamiensis new subspecies (p. 84)
- 4(1). Abdominal tergum 6 entire; apical margin of sternum 4 not grooved ... 5
 Tergum 6 usually with a distinct, apical, median emargination; if not, then apical margin of sternum 4 narrowly but distinctly grooved 10
5. Mid tarsi slender and simple 6
 Mid tarsal segments dilated, more or less swollen or compressed 9
6. Hind basitarsi strongly dilated apically, the base slender
 ..(*Centrosmia*) *nigriventris* Zetterstedt (p. 77)
 Hind basitarsi parallel-sided 7
7. Median segments of flagellum hardly twice as long as broad; apical margin of sternum 3 fully exposed, with a deep but rather narrow, median emargination 8
 Median flagellar segments narrow and elongate, more than twice as long as their breadth; apical margin of sternum 3 largely covered, with a very broad emarginate area
 (*Osmia*) *lignaria* Say (p. 72)
8. Inner apical angle of mandible a right angle, the apical tooth long and slender (*Acanthosmioides*) *integra* Cresson (p. 73)
 Inner apical angle of mandible acute, the inner and outer angles or teeth subequal ..(*Cephalosmia*) *subaustralis* Cockerell (p. 75)
- 9(5). Inner hind tibial spur nearly equalling basitarsi in length; mid tarsal segments very broadly dilated, nearly triangular in cross-section
 (*Centrosmia*) *bucephala* Cresson (p. 76)
 Inner hind tibial spur little more than half the length of hind basitarsi; mid tarsal segments slightly swollen and compressed
 ..(*Monilosmia*) *felti* Cockerell (p. 79)
- 10(4). Apical margin of abdominal sternum 4 thickened (*Chalcosmia*) 11
 Apical margin of sternum 4 neither thickened nor grooved 14
11. Tooth of hind basitarsus minute, hardly visible; apical margin of tergum 6 with very shallow, lateral emarginations ..
 *caerulescens* Linnaeus (p. 85)
 Hind basitarsus with a distinct submedian tooth on anterior margin; apical margin of tergum 6 entire laterally 12
12. Lateral ocelli slightly nearer margin of vertex than to each other
 *georgica* Cresson (p. 86)

- Lateral ocelli much nearer each other than to margin of vertex 13
13. Wings deeply infuscated; dorsal area of propodeum densely tessellate and dull; tergum 6 deeply emarginate
..... *chalybea* Smith (p. 84)
Wings faintly infuscated; lower half of dorsal area of propodeum smooth and shining; tergum 6 usually with only a small, shallow median emargination.
..... *texana* Cresson (p. 87)
- 14(10). Apical margin of sternum 4 produced medially, this area broadly incurved
..... *inspergens* Lovell and Cockerell (p. 91)
Apical margin of sternum 4 evenly out-curved or somewhat produced medially 15
15. Hind basitarsi dilated apically, nearly bare *simillima* Smith (p. 80)
Hind basitarsi more parallel-sided, or densely setose beneath 16
16. Mid tarsi much modified, the basitarsi robust, expanded apically, 2nd segment slender at base, expanded apically
*Synonymy of *bucephala* *tarsata** Provancher (p. 78)
Mid tarsi simple and unmodified. 17
17. Emargination of sternum 3 two-thirds the width of the plate
..... *distincta* Cresson (p. 90)
Emargination of sternum 3 about half or less width of plate 18
18. Color entirely black, with no metallic reflections ... *inermis* Zetterstedt (p. 98)
Color largely metallic 19
19. Tergum 7 with a shallow emargination; apical margin of 6 weakly arcuate, with a very small, median emargination; sides of 5 and 6 with unusually long hairs *albiventris* Cresson (p. 88)
Tergum 7 deeply emarginate; apical margin of 6 strongly arcuate, usually deeply emarginate medially; hairs on segments laterally of ordinary length . 20
20. Abdominal terga with wide, impunctate, depressed, marginal areas which occupy about one-fourth of the median length of each tergum 21
Depressed apical areas of terga much narrower 22
21. Apical margin of sternum 4 straight for almost entire width of plate, not at all thickened ... *virga* Sandhouse (p. 101)
Sternum 4 thickened apically, the margin produced medially, this area very slightly incurved . *tersula* Cockerell (p. 100)
- 22(20). Brilliant green, with bluish reflections *illinoensis* Robertson (p. 97)
Dark bluish or olive-green 23
23. Scutum dull, punctures closely crowded. 24
Punctures of scutum close, but distinct, the narrow interspaces shining 25
24. Abdominal tergum 6 finely and closely punctate throughout
..... *cordata* Robertson (p. 89)
Tergum 6 shining, punctures fine, shallow and quite sparse
..... *sandhouseae* Mitchell (p. 94)
- 25(23). Median emargination of sternum 3 completely filled by the marginal fringe, the hairs converging along mid-line . 26
Median emargination of sternum 3 not filled by the marginal fringe, hairs relatively short 27
26. Depressed, apical areas of abdominal terga largely impunctate, invaded only slightly by the discal punctures
..... *proxima* Cresson (p. 99)
Apical margins of abdominal terga only very narrowly impunctate
..... *atriventris* Cresson (p. 95)*
- 27(25). Sternum 4 with a distinct, median, impunctate furrow dividing the setose area into right and left halves
..... *collinsiae* Robertson (p. 96)
Sternum 4 without such a median furrow 28
28. Median emargination of sternum 3 quite broad, occupying nearly half of the total width of the plate, and with a short but quite dense fringe; hind basitarsi not toothed
..... *michiganensis* new species (p. 92)
Median emargination of sternum 3 not so broad, the fringe rather thin and inconspicuous; hind basitarsi with a small but definite, submedian tooth
..... *pumila* Cresson (p. 93)*

Osmia (Osmia) lignaria lignaria Say

(Figs. 30-35)

Osmia lignaria Say, 1837. Boston Jour. Nat. Hist. 1, p. 399. ♀ ♂.

Osmia purpuracens Smith, 1849. Zoologist 7 (append.), lviii. ♂.

Osmia lignaria Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 203. (biology)

Ceratostmia lignaria Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Osmia) lignaria Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 10.

* *pumila*: abd. greenish, hair golden

atriventris: abd. blue, hair white

Osmia (Osmia) lignaria Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1057. (larva)

Osmia lignaria Bohart, 1955. Ent. Soc. Wash. Proc. 57, pp. 203-204. (biology)

FEMALE—Length 10-11 mm.; dark blue, becoming greenish on vertex, dorsum of thorax and abdominal terga; face only slightly longer than distance between eyes above; eyes subparallel; lateral ocelli somewhat nearer each other than to eyes, and nearer eyes than to margin of vertex; apical margin of clypeus somewhat produced, with a broad and deep, subquadrangular, median emargination (fig. 30); median length of labrum somewhat greater than basal width, slightly narrowed and truncate apically, with a sub-basal, transverse brush of hairs; mandibles rather slender and elongate, bidentate apically, with a small, inconspicuous, submedian tooth (fig. 32); width of cheeks nearly twice that of eyes; wings very lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell only slightly nearer apex than 1st does to base; tarsal segments simple and unmodified; front spurs brownish-hyaline, mid and hind spurs piceous; pubescence, including scopa, largely black, but pale with intermixed, rather long and erect fuscous hairs around antennae and on dorsum of thorax, entirely pale on basal abdominal tergum and on tergum 2 except apical margin; punctures deep and distinct in general, fine and quite close over most of head and on dorsum of thorax, becoming somewhat more widely separated but still quite close on scutum posteriorly and on scutellum, pleura and propodeum dull, punctures fine and almost crowded; punctures somewhat finer on abdominal terga medially, distinctly but not widely separated, becoming very fine toward sides, and uniformly close on tergum 5, densely crowded and minute on 6.

MALE—Length 9-10 mm.; dark blue, with greenish tints on face, vertex and dorsum of thorax; face only slightly longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli somewhat nearer margin of vertex than to each other, somewhat more removed from eyes; clypeus rather strongly convex, apical margin considerably produced, nearly straight; median length of labrum nearly equal to basal width; mandible bidentate; cheeks considerably broader than eyes; wings very lightly infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments slender and simple, anterior margin of hind basitarsus with a small but distinct tooth near apical third; front spurs brownish-hyaline, mid and hind spurs piceous; pubescence elongate, largely pale on head and thorax, but with intermixed fuscous hairs on

vertex, that on upper part of pleura and propodeum black; pubescence pale on abdominal terga 1 and 2, becoming obscurely darkened at apex of 2, entirely black, rather elongate and conspicuous on 3-6; punctures quite deep and distinct, rather fine and close in general, close but not crowded on vertex, cheeks and scutum, somewhat more widely separated on scutellum; pleura dull, with rather fine and densely crowded punctures; lateral faces of propodeum somewhat smoother, punctures fine and rather shallow, posterior face dull and tessellate, punctures becoming inevident medially, propodeal triangle dull and tessellate but rather smooth; punctures of abdominal terga somewhat finer, more distinctly separated medially on 1-5, becoming slightly closer toward extreme sides, 6 without a median, emarginate area, 7 rather evenly rounded, apex medially with a very shallow emargination; sternum 2 broadly rounded apically, largely covering 3 and to a considerable degree 4, 3 with a very broad, apical, emarginate area, this with a median, restricted, setose area, the setae converging along midline (fig. 33); apical margin of sternum 4 somewhat thickened and grooved (fig. 34), 5-8 entirely retracted, not markedly modified, 8 rather elongate, triangular, apex acute; gonocoxites of genital armature slender and elongate, apex with a subapical, ventral, slender projection (figs. 31 and 35).

DISTRIBUTION — British Columbia to Quebec and the New England states, south to California, Oklahoma and Georgia, March to June.

FLOWER RECORDS—*Cercis*, *Fragaria*, *Geranium*, *Lupinus*, *Malus*, *Prunus*, *Rubus*, *Salix*, *Taraxacum*, *Vicia* and *Viola*. Robertson (1929) records *lignaria* also on *Camassia*, *Cardamine*, *Chaerophyllum*, *Claytonia*, *Collinsia*, *Dentaria*, *Dicentra*, *Direa*, *Erigenia*, *Erythronium*, *Hydrophyllum*, *Mertensia*, *Osmorrhiza*, *Oxalis*, *Polymonium*, *Pyrus*, *Ranunculus*, *Ribes*, *Stellaria*, *Taenidia*, *Viburnum* and *Zanthoxylum*.

The subspecific designation of *lignaria* is made necessary by the recognition of another subspecies, *propinqua* Cresson, that is found in the West.

Osmia (Acanthosmioides) integra Cresson

(Figs. 26 & 32)

Osmia integra Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 106. ♂.

Osmia novomexicana Cockerell, 1903. Ent. News 14, p. 331. ♀.

Osmia florissanticola Cockerell, 1906. Amer. Mus. Nat. Hist. Bul. 22, p. 450. ♀.

Osmia integra Cockerell, 1910. Ent. News 21, p. 270. ♂.

Osmia novomexicana Hicks, 1926. Colo. Univ. Studies 15, p. 246. (biology)

Osmia (Acanthosmioides) integra Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 56.

Osmia integra White, 1952. Univ. Kans. Sci. Bul. 35, p. 290.

FEMALE — Length 12 mm.; greenish-blue, becoming more distinctly green on dorsum of thorax, legs black; face much longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex, very slightly nearer to each other; clypeus convex, much produced apically but not at all thickened, median area of apical margin nearly straight, narrowly shining and impunctate; median length of labrum about equal to basal width; mandibles obscurely 4-dentate (fig. 32); cheeks considerably broader than eyes; wings subhyaline basally, becoming faintly infuscated along apical margin, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence quite copious, yellowish-white on dorsum of thorax and basal abdominal tergum, with pale hairs in part on vertex, elsewhere black, scopa entirely black; discal pubescence of terga 2-5 rather long and erect, quite copious, entirely black; punctures in general quite deep and distinct close in large part, close but not crowded on vertex and on cheeks below but somewhat crowded on median area of cheeks, subcontiguous below ocelli, becoming very fine and close at sides of face below, clypeus closely and quite coarsely punctate above, becoming very finely and obscurely punctate toward apical margin; punctures of scutum fine and densely crowded anteriorly, becoming somewhat more coarse and distinct but still close posteriorly, those on scutellum uniformly close and rather fine; punctures of pleura rather fine and shallow, close in general; lateral faces of propodeum dull but rather smooth, posterior face obscurely but more definitely punctate, dorsal area velvety, becoming very narrowly and obscurely striate along upper margin; abdominal terga shining, median punctures of 1-4 fine and rather widely separated but not sparse, becoming close toward sides, apical margins rather broadly impressed and entirely impunctate, tergum 5 somewhat more closely punctate and 6 very finely and densely punctate throughout.

MALE—Length 13 mm.; bluish-green, the vertex, upper half of face and dorsum of thorax somewhat brassy, legs black; face much

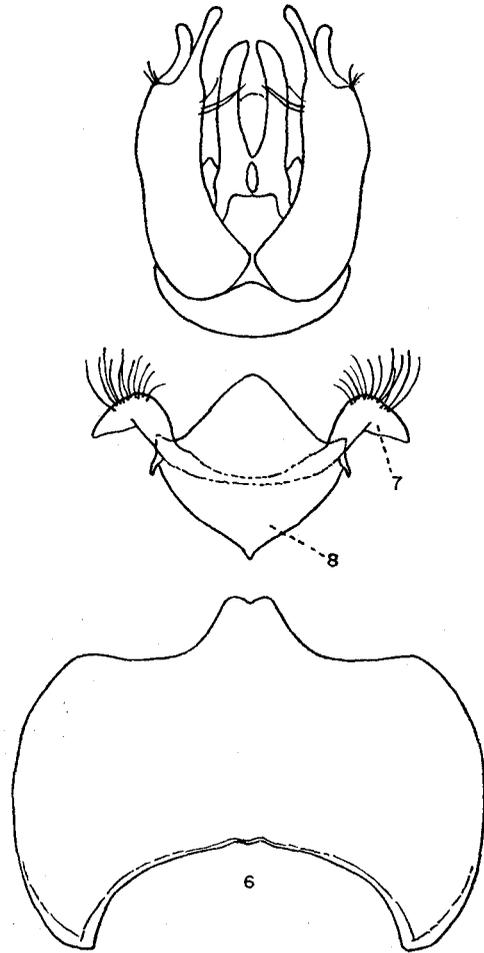


Figure 25
Genital armature and sterna 6-8 in male of
Osmia integra.

longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus slightly convex, apical margin considerably produced, nearly straight; median length of labrum considerably less than basal width; mandible bidentate, inner tooth broadly truncate; cheeks considerably broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell about half the distance from apex as 1st does to base; tarsal segments unmodified, anterior margin of hind basitarsus not toothed; front spurs testaceous-hyaline, mid and hind spurs black; pubescence elongate, whitish on face, pleura and terga 1 and 2, more yellowish on vertex and dorsum of thorax, black on cheeks, mid and hind legs, and terga 3-6; punctures fine and densely crowded over most

of head and thorax lateral faces of propodeum somewhat smoother, punctures fine and rather shallow, posterior face dull and tessellate, punctures becoming inevident medially, propodeal triangle dull and tessellate but rather smooth; punctures of abdominal terga somewhat finer, more distinctly separated medially on 1-5, becoming slightly closer toward extreme sides, apical margins quite broadly shining and impunctate; apical margin of tergum 6 nearly straight, without a median emargination, 7 broadly subtruncate, with a shallow median emargination; sternum 2 slightly outcurved apically, with a small, shallow, median emargination, not hiding margins of 3 and 4, 3 with a quite deep, median emarginate area which is conspicuously fringed, but the setae short, not meeting at midline; apical margin of sternum 4 broadly rounded, not at all thickened, margin of 5 nearly straight, 6-8 (fig. 26) retracted, lateral portions of 7 quite heavily sclerotized and setose; genital armature as shown.

DISTRIBUTION — British Columbia to New Mexico, east to Michigan, April to June. This is the first record of *integra* in the East, and is based on the following: 2 ♀♀, Chippewa Co., Mich., June 7, 1959 (Dreisbach).

Osmia (Cephalosmia) subaustralis
subaustralis Cockerell
(Figs. 31 & 32)

- Osmia nigrifrons* var. *subaustralis* Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 5, p. 410. ♀.
Osmia wardiana Cockerell, 1907. Ann. Mag. Nat. Hist. (7) 19, p. 368. ♀.
Osmia seneciophila Cockerell, 1907. Ann. Mag. Nat. Hist. (7) 20, p. 446. ♂.
Osmia lyncis Cockerell, 1937. South. Calif. Acad. Sci. Bul. 36, p. 110. ♀.
Osmia (Cephalosmia) subaustralis Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 28.

FEMALE—Length 10 mm.; bluish-green; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer to each other; clypeus quite strongly convex and strongly produced apically, median area of apical margin shining and impunctate; median length of labrum somewhat greater than basal width; margin of hypostome strongly carinate, these carinae slightly reduced toward base of mandible; mandibles somewhat constricted just before base, broadly expanded apically, with two distinct teeth and a broad, bevelled area above (as shown, fig. 32); width of cheeks nearly twice that of eyes; wings lightly infuscated, more deeply so in region of marginal cell, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does

to base; tarsal segments simple and unmodified, front spurs yellowish-hyaline, mid and hind spurs piceous; pubescence rather thin but long and erect, pale, with an intermixture of blackish hairs on vertex and dorsum of thorax, on face, cheeks and basal abdominal tergum, largely blackish on clypeus, pleura and discs of abdominal terga 2-6, the scopa black; punctures in general, deep and distinct, but not very coarse, well separated and rather coarse on vertex, becoming very fine and close on face below, somewhat more coarse and irregular on clypeus, very fine and distinctly separated on cheeks medially, but becoming coarser and more shallow and obscure toward the hypostomal carinae; punctures rather densely crowded along anterior margin of scutum, becoming well separated along median line posteriorly, close and rather coarse on scutellum, rather shallow and densely crowded on the dull pleura; propodeum dull, densely tessellate, with no evident punctures; abdominal terga 2 and 3 with fine, well separated punctures medially, becoming somewhat finer and quite close toward sides, rather coarse on tergum 1 basally but becoming very fine and more sparse toward apical margin, somewhat coarser but well separated on 4, closer on 5, very close and minute on 6, apical margins of the terga rather narrowly impunctate and more bluish in color.

MALE — Length 10-11 mm.; head and thorax bluish-green above, somewhat more bluish below, basal abdominal tergum somewhat more greenish, the following terga blue, legs black; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus only slightly convex, apical margin considerably produced, slightly outcurved, with a very faint, median indentation; mandibles bidentate, teeth nearly equal; cheeks very slightly broader than eyes; wings subhyaline, veins testaceous to piceous, 2nd recurrent vein entering 2nd submarginal cell slightly nearer apex than 1st does to base; tarsal segments slender and simple, hind basitarsus without a median denticle; front spurs testaceous, mid and hind spurs black; pubescence pale ochraceous to whitish, rather long and copious on face, vertex, dorsum of thorax and basal abdominal tergum, largely black on legs and terga 2-6; cheeks with rather short, pale pubescence interspersed with elongate black hairs, front femora with a tuft of whitish hairs posteriorly, pleura with intermixed light and dark hairs, and propodeum largely black pubescent laterally, pale pubescent medially; punctures fine and close on head and thorax, but somewhat coarser and more distinct between eyes and ocelli and on upper

part of face, fine and densely crowded on clypeus beneath dense pubescence, quite closely crowded on cheeks and over most of scutum, but somewhat more distinct on scutum along mid-line posteriorly, those on scutellum quite coarse, deep and distinct but still close; punctures of abdominal terga minute and slightly separated but still quite close, becoming more closely crowded on the more apical plates; tergum 6 rather broadly rounded apically, with a very small and obscure, median emargination; tergum 7 narrowly but abruptly produced medially, this area quite broadly emarginate; sternum 2 broadly rounded apically, not hiding apical margin of 3 which is quite deeply emarginate medially, this area densely fringed with rather elongate hairs which do not meet along mid-line (somewhat as in *inspergens*, fig. 33); sternum 4 rather narrowly produced medially, this area slightly incurved and fringed with dark hairs, 6 entirely retracted, its apical margin rather narrowly produced medially, with a rather small tuft of hairs on each extreme side, 7 slightly sclerotized medially, this area produced and abruptly truncate; apex of gonocoxites as shown (fig. 31).

DISTRIBUTION—Washington and Oregon to New Mexico, east to Michigan, June and July. This is the first record of this species in the East, the collection data as follows: 5 ♀♀, Alpena Co., Mich., July 4, 1940 (Dreisbach).

In the type specimen, a female from New Mexico, the mandibles are not quite as broad apically as in this series from Michigan, the space between the ocelli and margin of vertex is somewhat narrower, and the rims of the abdominal terga are strongly reddened. The degree of these differences does not seem to justify recognition of this eastern form as a subspecies, at least until males also have been studied. The male described above is from Oregon and was identified by Sandhouse.

Another subspecies, *austromontana* Michener, occurs in southern California.

***Osmia (Centrosmia) bucephala*
bucephala Cresson**

(Figs. 27 & 32)

- Osmia bucephala* Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 17. ♀.
Osmia megacephala Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 18. ♀.
Osmia latitarsis Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 20. ♂.
Osmia lignivora Packard, 1867. Amer. Nat. 1, p. 375. (biology)

Osmia lignicola Provancher, 1882. Nat. Canad. 13, p. 208. ♀.

Osmia lignivora Cockerell, 1907. Colo. Univ. Studies 5, p. 37. ♀.

Centrosmia bucephala Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Melanosmia) bucephala Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 37.

FEMALE — Length 15-16 mm.; black, with bluish reflections; length of face to anterior ocellus equal to distance between eyes; eyes subparallel; lateral ocelli much nearer each other than to eyes, and slightly nearer eyes than to margin of vertex; clypeus quite strongly convex, apical margin considerably produced and very strongly thickened, strongly depressed just above this area; labrum subquadrate, only very slightly longer than basal width; mandibles 3-dentate, as shown (fig. 32); width of cheeks about twice that of eyes; wings lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments quite short, simple and unmodified, mid and hind spurs piceous; pubescence yellowish-white around antennae, on vertex, dorsum of thorax and in large part on abdominal terga 1 and 2, elsewhere, including the scopa, black; punctures in general, fine and rather close, slightly separated on each side of clypeus, around ocelli and over most of cheeks, quite dense on supra-clypeal area, clypeus medially, sides of face, and vertex medially; punctures slightly separated in center of scutum, otherwise close over dorsum of thorax and on pleura, propodeum smooth but rather dull, punctures hardly evident, dorsal area velvety, upper margin not definitely striate or rugose; punctures of abdominal terga minute and rather close but not crowded on terga 1 and 2, becoming closer on the following terga, apical margins somewhat depressed, but these areas to some degree punctate, punctures becoming more sparse and minute toward the rims; abdominal terga densely and copiously pubescent, this yellowish on 1 and 2, but apex of 2 becoming blackish, and black and erect on 3-5, more or less appressed but still quite dense on 6.

MALE — Length 13-14 mm.; head and thorax largely black, but with vague bluish reflections above, abdomen more definitely bluish; face considerably longer than distance between eyes; eyes subparallel, lateral ocelli somewhat nearer each other than to eyes, and slightly nearer eyes than to margin of vertex; clypeus rather broadly convex, apical margin considerably produced, median area nearly straight but with vague crenulations; labrum short, much broader than the median

length; mandibles bidentate; cheeks only slightly broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; mid tarsal segments much modified, the basitarsus produced apically on inner side, segments 2-4 very broadly dilated apically and strongly thickened, hind basitarsus slender at base and quite broadly dilated toward apex, not tuberculate, mid and hind spurs black, the inner hind spur nearly as long as the basitarsus and strongly curved; pubescence whitish over most of head and thorax, rather dense on front of face, clypeus and lower cheeks, on pleura and around margin of dorsum of thorax, white on basal portions of legs, becoming more or less blackish on tarsal segments; pubescence whitish on terga 1 and 2, black and erect on discs of 3-5, pale with intermixed, blackish hairs on 6; punctures fine and close in general, somewhat separated on each side of vertex above eyes, otherwise quite densely crowded over most of head, close over most of scutum and scutellum, but slightly separated medially on scutum posteriorly and over much of scutellum; punctures very fine and densely crowded on pleura, lateral faces of propodeum smooth and somewhat shining, with vague, minute punctures, posterior face becoming rather dull, without distinct punctures, dorsal area velvety; punctures minute and slightly separated on abdominal terga 1-4 medially, becoming very close and minute laterally, somewhat more uniformly distributed on 5, and becoming minute and rather widely separated on 6, apical margins rather broadly depressed and impunctate on all terga, 6 without a distinct, median emargination, 7 very broad and very shallowly emarginate; sternum 2 broadly subtriangular apically, only partially covering sternum 3, this with a rather narrow, median emarginate area which is largely occupied by convergent setae; sternum 4 rather broadly rounded apically, with a median area beset with elongate, black setae, bare on each side, 5-8 entirely retracted, apical

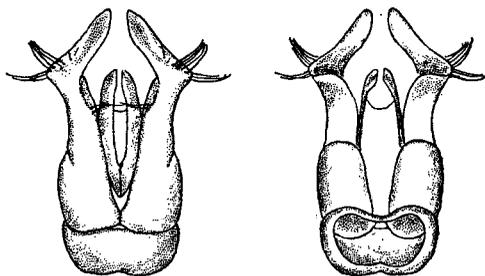


Figure 27

Dorsal (left) and ventral views of genital armature in male of *Osmia bucephala*.

margin of 6 with a rather narrow, median, truncate lobe, 8 produced medially into an elongate, slender, pubescent process; genital armature as shown (fig. 27).

DISTRIBUTION — British Columbia and the Yukon to the New England states, south to Georgia, April to July.

FLOWER RECORDS — *Azalea* and *Pentstemon*. Robertson (1929) records *bucephala* on *Aesculus*, *Baptisia*, *Cercis*, *Dentaria*, *Dicentra*, *Erythronium*, *Mertensia* and *Viola*.

A subspecies from the Northwest, *subornata* Cockerell, makes the subspecific designation of *bucephala* necessary.

Osmia (Centrosmia) nigriventris (Zetterstedt)

(Fig. 32)

- Anthophora nigriventris* Zetterstedt, 1838. Ins. Lapponica 1, p. 465. ♀
Osmia frigida Smith, 1853. Cat. Hym. Brit. Mus. I, p. 142. ♀ ♂.
Osmia hudsonica Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 21 ♂.
Osmia corticalis Gerstaecker, 1869. Stettin. Ent. Ztg. 30, p. 331. ♀ ♂.
Osmia frigida Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 332. ♀ ♂.
Osmia (Melanosmia) nigriventris Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 35.
Osmia (Centrosmia) nigriventris Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 244.
Osmia (Centrosmia) nigriventris Sinha and Michener, 1958. Univ. Kans. Sci. Bull. 39, p. 284.

FEMALE — Length 11 mm.; entirely black, without metallic reflections; length of face only slightly greater than distance between eyes above; eyes very slightly convergent below; lateral ocelli somewhat nearer eyes than to margin of vertex, much nearer each other; clypeus strongly convex, considerably produced apically, margin strongly thickened, very slightly outcurved, but not otherwise modified; median length of labrum about equal to basal width; mandibles not much broadened apically, rather short, distinctly 4-dentate (fig. 32); cheeks more than double width of eyes; wings lightly infuscated, not much darker apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence largely pale over head, thorax and basal abdominal tergum, with a few blackish hairs behind eyes and some obscure fuscous hairs intermixed on clypeus,

rather short on head but quite dense over front of face, quite elongate and copious on thorax, legs largely black pubescent; scopa entirely black, discs of abdominal terga 2-5 with rather short but erect and conspicuous pubescence, becoming more elongate toward sides, largely pale on tergum 2, with a few dark hairs intermixed, becoming more blackish on the following terga, entirely pale and largely subapressed on tergum 6; punctures rather fine and close in general, close but not crowded on vertex medially, becoming somewhat more distinctly separated but close laterally and on upper cheeks, becoming more crowded on cheeks below, median area between ocelli and antennae densely and finely rugose, rather shallow and sparse on each side of clypeus, but clypeus densely rugose; punctures fine and densely crowded over most of scutum, becoming slightly separated only in center of disc, very fine and close on scutellum, crowded only along posterior margin; pleura dull, punctures fine and very close in general, lateral faces of propodeum smooth but dull, posterior face more tessellate, punctures very minute and obscure, dorsal area velvety, not at all striate along upper margin; abdominal terga somewhat more shining, punctures very fine, rather close but distinctly separated, those in center of each disc becoming minute and rather sparse toward apical margin, these rather broadly but slightly depressed, with minute and sparse punctures; tergum 6 with exceedingly minute, close and evenly distributed punctures.

MALE — Length 10-11 mm.; entirely black, with no metallic reflections; face slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli slightly nearer each other than to eyes, subequally distant from eyes and margin of vertex; clypeus rather broadly convex, apical margin considerably produced, median area nearly straight; median length of labrum slightly greater than basal width; mandibles bidentate; cheeks much broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base; mid tarsal segments slender and simple, hind basitarsus slender at base and broadly dilated toward apex, not tuberculate, mid and hind spurs piceous; pubescence whitish or pale ochraceous over most of head and thorax, rather dense on front of face, clypeus and lower cheeks, on pleura and around margin of dorsum of thorax, largely pale on legs, whitish on basal abdominal tergum, short, suberect and somewhat darker on discs of the following terga; punctures deep, distinct, rather coarse and close on head and thorax, but fine and densely crowded on cly-

peus, finer and very close on cheeks below, minute and slightly separated on abdominal terga 2-5, somewhat coarser, but shallow and rather close on basal tergum, more widely separated on 6, apical margins rather broadly depressed, with scattered minute punctures; sternum 2 broadly subtriangular apically, only partially covering sternum 3, this with a rather broad, median emarginate area which is largely occupied by convergent setae; sternum 4 somewhat produced, median third subtruncate; tergum 6 without a distinct, median emargination; tergum 7 very shallowly emarginate medially; sterna 5-8 entirely retracted, apical margin of 6 with a median truncate lobe (much as in *simillima*, fig. 28); apex of gonocoxite similar to that in *felti* (fig. 31).

DISTRIBUTION — This species is holarctic and is recorded on this continent in Alaska, across Canada and in the Northwestern and Rocky Mountain states. Although it has not yet been recorded from any of the eastern states, it has been collected in Minnesota and Ontario, and it seems possible that it will eventually be found in some of the border states in the Northeast.

In the Catalog of Hymenoptera (p. 1165) *Osmia xanthomelaena* Smith is included in the synonymy of *nigriventris*. It was described by Smith in 1844 (Zoologist 2, p. 745) but was attributed to Kirby. However, the name *xanthomelaena* was first proposed by Illiger (Magaz. f. Insectenk. 5, 1806, p. 112) and is included in the synonymy of *Osmia fuciformis* by Dalla Torre (Cat. Hym. p. 395). Specimens from Smith's collection were found in the Hope Museum at Oxford, and it is my opinion that they do not represent *nigriventris*. A need for more study of the Palaearctic species in this group is indicated.

Osmia (?*Centrosmia*) *tarsata* Provancher

- Osmia tarsata* Provancher, 1888. Addit. Corr. Faune Ent. Canad. Hym. p. 328. ♂.
Centrosmia tarsata Titus, 1906. Ent. Soc. Wash. Proc. 7, p. 158.
Osmia (*Melanosmia*) *bucephala* Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 37.
Osmia (*Centrosmia*) *bucephala* Sinha and Michener, 1958. Univ. Kans. Sci. Bul. 39, p. 278.

Both Sandhouse (1939), and Sinha and Michener (1958) have placed *tarsata* in synonymy under *bucephala*. This writer has examined the type in the Provincial Mu-

seum of Quebec and finds that the two are distinct. According to the brief notes that were made, it would run to *bakeri* in the key to *Centrosmia* males by Sinha and Michener, but it does not seem to agree entirely with Sandhouse's description of that species. The middle pair of legs show the most conspicuous differences from both of these species, for in *tarsata* the mid basitarsi are robust, expanded apically, but segment 2 is elongate, slender at the base and expanded apically, while segments 3 and 4 are relatively unmodified. The 6th tergum is very slightly emarginate medially, the 7th deeply emarginate; sternum 4 is not sulcate; and the median emargination of sternum 3 is very narrow.

DISTRIBUTION — Quebec.

Osmia (?*Monilosmia*) *felti* Cockerell

(Figs. 31 & 32)

Osmia felti Cockerell, 1911. Ent. News 22, p. 18. ♀.

Osmia (*Nothosmia*) *felti* Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 91.

Osmia (*Monilosmia*?) *felti* Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 253.

FEMALE—Length 12 mm.; head and thorax blackish, with blue-green tints, abdomen deep blue; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer to each other; clypeus quite strongly convex, considerably produced apically, margin nearly straight, narrowly polished and impunctate; dentition of mandible as shown (fig. 32); cheeks much broader than eyes; wings lightly infuscated, somewhat more deeply so along apical margin, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence largely yellowish-white on head, thorax and basal segment of abdomen, with only a few darker hairs on clypeus apically, discal pubescence of abdominal terga very thin and sparse, short but erect, dark on tergum 5, pale and subappressed on 6; scopa entirely fuscous; punctures quite close and fine over most of head and thorax, but somewhat separated on vertex laterally, in center of scutum posteriorly, and along anterior portion of scutellum, pleura rather dull, punctures fine and close but rather shallow and indistinct, lateral faces of propodeum somewhat smoother but dull, dorsal area of posterior face velvety, becoming narrowly and obscurely substriate along dorsal margin;

abdominal terga shining, punctures deep and distinct across base of each plate, somewhat separated but quite close in general, becoming somewhat more sparse and fine apically, margins quite broadly depressed, but with fine, rather sparse punctures nearly to the rims, tergum 6 densely and very finely punctate.

MALE — Length 9-10 mm.; bluish-green; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, somewhat nearer to each other; clypeus convex, somewhat produced apically, margin nearly straight, narrowly polished and impunctate; median length of labrum not quite equal to the basal width; mandible distinctly bidentate; cheeks about equal to eyes in width; wings subhyaline, faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; mid tarsal segments 2-4 strongly compressed, somewhat dilated apically, hind basitarsus not tuberculate; mid and hind spurs piceous; pubescence yellowish-white, without dark intermixture, dense and elongate between antennae and on lower part of face, on cheeks, over most of thorax, and on basal abdominal tergum, short thin and suberect on discs of the following terga; punctures rather fine and close but quite deep over most of head and thorax, slightly separated on vertex laterally, in center of scutum posteriorly and over anterior portion of scutellum, pleura rather dull, with dense and fine punctures, propodeum smooth but rather dull, punctures minute and obscure, dorsal area of posterior face velvety, becoming irregularly finely striate along dorsal margin; abdominal terga 1-5 shining, punctures fine and rather close but not contiguous, apical margins depressed and rather broadly polished and impunctate; tergum 6 minutely and rather sparsely punctate apically, margin without a distinct emargination; tergum 7 rather narrowly produced and with a very small and shallow, median emargination; sternum 2 broadly rounded apically, covering sternum 3 in large part and base of sternum 4, 3 with a narrow, median emargination which is occupied by rather short setae which do not completely converge, 4 rather broadly produced apically, this area rather densely and uniformly setose, 5-8 entirely retracted, 8 triangularly acute apically; penis valves of genital armature slender and much shorter than gonocoxities, apex of gonocoxities as shown, (fig. 31).

DISTRIBUTION — Minnesota to the New England states, south to West Virginia, June to August.

Osmia (Monilosmia) simillima Smith

(Figs. 28, 32 & 35)

- Osmia simillima* Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 142. ♀ ♂.
Osmia canadensis Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 33. ♂.
Osmia cognata Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 33. ♂.
Osmia major Robertson, 1902. Ent. News 13, p. 79. ♀ (♂ misdet.)
Osmia chlorops Cockerell and Titus, 1902. Amer. Nat. 36, p. 816. ♂.
Osmia simillima Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 332.
Osmia chlorops Cockerell, 1906. Amer. Mus. Nat. Hist. Bul. 22, p. 448. ♂.
Osmia stasima Lovell, 1909. Ent. News 20, p. 125. ♀. New synonymy
Monilosmia canadensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Osmia (Nothosmia) simillima Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 92.
Osmia (Monilosmia) simillima Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 241.

FEMALE — Length 11-12 mm.; bluish-green, with black legs; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; clypeus convex, considerably produced apically, broad apical margin nearly straight, narrowly shining and substriate; median length of labrum subequal to basal width; mandibles obscurely 4-dentate (fig. 32); cheeks much broader than eyes; wings subhyaline basally, becoming lightly infuscated along apical margin and in marginal cell, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; front basitarsi somewhat dilated and flattened, upper surface slightly concave, beset with long curled hairs, tarsi otherwise simple and unmodified, mid and hind spurs piceous; pubescence of head and thorax largely pale, becoming more or less fuscous toward apical margin of clypeus, quite copious and elongate in general, especially over face and around wing bases; scopa black; basal abdominal tergum entirely whitish pubescent, hairs rather copious and elongate, discs of the following terga with more or less erect, but short and rather thin pubescence which becomes more or less fuscous on 4 and 5, 6 largely covered with a rather thin, subappressed, pale tomentum which does not hide surface; punctures quite deep and distinct in general, close but distinct on vertex and cheeks, becoming finer and crowded at sides of face below antennae, clypeus more shallowly rugoso-punctate; punctures close, deep and

quite coarse on scutum laterally and anteriorly, becoming rather widely separated near center and toward posterior margin, deep, distinct and quite close over most of scutellum, becoming densely crowded and obscure around posterior margin; pleura rather dull, punctures somewhat more shallow, subcontiguous; propodeum somewhat shining but minutely roughened laterally, posterior face with shallow but rather close and more distinct punctures, dorsal area smooth, becoming narrowly, finely and obscurely substriate along upper margin; abdominal terga shining, punctures fine and distinctly separated medially on 1-4, these becoming more closely punctate toward extreme sides, punctures of 5 more irregular but rather close across entire disc, 6 densely, finely uniformly punctate, apical margins of 2-5 shallowly depressed, invaded by scattered and rather sparse, fine punctures, leaving the narrow, apical rims shining and impunctate.

MALE — Length 10-12 mm.; head and thorax dark olive green, abdomen more bluish-green; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex, and each other; each antennal segment slightly dilated apically, resulting in a moniliform appearance; clypeus convex, considerably produced apically, median area of margin nearly straight, narrowly polished and impunctate; median length of labrum subequal to basal width; mandibles obscurely bidentate; cheeks slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; front tarsal segments slender and simple, mid basitarsi quite short, 2nd fully half its length, hind basitarsi slender basally, becoming quite gradually and broadly dilated apically, 2nd segment about equal in length to that on the 2nd pair of legs, mid and hind spurs piceous; pubescence entirely whitish, quite copious and elongate over most of head and thorax, rather elongate on basal abdominal tergum, discs of terga 2-5 with suberect, short and thin, pale pubescence, that on 6 more scattered and elongate; punctures quite deep and distinct, rather fine and close in general, close but not crowded on vertex and cheeks, becoming crowded below ocelli, clypeus finely and very densely punctate; punctures deep and distinct but rather fine and close over most of scutum, slightly separated only in center, scutellum shining, punctures deeper and more distinct, close but not crowded, but becoming densely crowded and obscure around posterior margin; pleura rather dull, punctures quite deep, distinct, close and rather fine, lateral faces of propodeum somewhat shining and obscurely

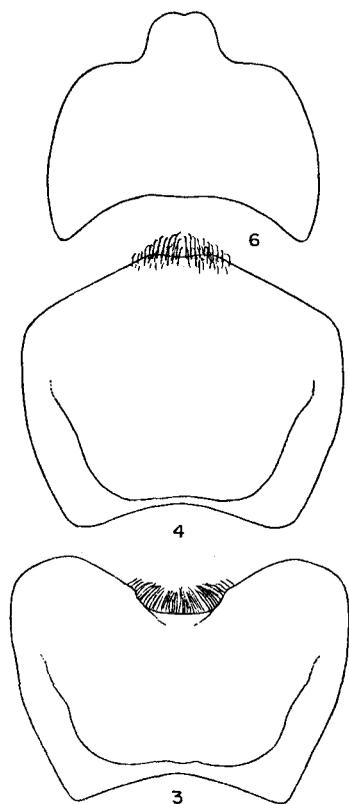


Figure 28
Abdominal sterna 3, 4 and 6 in male of *Osmia simillima*.

lineolate, posterior face more roughened, punctures very vague and obscure but rather close, dorsal area somewhat smooth and shining, becoming very finely and obscurely substriate along upper margin; abdominal terga shining, more finely punctate, punctures quite close but distinct on terga 1-5, these not much closer at extreme sides, apical margins somewhat depressed, invaded to only a slight degree by very fine and rather sparse punctures, rims becoming smooth and impunctate; punctures of tergum 6 scattered, rather sparse and irregular, apical margin with a shallow, median emargination and a slight indentation at each extreme side; tergum 6 narrowly produced apically, with a deep, rounded, median emargination; sternum 2 broadly outcurved apically, covering sternum 3 in large part and base of 4, apical margin of 3 with a very broad, deep, triangular, median emargination which is occupied medially by a dense fringe of elongate, convergent setae (fig. 28); sternum 4 rather broadly produced apically, the median area nearly straight and occupied by rather numerous, elongate, dark setae, 5-8 entirely

retracted, 6 with a broad, median, rounded apical lobe, 7 and 8 largely membranous; genital armature as shown (fig. 35).

DISTRIBUTION — British Columbia to Nova Scotia, south to Arizona and North Carolina, April to August.

FLOWER RECORDS — *Althaea*, *Barbarea*, *Pentstemon*, *Rubus*, *Vicia* and *Viola*. This is recorded by Robertson (1929) on *Oxalis* and *Ranunculus*.

Osmia (Diceratostmia) conjuncta (Cresson)

(Figs. 29 & 32)

Osmia conjuncta Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 31. ♀.

Osmia 4-dentata Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 107. ♂.

Osmia cressoni Dalla Torre, 1896. Cat. Hym. 10, p. 392. (new name)

Osmia quadridentata Dalla Torre, 1896. Cat. Hym. 10, p. 392. (Emend.)

Osmia conjuncta Sandhouse, 1925. Canad. Ent. 57, pp. 36 & 64.

Osmia conjuncta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia conjuncta Graenicher, 1935. Ent. Soc. Amer. Ann. 28, p. 305.

Osmia conjuncta Rau, 1937. Ent. Soc. Amer. Ann. 30, p. 330.

Diceratostmia conjuncta Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 139.

Diceratostmia conjuncta Michener, 1949. Ent. Soc. Amer. Ann. 42, p. 260.

Osmia (Diceratostmia) conjuncta Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 230.

FEMALE — Length 9 mm.; bluish-green; face slightly longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes, from each other and from margin of vertex; clypeus slightly convex, somewhat produced apically but not at all thickened, median third nearly straight; median length of labrum about equal to its basal width; mandibles tridentate, middle tooth nearer apex than to inner angle (fig. 32); cheeks slightly broader than eyes; wings very lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; basitarsi of all legs relatively slender, about equal to the following segments combined, mid and hind spurs dark; pubescence including scopa entirely yellowish-white; punctures in general, deep and distinct, coarse and close on vertex, becoming very coarse and crowded, or subreti-

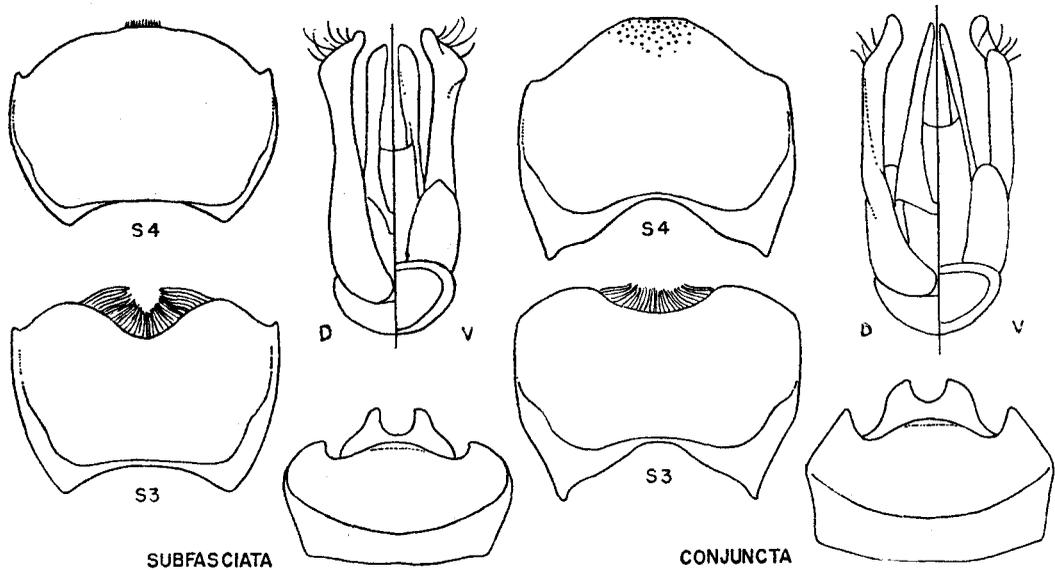


Figure 29—Dorsal and ventral views of genital armature, sternum 3 and 4, and terga 6 and 7 in males of *Osmia conjuncta* and *O. subfasciata*.

culate, on clypeus, front with a distinct nodus midway between antennal fossae, and with a second similar nodus just above this; punctures somewhat finer but close and distinct on cheeks and on scutum anteriorly, becoming somewhat coarser posteriorly, and very coarse and close, but interspaces shining, on scutellum; pleura coarsely, deeply and contiguously punctured; propodeum dull and tessellate, posterior surface with very shallow and obscure punctures, lateral faces practically impunctate, dorsal area densely tessellate but impunctate; abdominal terga somewhat more finely punctate, punctures distinctly separated medially on terga 1-3, becoming closer, deeper and coarser toward sides, more uniformly coarse and close on 4 and 5, very finely and densely punctate on 6, apical margins of all finely and distinctly punctate to the rims.

MALE — Length 9 mm.; abdomen bluish-green, head and thorax more olive green; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, each other, and margin of vertex; clypeus slightly convex, somewhat produced apically, with a shallow, median, apical emargination; length and basal width of labrum about equal; mandibles distinctly bidentate; cheeks considerably broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer its apex than 1st does to base; tarsal segments of legs slender and simple, hind basitarsus without any evident

tubercle, mid and hind spurs dark; pubescence entirely yellowish-white; punctures in general deep and distinct, close and coarse on vertex, becoming finer and densely crowded on lower portions of face, on clypeus, and on cheeks below, scutum rather finely and closely punctate anteriorly, becoming somewhat more coarsely so posteriorly, those of scutellum considerably coarser and very close; pleura densely, coarsely and deeply punctate; propodeum rather dull, punctures shallow but evident on both posterior and lateral faces; abdominal terga somewhat more finely punctate, punctures deep, distinct and uniformly quite close, reaching nearly to apical rim of each plate; lateral angles of tergum 6 acute (fig. 29); semicircular median emargination on tergum 7 delimited on each side by rather broadly rounded lobes; sternum 2 very broadly rounded apically, largely covering sternum 3, apical areas of 3 and 4 exposed, form as shown (fig. 29), 5-8 entirely retracted, 5 and 6 but little modified, 7 much reduced, and 8 triangularly pointed medially; gonocoxites rather deeply constricted just before tip.

DISTRIBUTION — Minnesota to Ontario and the New England states, south to Texas and North Carolina, March to August.

FLOWER RECORDS — *Cercis*, *Dentaria*, *Fragaria*, *Geranium*, *Lupinus* and *Rubus*. Recorded by Robertson (1929) on *Anemonella*, *Blephilia*, *Cardamine*, *Collinsia*, *Hydrophyllum*, *Osmorrhiza*, *Polyonium*,

Psoralea, *Ranunculus*, *Scutellaria*, *Stellaria*, *Trifolium* and *Viola*.

Rau (1937) has recorded the rearing of *conjuncta* from snail shells.

***Osmia (Diceratosmia) subfasciata subfasciata* (Cresson)**

(Figs. 29 & 32)

Osmia subfasciata Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 261. ♀ ♂.

Osmia conjunctoides Robertson, 1893. Amer. Ent. Soc. Trans. 20, p. 276. ♂. New synonymy

Diceratosmia subfasciata Michener, 1947. Amer. Midland Nat. 38, p. 450. (flower record)

Diceratosmia subfasciata subfasciata Michener, 1949. Ent. Soc. Amer. Ann. 42, p. 262.

Osmia (Diceratosmia) subfasciata Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 230.

FEMALE — Length 8 mm.; head and thorax bluish, with a slightly greenish tinge dorsally, abdomen somewhat more greenish; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, slightly closer to eyes; clypeus slightly convex, median area rather abruptly produced apically, this portion nearly straight; median length of labrum about equal to its basal width, somewhat narrowly rounded apically, with a distinct, transverse, median, setose area, otherwise shining and with a row of apical setae; mandibles distinctly tridentate, middle tooth about equally distant from apex and inner angle (fig. 32); cheeks somewhat broader than eyes; front of head not tuberculate; wings lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments of legs simple and unmodified, basitarsi not quite equalling combined length of the following segments, front spurs yellowish-hyaline, mid and hind spurs piceous or black; pubescence, including scopa, entirely white, rather short and thin in general, forming rather distinct, whitish, apical fasciae toward sides on abdominal terga 1 and 2; punctures quite coarse, deep and distinct in general, close on vertex and face above antennae, becoming crowded and quite coarse on clypeus, somewhat finer but close on cheeks and on scutum anteriorly, becoming slightly coarser posteriorly, quite coarse and rather well separated on the shining scutellum; punctures of pleura close and coarse but not crowded, interspaces somewhat shining; propodeum somewhat shining, punctures finer but quite deep, distinct and close, dorsal area becoming finely reticulate along upper margin; punctures of abdominal terga medially rather fine,

rather wide separated on 2 and 3, becoming closer and coarser toward sides, uniformly quite close and coarse on 4 and 5, rather fine and densely crowded on 6, punctures reaching apical margin, rims of 2-5 with a single row of very fine and close but deep and distinct punctures.

MALE — Length 7mm.; bluish-green, front of face somewhat more olive green; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, each other, and margin of vertex; clypeus very slightly convex, apical margin rather narrowly produced medially, this area nearly straight, shining and impunctate; median length of labrum about equal to basal width; mandibles distinctly bidentate; cheeks only very slightly broader than eyes; wings faintly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments of legs slender and simple, hind basitarsi without a median denticle, mid and hind spurs piceous; pubescence entirely whitish, dense and erect on clypeus, forming rather distinct, apical fasciae on the more basal abdominal terga, these more or less interrupted medially; punctures deep and distinct, rather coarse in general, coarse on vertex and face above antennae, becoming finer, densely crowded and obscure below antennae and on clypeus, coarse and almost crowded on cheeks; punctures close over most of scutum, somewhat coarser posteriorly, quite coarse and close on scutellum, coarse and almost crowded on pleura; propodeum shining, with rather close and distinct punctures; abdominal terga more finely punctate, rather uniformly close across discs of terga 1-5, somewhat coarser and deeper on 6, close and irregular on 7; lateral angles of tergum 6 rather broadly rounded; median, semicircular emargination of 7 delimited by a pair of rather narrow, blunt processes (fig. 29); sternum 2 broadly rounded apically, largely covering sternum 3 and 4, apical margins of these exposed, form as shown (fig. 29), 5-8 entirely retracted, 5 and 6 but slightly modified, 7 and 8 much reduced, resembling those of *conjuncta*; apex of gonocoxites strongly angulate on outer side, as shown.

DISTRIBUTION—According to Michener (1949), typical *subfasciata* occurs from northern Mexico and Texas to Kansas, and east to Mississippi and Tennessee. He was doubtful of a New Jersey record. It is now known to occur from Florida to North Carolina, and the New Jersey record is probably correct. It is in flight from March to June.

FLOWER RECORDS — *Brassica* and *Rubus*. It is also recorded by Michener (1947 & 1949) on *Achillea*, *Astragalus*, *Cercis*, *Coreopsis*, *Gaillardia*, *Helianthus*, *Marilaunidium*, *Monarda* and *Prunus*.

This species was found nesting in a house at Waynesville, North Carolina, in burrows of *Hylotrupes bajulus*.

It was at first thought that a dark blue form of *subfasciata* occurring in South Florida represented Robertson's *conjunctoides*. However, the type of *conjunctoides* has been seen and compared with typical *subfasciata* from North Carolina and no differences can be detected. It appears, therefore, that *conjunctoides* is a synonym of *subfasciata*, and the darker blue South Florida form, if it is distinct, should be designated by another name. This, together with the chief differences, follows.

Osmia (Diceratosmia) subfasciata
miamiensis
new subspecies

FEMALE — Length 10 mm.; deep blue to purplish; punctures of vertex and dorsum of thorax finer and much closer, being densely crowded on scutum anteriorly; pleura dull, punctures rather coarse but densely crowded, wings somewhat more deeply infuscated.

MALE — Resembles female in color, size and relative density of punctures; terga 6 and 7, and abdominal sterna similar to those in *subfasciata* (fig. 00).

TYPE — Holotype: Female, Cape Florida, Fla., Feb. 15, 1925 (S. Graenicher, on *Crotalaria*.) [author's coll.] Allotype: (head missing), Miami Beach, Fla., Feb. 8, 1917 (Graenicher). Paratypes: 2 ♀♀, topotypical.

Osmia (Chalcosmia) chalybea Smith
(Figs. 30, 32-35)

Osmia chalybea Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 143. ♀ ♂.

Osmia chalybea Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 33. ♂.

Chalcosmia chalybea Titus, 1906. Ent. Soc. Wash. Proc. 7, p. 156.

Osmia (Chalcosmia) chalybea Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 16.

FEMALE — Length 14-15 mm.; dark blue; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli considerably nearer each other than to eyes, widely removed from margin of vertex; apical

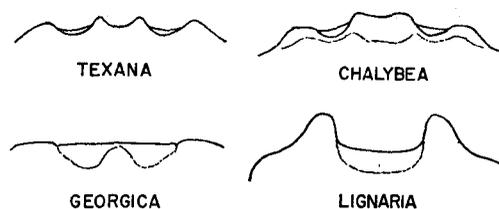


Figure 30

Apical margin of clypeus in females of *Osmia*.

margin of clypeus slightly produced, with a median, elevated, blunt tubercle, depressed area on each side slightly emarginate (fig. 30); labrum with rather copious, black pubescence, its median length somewhat greater than basal width; mandibles rather short and blunt, upper part of base somewhat swollen and with a rounded, carina-like protuberance below, dentate margin with distinct, apical and subapical teeth, and an elongate, beveled area above (fig. 32); cheeks broader than eyes; wings deeply infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified; front spurs testaceous-hyaline, mid and hind spurs piceous; pubescence of head and thorax largely whitish, rather short and dense, pale on the more basal segments of the legs, but becoming black on tarsal segments; scopa entirely black, the abdominal terga with extremely short, inconspicuous, discal pubescence which is barely evident, somewhat more elongate on basal tergum; punctures deep and distinct, quite close in general, rather coarse and distinctly separated on vertex, becoming somewhat closer on cheeks below, densely crowded on face, somewhat coarser and crowded or subreticulate on clypeus; punctures of scutum rather fine and crowded laterally, becoming somewhat coarser and more widely separated along midline, the scutellum with rather sparse and irregular punctures anteriorly, becoming close around posterior margin; pleura dull, with densely crowded punctures, those on lateral faces of propodeum very fine and densely crowded, becoming somewhat more distinctly separated on the tessellate, posterior face, dorsal area dull but smooth, its dorsal margin with short, fine striations; punctures of abdominal terga fine, distinctly but not widely separated medially, becoming almost crowded at extreme sides, those on tergum 5 somewhat coarser and uniformly close, 6 finely and densely punctate, apical margins of all somewhat depressed, well punctured to the rims.

MALE — Length 10-11 mm.; face somewhat longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant

from eyes and each other, somewhat more distant from margin of vertex; clypeus slightly convex, apical margin slightly produced and outcurved, median area rather narrowly truncate; median length of labrum about equal to basal width; mandibles bidentate; cheeks slightly broader than eyes; wings rather deeply infuscated, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; tarsal segments simple and unmodified, hind basitarsus with a submedian tubercle on anterior margin; mid and hind spurs fuscous; pubescence of head and thorax entirely, and of legs in large part, whitish, rather short and dense on thorax, becoming somewhat blackish on hind tarsal segments; discal pubescence of basal abdominal tergum entirely whitish, rather elongate, especially laterally, very short and inconspicuous on the following terga, forming rather obscure and indefinite, apical fringes on 4 and 5, entirely pale on apical tergum and on the sterna; punctures quite deep and distinct, rather fine in general, slightly separated on vertex and cheeks, becoming densely crowded on face below ocelli and on clypeus, scutum with densely crowded punctures except along midline posteriorly, those on scutellum somewhat coarser and distinctly separated in center anteriorly, becoming crowded toward posterior and lateral margins; pleura dull, with densely crowded and indefinite punctures, lateral faces of propodeum somewhat shining, punctures very shallow and indistinct, posterior face rather dull, punctures shallow, irregular and rather obscure, dorsal area dark, densely tessellate, with a narrow, dorsal fringe of short striations; punctures of abdominal terga somewhat more distinct but fine, slightly separated medially on 1-3, becoming somewhat closer at extreme sides, uniformly close on 4-6, very fine on 6, apical margins rather narrowly depressed and finely punctate, the punctures becoming obsolescent toward the rims, these shining and impunctate on terga 4 and 5; apical margin of tergum 6 with a distinct, semicircular, median emargination, 7 narrowly produced, this area with a deep semicircular emargination; sternum 2 broadly produced apically, covering most of sternum 3 and basal half of 4, apical margin of 3 with a deep, triangular, median emargination, this area fringed with elongate setae which converge along midline, largely filling the emargination (fig. 33); sternum 4 considerably produced apically, margin slightly thickened and quite deeply grooved (fig. 34), 5-8 entirely retracted, slightly modified; genital armature as shown (fig. 35).

DISTRIBUTION — North Carolina to Florida and Texas, March to May. Sand-

house (1939) includes New York (Long Island) and New Jersey in the distribution.

FLOWER RECORDS — *Ceanothus*, *Cirsium* and *Vaccinium*.

***Osmia (Chalcosmia) coerulescens*
(Linnaeus)**

(Figs. 33-35)

- Apis coerulescens* Linnaeus, 1758. Syst. Nat. 10th., p. 576. ♀.
Apis aenea Linnaeus, 1761. Fauna Suecica, 2nd. ed., p. 421. ♂.
Osmia cyanea Giraud, 1866. Soc. Ent. France Ann. 6, p. 451. ♀ ♂.
Osmia purpurea Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 27. ♀.
Osmia rustica Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 27. ♂.
Osmia caerulescens Dalla Torre, 1896. Cat. Hym. 10, p. 388. (emend.)
Osmia (Chalcosmia) coerulescens Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 15.

FEMALE — Length 10-11 mm.; dark blue, becoming almost black in some areas; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli slightly nearer each other than eyes, and nearer eyes than to margin of vertex; clypeus strongly convex, apical margin considerably produced, median area straight and simple; labrum slightly longer than basal width; mandible obscurely 4-dentate (resembling that in *albiventris*, fig. 32); cheeks much wider than eyes; wings lightly infuscated, becoming somewhat more deeply so apically, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence pale yellow on face, vertex and dorsum of thorax, whitish on cheeks, thorax laterally and beneath, and on abdomen, the scopa black; punctures quite deep and distinct, rather coarse in general, slightly separated on vertex medially, but becoming crowded on face below ocelli, on clypeus, and over most of cheeks; punctures slightly separated in a restricted area in center of scutum, but otherwise closely crowded on scutum, scutellum and pleura; lateral faces of propodeum somewhat shining, punctures minute and vague, posterior face becoming more shining, punctures shallow and obscure, dorsal area polished, but upper margin becoming narrowly striate; abdominal terga more finely punctate, punctures distinctly separated medially on 1-3, becoming somewhat more deep, distinct and close toward sides, more uniformly close on 4 and 5, very fine and densely crowded on 6, apical margins of all narrowly depressed, but

finely and closely punctate to the rims; pubescence of abdominal terga quite copious, somewhat elongate on basal tergum, short but erect and conspicuous on terga 2-5, these more or less distinctly yellowish fasciate apically, but the fasciae widely interrupted on the more basal terga; tergum 6 with fine, subappressed, pale tomentum.

MALE — Length 9 mm.; brassy green; face somewhat longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; clypeus strongly convex, somewhat produced apically, median area nearly straight but margin obscurely crenulate; mandibles bidentate; cheeks subequal to eyes in width; wings subhyaline, slightly infuscated apically, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; tarsal segments simple and unmodified, anterior margin of hind basitarsi without a submedian tubercle; mid and hind spurs piceous; pubescence yellow on head and thorax above, becoming somewhat more whitish on cheeks and on thorax beneath, copious over abdomen, forming rather indistinct, apical fasciae on the terga; punctures quite deep and distinct, close in general, crowded on face and clypeus, quite uniformly close over remainder of head and thorax, somewhat finer and distinctly separated on abdominal terga 1-4, becoming somewhat closer at extreme sides, rather shallow and indefinite but close on 5, minute and scattered on shining surface of 6, apical margins of all somewhat depressed, yellowish-hyaline, punctures becoming obsolescent; tergum 6 with a small, median, apical emargination, and a shallow and somewhat vague emargination on each extreme side; produced apical area of tergum 7 with a deep, semicircular emargination, acute on each side of this; sternum 2 broadly outcurved apically, covering most of remaining sternal plates, margin of 3 with a broad and deep, triangular, median emargination which is largely filled with elongate setae, converging toward midline (fig. 33); sternum 4 exposed along apical margin, this somewhat thickened and quite deeply grooved (fig. 34), 5-8 entirely retracted, submembraneous; genital armature as shown (fig. 35).

DISTRIBUTION — Minnesota to Nova Scotia, south to Illinois and North Carolina, March to July.

FLOWER RECORDS — *Philadelphus*, *Salvia*, *Trifolium* and *Vicia*.

Specimens of *coerulescens* have been reared from cells of an old mud-dauber nest.

Osmia (Chalcosmia) georgica Cresson

(Figs. 30, 34 & 35)

- Osmia georgica* Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 105. ♀.
Osmia (Gnathosmia) louisianae Cockerell, 1901. Canad. Ent. 42, p. 171. ♀.
Gnathosmia georgica Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Osmia (Chalcosmia) georgica Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 17.

FEMALE — Length 9 mm.; dark blue, with greenish tints on abdominal terga; face very slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; clypeus very short, apical margin hardly produced, with a median, carinate, apical elevation, which does not protrude beyond the apical margin, area on each side rather deeply excavated (fig. 30); labrum rather densely pubescent over upper half and laterally, median length slightly exceeding basal width, subtruncate apically; upper face of mandible with a robust, sub-basal, erect, flared protuberance, which partially covers apical margin of clypeus when mandibles closed, dentate margin with a pair of apical teeth and an inner, more elongate, bevelled edge; cheeks considerably broader than eyes; wings very lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence, including scopa, entirely whitish, rather dense over front of face and clypeus, and around wing bases, otherwise thin and inconspicuous; punctures deep and distinct in general, quite coarse and close but not crowded on vertex and cheeks, becoming crowded below ocelli, densely and finely crowded on clypeus; scutum somewhat more sparsely punctate in center of disc, punctures distinct but not widely separated on scutellum; pleura rather dull, with densely crowded punctures, lateral faces of propodeum minutely and densely punctate or subreticulate, posterior face densely tessellate, punctures becoming more irregular and obscure, dorsal area smooth but densely tessellate, becoming narrowly striate along upper margin; punctures rather fine and distinctly but not widely separated on abdominal terga 1-3, becoming finer and closer toward sides, rather uniformly close across 4 and 5, minute and densely crowded on 6, apical margins of all narrowly depressed and very finely punctate to the rims.

MALE — Length 7.5 mm.; deep blue; face

somewhat longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes, each other, and margin of vertex; clypeus only very slightly convex, apical margin slightly produced, nearly straight; median length of labrum approximately equal to basal width; mandibles bidentate; cheeks somewhat broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsi with a very robust, submedian tooth; mid and hind spurs brownish-testaceous; pubescence entirely whitish, rather dense around antennae and over part of face, on cheeks below, on thoracic sternum, with a rather prominent posterior fringe on front and mid femora, elsewhere rather thin and very inconspicuous; punctures quite deep and distinct, very close in general, rather coarse, close and distinct on vertex and cheeks, but becoming densely crowded below ocelli, around antennae and on clypeus; punctures rather coarse and almost crowded over most of scutum and scutellum, pleura dull with densely crowded and rather coarse punctures, but hypopimeral area just beneath tegulae somewhat shining and more sparsely punctate; lateral faces of propodeum rather dull, punctures shallow and obscure but rather close, posterior face dull and finely tessellate, punctures hardly evident, dorsal area smooth but tessellate, becoming very finely striate along upper margin; punctures of abdominal terga close, deep and distinct, rather coarse on the more basal terga, distinctly but not widely separated on terga 1-3, somewhat closer on 4 and 5, distinctly but not widely separated over most of 6, apical margins of all narrowly depressed, punctures becoming obsolescent toward rims; apical margin of tergum 6 with a small, median emargination, 7 narrowly produced, this area with a deep, rounded emargination; sternum 2 broadly rounded apically, largely covering sternum 3 and base of 4, sternum 3 quite similar to that of *inermis* (fig. 33), 4 rather broadly angulate apically, margin somewhat thickened and deeply grooved (fig. 34); sterna 5-8 entirely retracted; genital armature as shown (fig. 35).

DISTRIBUTION — Massachusetts to Michigan, south to Georgia and Texas, March to August.

FLOWER RECORDS — *Aronia*, *Brassica*, *Chrysanthemum*, *Claytonia*, *Erigeron*, *Fragaria*, *Geranium*, *Hydrangea*, *Linaria*, *Lupinus*, *Malus*, *Ranunculus*, *Rubus*, *Salix*, *Senecio* and *Vicia*. It is recorded by Robertson (1929) on *Cardamine*, *Coreopsis* and *Krigia*.

***Osmia (Chalcosmia) texana* Cresson**
(Fig. 30)

- Osmia texana* Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 261. ♂.
Osmia mandibularis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 102. ♀.
Osmia faceta Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 103. ♂.
Osmia (Chalcosmia) faceta Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 5, p. 409.
Osmia (Gnathosmia) mandibularis Cockerell, 1903. Ent. News 14, p. 332.
Osmia davidsoniella Cockerell, 1905. Canad. Ent. 37, p. 370. ♂.
Osmia texana Hicks, 1926. Colo. Univ. Studies 15, p. 217. (biology)
Osmia texana Mickel, 1928. Ent. News 39, p. 69. (biology)
Osmia (Chalcosmia) texana Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 20.

FEMALE — Length 12 mm.; dark blue, becoming almost black on vertex and dorsum of thorax; face only slightly longer than distance between eyes above; eyes subparallel; lateral ocelli much nearer to each other than to eyes, much nearer eyes than margin of vertex; clypeus broad and very short, median area strongly convex, apical margin only slightly produced, with an elevated, median, apical protuberance which is somewhat deeply excavated apically, depressed areas on each side very slightly emarginate (fig. 30); labrum with rather copious, black pubescence, its median length slightly greater than basal width; mandibles very similar to those of *chalybea* (fig. 32); width of cheeks nearly twice that of eyes; wings rather lightly infuscated, becoming somewhat more deeply so in marginal cell, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence rather short and inconspicuous, white in large part on head and thorax, somewhat more dense around antennae, on cheeks below, and around wing bases, pale on legs in large part, becoming blackish on hind tarsal segments; scopa entirely black, discal pubescence of abdominal terga very short and inconspicuous, barely visible, entirely pale, becoming rather dense and subappressed on tergum 6; punctures quite deep and distinct, rather coarse and slightly separated on vertex and on scutum toward posterior margin medially, those on scutellum distinctly but not widely separated; pleura rather dull, with rather coarse and close punctures throughout; lateral faces of propodeum, dull, with fine and densely crowded punctures, posterior face more shining, punctures fine and to some degree separated, dorsal area smooth and somewhat

shining, upper margin becoming very narrowly striate; punctures of abdominal terga deep, distinct and well separated on terga 1-4, these becoming rather close toward sides, rather uniformly close across 5, very fine and densely crowded on 6.

MALE—Length 9 mm.; dark blue, becoming almost black on dorsum of thorax; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli nearer each other than to eyes and nearer eyes than to margin of vertex; clypeus broadly convex, apical margin somewhat produced, rather broadly outcurved, median area rather straight; labrum with rather copious pubescence, median length about equal to basal width; mandibles bidentate; cheeks slightly broader than eyes; wings very lightly infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments simple and unmodified, anterior margin of hind basitarsus with a distinct tubercle near apical third; mid and hind spurs piceous, pubescence entirely pale, rather copious and dense on face below ocelli, around wing bases and lateral margins of propodeum, otherwise rather thin and short, discal pubescence of abdominal terga extremely short and inconspicuous, hardly evident, but tending to form thin and very obscure, apical fasciae on terga 4 and 5; punctures rather deep and distinct, slightly separated on vertex, becoming densely crowded below ocelli, rather coarse and distinct on cheeks below, rather fine and densely crowded over most of scutum, punctures of scutellum somewhat coarser and distinctly separated, interspaces shining; pleura dull, with densely crowded punctures, these becoming slightly more coarse and distinct just below tegulae; propodeum somewhat shining, punctures fine, irregular and obscure on lateral faces, finer and more distinctly separated on posterior face, dorsal area dull above, margin narrowly striate; sternum 2 broadly produced apically, slightly emarginate medially, largely covering 3 and 4, apical margin of 3 rather broadly emarginate, this area occupied by elongate setae which converge along midline, apical margin of 4 slightly thickened and rather deeply grooved, 5-8 entirely retracted, submembranous; genital armature much as in *chalybea* (see fig. 35).

DISTRIBUTION — This is primarily western, ranging from British Columbia and California to North Dakota and Texas. Collections have also been made in the East, with positive records in Michigan, New York and Florida, May to August, but as early as March in Florida.

***Osmia (Nothosmia) albiventris* Cresson**
(Figs. 32, 33 & 35)

Osmia albiventris Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 31. ♀ ♂.

Leucosmia albiventris Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 171.

Leucosmia albiventris Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Nothosmia) albiventris Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 117.

FEMALE — Length 8 mm.; bluish-green; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, slightly more removed from eye; clypeus broadly convex, considerably produced apically, median area of margin nearly straight; median length of labrum considerably less than basal width; mandibles obscurely 4-dentate, as shown (fig. 32); cheeks somewhat broader than eyes; wings subhyaline, very lightly clouded apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments simple and unmodified; mid and hind spurs piceous; pubescence entirely pale, yellowish-white above, becoming more whitish below, and scopa entirely white; discal pubescence of abdominal terga very short and inconspicuous, forming rather loose and indefinite, apical fasciae at sides of 2 and 3 and across entire width of 4 and 5, 6 rather densely covered with subappressed, pale tomentum; punctures deep and distinct, rather fine and close in general, quite uniform over most of head, somewhat more distinctly separated in center of scutum posteriorly, and scutellum with a narrow, impunctate, median line, punctures on each side deep, distinct and quite close; pleura rather dull, punctures rather shallow but closely crowded, becoming slightly separated just beneath tegulae; lateral faces of propodeum somewhat shining, but very finely roughened, posterior face dull, with shallow, indefinite, obscure but rather close punctures, dorsal area rather velvety, but becoming rather broadly and finely striate along upper margin; punctures of abdominal terga deep, distinct and fine but well separated on terga 1-3, becoming somewhat coarser but still slightly separated at extreme sides, rather uniformly close across 4 and 5, very fine and densely crowded on 6, apical margins only slightly depressed, finely and rather sparsely punctate nearly to the rims.

MALE — Length 8-9 mm.; bluish-green; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from mar-

gin of vertex and each other, slightly more distant from eyes; clypeus broadly convex, somewhat produced apically, the narrow, median area of margin smooth and shining, impunctate, nearly straight; mandibles bidentate; cheeks somewhat broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments slender, simple and unmodified, anterior margin of hind basitarsus with a very low, subapical tubercle or angle; mid spurs brownish-testaceous, hind spurs more fuscous; pubescence entirely whitish, rather copious on face, cheeks below, over most of thorax, and on front and middle legs; punctures quite deep and distinct, rather close but not crowded on vertex and cheeks, and on face between antennae and ocelli, becoming densely crowded below antennae and over clypeus; punctures of scutum quite close but not crowded, slightly separated in center of disc, scutellum with a very narrow, median, impunctate line, otherwise closely punctate; punctures of pleura almost crowded; lateral faces of propodeum rather smooth but minutely roughened, the metapleura largely shining and impunctate, posterior face of propodeum rather dull and tessellate, punctures vague and obscure, dorsal area velvety, margin becoming very finely striate; abdominal terga shining, punctures quite deep and distinct, rather coarse and well separated toward basal margin of each tergum, becoming rather fine and irregular toward the depressed, shining and impunctate apical rims, punctures of 5 more uniformly distributed, slightly separated, those on 6 rather distinct, close at base, but becoming sparse, minute and irregular apically; tergum 6 with a shallow, median emargination, 7 quite broad and short, the median, apical emargination very shallow and obscure, hardly evident; sternum 2 largely covering 3 and 4, apical margin broadly outcurved, narrowly yellowish-hyaline, 3 with a rather narrow, median, triangular emargination which is largely filled with converging setae (fig. 33), 4 slightly produced medially toward apex, this area sparsely clothed with elongate, recurved setae, 5-8 entirely retracted, 8 broadly rounded apically, apex very narrowly emarginate medially; genital armature as shown (fig. 35).

DISTRIBUTION — Minnesota to Quebec and the New England states, south to Georgia, April to August.

FLOWER RECORDS — *Brassica*, *Geranium*, *Malus*, *Pentstemon*, *Rubus*, *Trifolium* and *Vicia*. This is recorded by Robertson (1929) on *Gillenia*.

***Osmia (Nothosmia) cordata* Robertson**
(Figs. 32 & 33)

- Osmia cordata* Robertson, 1902. Ent. News 13, p. 79. ♂.
Osmia hesperella Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 227. ♀.
Osmia coloradella Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 229. ♀.
Osmia ramaleyi Cockerell, 1907. Ann. Mag. Nat. Hist. (7) 20, p. 126. ♂ ♀.
Osmia hesperella Cockerell, 1911. Canad. Ent. 43, p. 389.
Stelidae Turner, 1911. Jour. Anim. Behavior 1, p. 374. (biology)
Osmia cordata Rau, 1916. Jour. Anim. Behavior 6, p. 37. (biology)
Osmia cordata Rau, 1923. Ent. News. 34, p. 308. (biology)
Osmia cordata Rau, 1928. Acad. Sci. St. Louis, Trans. 25, p. 363. (biology)
Osmia cordata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Osmia figginsii Cockerell, 1935. Amer. Mus. Novitates 766, p. 2. ♂.
Osmia cordata Rau, 1937. Ent. Soc. Amer. Ann. 30, p. 324. (biology)
Osmia (Nothosmia) cordata Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 110.
Osmia cordata Chandler, 1958. Indiana Acad. Sci. 68, pp. 199-204. (biology)

FEMALE — Length 11 mm.; blue-green; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, from posterior margin of vertex and from each other; clypeus broadly convex and quite broadly produced apically, the wide, median area nearly straight; median length of labrum about equal to basal width; dentition of mandible as shown (fig. 32); cheeks considerably broader than eyes; wings subhyaline, becoming faintly infuscated apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence, including scopa, entirely pale, rather short and thin but somewhat more copious around antennae, on cheeks below, around wing bases, on propodeum and basal abdominal tergum, very short on discs of the following terga, becoming subappressed on tergum 6; punctures rather fine and close but deep and distinct over most of head and thorax, densely crowded on face and clypeus, on cheeks and pleura, slightly separated in center of scutum but otherwise contiguous, and contiguous in large part on scutellum; lateral and posterior faces of propodeum somewhat shining but with minute, densely crowded, shallow punctures, dorsal

area velvety, becoming finely striate along upper margin; abdominal terga shining, punctures finer and distinctly separated on 1-3 medially, but these becoming closely punctate at sides, 4 and 5 uniformly, closely punctate, and 6 minutely and densely punctate, apical margins of all only slightly depressed, apical rims narrowly shining and impunctate.

MALE — Length 9-10 mm.; head and thorax dark olive-green, abdomen more bluish-green; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus very slightly convex, considerably produced apically, median area nearly straight but finely crenulate, margin narrowly shining and impunctate; median length of labrum about equal to basal width; mandibles distinctly bidentate; cheeks subequal to eyes in width; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; tarsal segments simple and unmodified, anterior margin of hind basitarsus with a very small tubercle near apical third, mid and hind spurs piceous; pubescence entirely white, dense around antennae, over lower portion of face and on cheeks below, quite copious over most of thorax and on basal abdominal tergum, shorter but erect on the following terga; punctures fine and densely crowded over most of head and thorax, but becoming somewhat more coarse and distinct on scutellum, very shallow and indistinct on lateral and posterior faces of propodeum, dorsal area velvety, becoming very finely and irregularly striate along upper margin; abdominal terga shining, punctures fine and definitely but not widely separated medially, becoming somewhat coarser and closer toward sides, terga 4-6 more uniformly finely and closely punctate, 6 becoming impunctate along the brownish apical margin, this broadly and shallowly emarginate medially, 7 narrowly produced medially, with a deep, semi-circular emargination, the two resulting projections slender and acute; sternum 2 broadly rounded apically, covering 3 and most of 4, apical margin of 3 with a quite deep, triangular, median emargination which is largely filled with elongate, converging setae (fig. 33), 4 rather broadly outcurved apically, median area rather finely setose, and with a very fine, median, impunctate line, the margin not thickened; sterna 5-8 entirely retracted, submembranous, 8 broadly triangular apically; genital armature much as in *collinsiae* (fig. 35), but pubescence not quite as elongate.

DISTRIBUTION — North Dakota, Colorado and New Mexico, east to Ohio, March to June.

FLOWER RECORDS — *Salvia* and *Verbena*. This is recorded by Robertson (1929) on *Aesculus*, *Cardamine*, *Lithospermum*, *Pentstemon*, *Phlox*, *Rubus* and *Trifolium*.

This species has been reared from cells of *Scelifron caementarium*.

***Osmia (Nothosmia) distincta* Cresson**
(Figs. 31-33)

Osmia distincta Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 30. ♀.

Monilosmia canadensis Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 171.

Osmia distincta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Nothosmia) distincta Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 75.

FEMALE — Length 9 mm.; blue; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus convex, considerably produced apically, median area broadly incurved, margin narrowly shining and impunctate; median length of labrum about equal to basal width; dentition of mandible as shown (fig. 32); cheeks slightly broader than eyes; wings subhyaline, apical margin becoming lightly but abruptly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence of head and thorax yellowish-white, that on abdomen, including scopa, white, the interocellar area with a distinct row of elongate, downcurved hairs which meet a strong tuft of suberect, pale hairs between antennae, those on clypeus downcurved, resulting in a pattern peculiar to this species; pubescence of basal abdominal tergum rather long and copious, quite short but erect and clearly evident on discs of the following terga, that on 6 subappressed and very short; hypostomal carinae angulate opposite apex of labrum; punctures rather fine and close in general, but deep and distinct, close over most of head, face rather coarsely rugose below ocelli; scutum and scutellum shining, punctures close except across posterior half of scutum, quite distinct but close on scutellum; pleura rather dull, with subcontiguous, rather shallow punctures; lateral faces of propodeum somewhat smoother but with close, minute punctures, these becoming very obscure on posterior face, dorsal area velvety, upper margin very narrowly and irregularly striate; abdominal terga shining, punctures fine, quite close but slightly separated medially on 1-5, becoming quite close at extreme sides, uni-

formly, densely crowded on 6, apical margins slightly and narrowly depressed, finely and closely punctate nearly to the rims.

MALE — Length 7-8 mm.; head and thorax dark olive-green, abdomen somewhat more bluish-green; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus convex, apical margin somewhat produced, nearly straight, narrowly shining and impunctate medially; labrum about as long as basal width; mandibles distinctly bidentate; cheeks subequal to eyes in width; wings subhyaline, faintly clouded apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsus with a very low, submedian tubercle, mid and hind spurs piceous; pubescence of head and thorax yellowish-white, that of abdomen more distinctly white, quite copious on lower half of face, on cheeks, over most of thorax, and to some degree on basal abdominal tergum; punctures quite deep and distinct, rather close and coarse in general, becoming rather fine and densely crowded around antennae and over lower portion of face, shallow but subcontiguous of cheeks below, subcontiguous over most of scutum but becoming slightly separated medially toward posterior margin, those on scutellum distinctly but not widely separated, quite coarse and deep; pleura dull, with rather shallow, subcontiguous punctures, these slightly separated just below wing bases; lateral faces of propodeum rather dull, surface finely roughened but hardly punctate, posterior face rather dull and obscurely roughened, dorsal area velvety, upper margin rather broadly and finely striate; abdominal terga shining, punctures rather fine and close basally, becoming somewhat more distinctly separated apically, margins rather broadly depressed, invaded by punctures nearly to the narrowly shining and impunctate rims; tergum 6 with a rather shallow but distinct median apical emargination, 7 narrowly produced medially, deeply emarginate, the two resulting projections acutely triangular; sternum 2 broadly outcurved apically, margin rather narrowly yellowish-hyaline, smooth and impunctate, largely covering sternum 3 and base of 4, 3 broadly incurved apically, median area occupied by a tuft of convergent setae (fig. 33), 4 rather broadly produced medially, this area rather densely setose and with a narrow, median, non-setose line; sterna 5-8 retracted, submembranous, 8 triangularly pointed apically; genital armature resembling that of *albiventris*, (fig. 35), apex of gonocoxite as shown (fig. 31).

DISTRIBUTION — North Dakota to Ontario and the New England states, south to Colorado, Tennessee and North Carolina, March to July.

FLOWER RECORDS — *Pentstemon*, *Rubus* and *Trifolium*. Additional records by Robertson (1929) include *Blephilia*, *Dianthera*, *Gillenia*, *Hypoxis* and *Lithospermum*.

Osmia (Nothosmia) inspergens
Lovell and Cockerell

(Figs. 33-35)

Osmia inspergens Lovell and Cockerell, 1907.

Psyche 14, p. 17. ♀.

Osmia (Nothosmia) inspergens Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 88.

FEMALE—Length 10 mm.; dark bluish, becoming almost black in some areas; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from each other and margin of vertex, very slightly more distant from eyes; clypeus convex but strongly produced apically, median area of margin nearly straight, very narrowly polished and impunctate; labrum short, not much more than half as long as basal width; mandibles much broadened apically, dentition much as in *albiventris* (fig. 32); cheeks considerably broader than eyes; wings very lightly infuscated, becoming somewhat darker apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; front basitarsi somewhat flattened, posterior surface somewhat concave, fringed with elongate, white hairs; mid and hind spurs piceous; pubescence of head and thorax largely yellowish-white, but clypeus with a subapical, rather dense brush of fuscous hairs; pubescence quite long and copious over most of thorax, elongate and white on basal abdominal tergum, discal pubescence of the following terga erect, entirely white, rather thin and inconspicuous, that on tergum 6 subappressed and silvery, scopa entirely yellowish-white; punctures deep and distinct in general, rather well separated but not sparse on vertex, becoming quite close but not crowded below ocelli and along sides of face, close, deep and distinct on clypeus, but this with a median, triangular, shining and impunctate area on upper margin; scutum and scutellum shining, punctures close but not crowded, becoming rather sparse in center of scutum and in midline of scutellum, pleura rather dull, with densely crowded, shallow punctures, lateral faces of propodeum somewhat smoother but finely roughened, posterior face dull, more tessellate, dorsal area velvety, becoming very

finely and obscurely substriate along upper margin; abdominal terga shining, punctures fine but rather close and deep, becoming somewhat closer at extreme sides, apical margins rather narrowly depressed but well punctured nearly to the rims, tergum 6 very finely and densely punctate.

MALE—Length 9-10 mm.; bluish-green, with dorsum of head and thorax somewhat more olive-green; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distance from eyes and each other, slightly nearer margin of vertex; clypeus convex, apical margin somewhat produced, median area nearly straight, narrowly polished and impunctate; median length of labrum about equal to its basal width; mandibles bidentate; cheeks slightly broader than eyes; wings subhyaline basally, becoming very faintly infuscated toward apical margin, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, anterior margin of hind basitarsus without a definite tubercle, mid and hind spurs piceous; pubescence of head and thorax yellowish-white, quite copious over face and cheeks and over most of thorax, basal abdominal tergum with copious, more whitish pubescence, discal pubescence of following terga very short and inconspicuous but erect and evident; punctures rather deep and distinct, rather fine and close in general, close but not crowded on vertex and dorsum of thorax, becoming densely crowded on face below, on cheeks and on pleura, lateral faces of propodeum smooth but rather dull, minutely and closely punctate, posterior face more tessellate, punctures close but obscure, dorsal area velvety, becoming very narrowly and irregularly striate along upper margin; abdominal terga smooth and shining, punctures fine and quite close, but not crowded, apical margins rather narrowly depressed, these areas invaded in part by very fine and scattered punctures, only the narrow rims impunctate; tergum 6 rather sparsely punctate and shining, with a small, median, apical emargination, 7 quite broad, rather broadly produced medially, with a deep, narrow, median emargination; sternum 2 broadly outcurved apically, largely covering 3 and base of 4, 3 with a deep, triangular, median emargination which is fringed with short setae which do not converge medially (fig. 33); sternum 4 rather broadly produced apically, this area quite strongly incurved and slightly thickened (fig. 34); 5-8 entirely retracted, submembraneous, apical margin of 8 somewhat narrowly rounded apically; genital armature as shown (fig. 35).

DISTRIBUTION — Quebec and Maine to Georgia, April to June.

FLOWER RECORDS — *Baptisia*, *Polycodium*, *Trifolium* and *Vaccinium*.

Osmia (Nothosmia) michiganensis
new species

(Fig. 35)

MALE—Length 7.5 mm.; dark bluish-green, becoming somewhat more greenish on upper part of face and dorsum of thorax; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli slightly nearer each other than to eyes, and slightly nearer margin of vertex than to each other; clypeus convex, apical margin considerably produced, the broad, median area nearly straight, narrowly shining and impunctate; median length of labrum about equal to its basal width, rather broadly rounded; mandibles bidentate; cheeks slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated toward apical margin, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments slender and simple, hind basitarsi not tuberculate anteriorly, mid and hind spurs piceous; pubescence entirely pale, quite copious and elongate over face, vertex, dorsum of thorax and basal abdominal tergum, discs of the following terga with erect but short and thin, pale pubescence which is very inconspicuous, with no dark hairs in evidence; punctures quite deep and distinct in general, close but not crowded on vertex and cheeks, becoming rather densely crowded and coarse just below ocelli and between antennae, fine and densely crowded on clypeus; punctures close but not crowded over most of scutum, those on scutellum slightly more separated but still quite close, with a narrow, median, impunctate line, posterior margin very finely and densely punctate; pleura somewhat shining above, but punctures shallow and quite close in general; lateral faces of propodeum somewhat smoother but rather dull, posterior face somewhat more coarsely roughened, dorsal area dull and densely tessellate although smooth, becoming very obscurely sub-striate along upper margin; abdominal terga shining, punctures rather coarse toward base of each tergum, becoming somewhat finer and more sparse toward the depressed apical margins, these invaded by punctures, but apical half of each smooth, shining and impunctate; punctures of tergum 6 rather widely separated but quite uniform, evenly distributed, apical margin with a narrow, but very deep, rounded, median emargination; tergum 7 narrowly produced and with

a deep, rounded, median emargination; sternum 2 rather broadly outcurved, covering basal half of 3, this with a broad, rounded, median emargination which is filled with a row of rather short setae which do not markedly converge medially; sternum 4 rather broadly produced apically, rather evenly beset across entire width with very fine setae, these somewhat elongate across median, apical area; sterna 5-8 entirely retracted; apices of gonocoxites slightly thickened and flexed at tip, much exceeding penis valves in length (fig. 35).

TYPE — Holotype — Male, Grand Traverse Co., Mich., May 27, 1950 (R. R. Dreisbach) [author's coll.].

Osmia (Nothosmia) pumila Cresson

(Figs. 31, 33 & 34)

Osmia pumila Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 35. ♀.

Osmia vicina Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 38. ♂.

Osmia pumila Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia pumila (!) Pearson, 1933. Ecol. Monogr. 3, p. 381.

Osmia (Nothosmia) pumila Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 126.

FEMALE—Length 8 mm.; blue, legs mostly black; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, very slightly nearer margin of vertex; clypeus convex, considerably produced apically, margin nearly straight medially, narrowly smooth and impunctate; median length of labrum about equal to its basal width; mandibles obscurely 4-dentate (much as in *cordata*, fig. 32); cheeks subequal to eyes in width; wings hyaline basally, becoming lightly infuscated along apical margin, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence of head and thorax yellowish-white above, becoming more whitish below, rather long but thin, not hiding surface, somewhat more copious around wing bases; scopa entirely white, pubescence of basal abdominal tergum entirely white, rather elongate, discal pubescence of the following terga very short and thin but erect, entirely white, tending to form whitish, apical fringes on the more apical terga; tergum 6 with rather dense, subappressed, whitish pubescence; punctures in general quite coarse, deep and distinct, close over most of head, becoming crowded between antennae and eyes, very coarse and deep on upper portion of

clypeus, becoming somewhat more fine and shallow apically; scutum closely punctate anteriorly and laterally, becoming rather sparsely punctate in center of disc, punctures of scutellum distinctly but not widely separated, with a narrow, median, impunctate line; pleura dull, punctures subcontiguous, rather shallow; lateral faces of propodeum dull, very finely reticulate, posterior face becoming more tessellate, with shallow, obscure, scattered punctures, dorsal area more velvety, upper margin rather broadly but very finely striate; punctures of abdominal terga fine and well separated on 2 and 3 medially, becoming somewhat coarser and closer at each side, basal tergum rather coarsely punctate across base and at sides, becoming more finely but still closely punctate medially, punctures of 4 and 5 somewhat more coarse and irregular, slightly but not widely separated, 6 with dense, fine, crowded punctures, apical margins of terga only faintly depressed, punctures fine and evenly distributed, nearly or quite reaching apical rims.

MALE—Length 7-8 mm.; bluish-green; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, from each other, and from margin of vertex; clypeus convex, considerably produced apically, margin very slightly outcurved, narrowly shining and impunctate; median length of labrum considerably less than basal width; mandible bidentate; cheeks slightly narrower than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base; basal segments of legs with metallic reflections, otherwise black, tarsal segments slender and simple, anterior margin of hind basitarsus with a fine, submedian tubercle, mid and hind spurs piceous; pubescence of head and thorax yellowish-white, rather copious and erect on face, vertex and dorsum of thorax, elongate on basal abdominal tergum, discs of the following terga with very thin, short, erect, entirely pale pubescence, tending to form obscure, pale fringes on the more apical terga; punctures in general quite deep and distinct, rather fine, close over most of head, becoming densely crowded below ocelli, between and around antennae, and over most of clypeus; punctures close but not crowded over most of scutum, becoming rather dense around anterior and lateral margins, close but distinct on scutellum, but becoming densely crowded and obscure around posterior margin, subcontiguous on pleura, but this somewhat shining, the metapleura shining and largely impunctate; lateral faces of propodeum dull and tessellate or subreticulate, posterior face tessellate, with shallow, obscure, scattered punctures, dorsal area densely tessellate.

late, becoming very finely and irregularly substriate along upper margin; abdominal terga shining, punctures fine and distinctly separated medially on 2-4, rather coarse across base of 1, these becoming more closely and deeply punctate toward sides, apical margins rather broadly impressed, invaded by very fine and rather well separated punctures, the rims only narrowly shining and impunctate, punctures of 5 and 6 rather irregular, more or less separated, becoming rather sparse across apical portion of 6; apical margin of tergum 6 with a shallow, median emargination, 7 somewhat produced medially, with a shallow, median emargination; sternum 2 broadly outcurved apically, largely covering 3 and basal portion of 4, 3 with a rather narrow, median emargination, this with a fringe of rather short, converging hairs which do not meet medially (fig. 33); apical margin of sternum 4 broadly outcurved, surface rather finely and evenly setose (fig. 34), 5-8 entirely retracted, submembranous; genital armature resembling that of *albiventris* (fig. 35), apex of gonocoxite as shown (fig. 31).

DISTRIBUTION — Minnesota to Quebec and the New England states, south to Georgia, April to July.

FLOWER RECORDS — *Barbarea*, *Claytonia*, *Crataegus*, *Geranium*, *Houstonia*, *Malus*, *Melilotus*, *Pedicularis*, *Pentstemon*, *Rubus*, *Taraxacum*, *Trifolium*, *Vaccinium*, *Viburnum* and *Vicia*. This has been recorded by Robertson (1929) on the following: *Anemonella*, *Antennaria*, *Arabis*, *Astragalus*, *Camassia*, *Cardamine*, *Cercis*, *Chaerophyllum*, *Collinsia*, *Comandra*, *Cornus*, *Dentaria*, *Diospyros*, *Ellisia*, *Erigenia*, *Erythronium*, *Fragaria*, *Isopyrum*, *Krigia*, *Malva*, *Mertensia*, *Nepeta*, *Oxalis*, *Polemonium*, *Potentilla*, *Ranunculus*, *Ribes*, *Rosa*, *Salix*, *Sassafras*, *Scutellaria*, *Sisyrinchium*, *Smilax*, *Viola*, *Zanthoxylum* and *Zizia*.

***Osmia* (*Nothosmia*) *sandhouseae*
Mitchell**

(Fig. 31)

Osmia albohirta Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 164. ♀. (preocc.)

Osmia sandhouseae Mitchell, 1927. Psyche 34, p. 178. (new name)

Osmia (*Nothosmia*) *sandhouseae* Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 119.

Osmia (*Nothosmia*) *sandhouseae* Michener, 1947. Amer. Midland Nat. 38, p. 450. (flower record)

FEMALE—Length 9-10 mm.; dark blue, with blackish legs; face slightly longer than

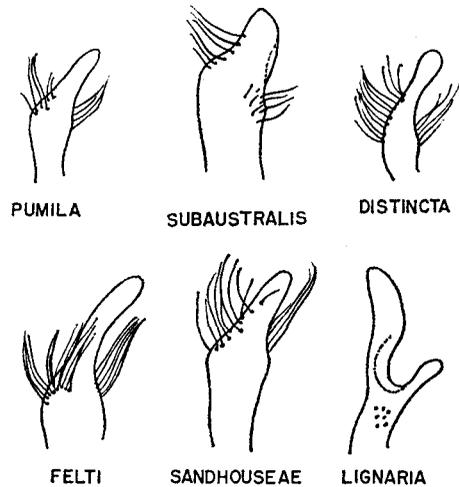


Figure 31
Gonostylus of genital armature in males of *Osmia*.

distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer to each other; clypeus convex, considerably produced apically, the broad margin nearly straight, very narrowly shining and substriate; median length of labrum about equal to basal width; mandibles 3-dentate (fig. 32); cheeks slightly broader than eyes; wings subhyaline basally, becoming lightly infuscated along apical margin, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence entirely pale, rather short and thin in general, but more dense around antennae and wing bases, elongate on basal abdominal tergum, but very short, erect, entirely pale on discs of the following terga, becoming subappressed on tergum 6, scopa entirely white; punctures quite coarse, deep and distinct on vertex, only slightly separated, becoming finer and crowded on sides of face below, rather coarse and subcontiguous on clypeus, densely crowded on cheeks; punctures rather coarse and densely crowded over most of scutum and scutellum, pleura dull, punctures rather shallow, but contiguous throughout; lateral faces of propodeum somewhat shining, punctures hardly evident, posterior face tessellate, with scattered, shallow and obscure punctures, dorsal area more velvety, becoming very finely and obscurely substriate along upper margin; abdominal terga shining, punctures fine, rather close in large part, being only slightly separated in median area of the more basal terga, punctures becoming somewhat more coarse on 4 and 5, very fine

and densely crowded over 6, apical margins very slightly depressed, finely punctate nearly to the rims.

MALE—Length 7-8 mm.; bluish-green; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus convex, considerably produced apically, apical margin nearly straight, with a sharply defined, polished, impunctate area; median length of labrum subequal to its basal width; mandibles bidentate; cheeks subequal to eyes in width; wings subhyaline, slightly infuscated toward apical margin, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments simple and unmodified, anterior margin of hind basitarsus with a low, triangular tubercle near apical third, mid and hind spurs piceous; pubescence entirely whitish or rather strongly yellowish, quite copious over face, cheeks below, entire thorax and basal segment of abdomen, short but rather dense and erect on discs of terga 2-5, tending to form obscure, apical fringes on the more apical terga; punctures quite deep and distinct, slightly separated on vertex, becoming densely crowded below ocelli, very fine and dense on supra-clypeal area and clypeus, shallow and rather coarse and irregular on cheeks; punctures rather fine and densely crowded on scutum anteriorly, becoming somewhat coarser posteriorly, but uniformly close, those on scutellum coarse, more distinct anteriorly, but becoming densely crowded around margin; pleura with subcontiguous, shallow punctures throughout, lateral faces of propodeum rather smooth and somewhat shining, posterior face dull and tessellate, with scattered, minute, shallow and obscure punctures, dorsal area more velvety, becoming very obscurely and finely substrate along upper margin; abdominal terga shining, punctures quite deep and distinct, only slightly separated medially on terga 1-3, more uniformly close across 4 and 5, 6 shining, with scattered, sparse, shallow and obscure punctures, apical margins of all shallowly depressed, rather evenly and finely punctate except on the very narrow, apical rims; apical margin of tergum 6 with a rather broad, shallow, median emargination, 7 produced medially, with a deep, subtriangular emargination, resulting in a pair of subacute, triangular lobes; sternum 2 broadly outcurved apically, covering sternum 3 in large part, and base of 4, apical margin of 3 with a deep, median emargination, this largely filled with long, convergent setae (fig. 33), apical margin of 4 broadly outcurved, surface finely and quite uniformly setose across entire breadth, but median setae more elongate (fig. 34), 5-8

entirely retracted, submembraneous; penis valves of genital armature only slightly exceeded by the gonostyli, apex of gonostylus as shown (fig. 31).

DISTRIBUTION—New York and the New England states, south to Florida and Texas, February (in Florida) to June.

FLOWER RECORDS—*Claytonia*, *Crataegus*, *Fragaria*, *Geranium*, *Ilex*, *Iris*, *Linnaria*, *Lupinus*, *Oenothera*, *Pedicularia*, *Pentstemon*, *Polycodium*, *Rubus*, *Tephrosia*, *Toxicodendron*, *Trifolium*, *Vaccinium* and *Vicia*. Michener (1947) records *sandhouseae* on *Astragalus* and *Gaylussacia*.

Osmia (*Chenosmia*) *atriventris* Cresson
(Figs. 32, 33 & 35)

Osmia atriventris Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 29. ♀.

Osmia atriventris Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (*Nothosmia*) *atriventris* Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 124.

Osmia (*Chenosmia*) *atriventris* Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 235.

FEMALE — Length 8 mm.; blue-green; face very slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; clypeus rather strongly convex, considerably produced apically, median area of margin nearly straight, narrowly impunctate and somewhat shining; median length of labrum approximately equal to basal width; mandibles 3-dentate, as shown (fig. 32); cheeks considerably broader than eyes; wings very lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; scopa black, pubescence otherwise largely pale, thin but rather elongate on face, cheeks below, dorsum of thorax, pleura and basal abdominal tergum, very thin, rather short and inconspicuous on terga 2-5, short, thin and subappressed, but not hiding surface on 6; punctures deep and distinct, quite close and coarse in general, slightly separated on each side of vertex, but otherwise nearly or quite contiguous over entire head; punctures quite coarse over most of scutum and scutellum, slightly separated in center of scutum posteriorly and on midline of scutellum; pleura dull, punctures shallow but contiguous; lateral faces of propodeum rather dull, very finely roughened or subreticulate, posterior face dull, densely tessellate, with scattered, obscure punc-

tures, dorsal area velvety, becoming narrowly striate along upper margin; abdominal terga shining, punctures rather fine and distinctly separated, somewhat closer toward base, but becoming well separated toward apical margin of each plate, becoming quite close at each extreme side, apical margins only very slightly depressed, this area invaded by fine, scattered punctures which do not reach the apical rims.

MALE — Length 7-8 mm.; dark bluish-green; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli slightly nearer margin of vertex than to each other, slightly more distant from eyes; clypeus rather strongly convex, somewhat produced apically, median area of margin nearly straight, vaguely crenulate, narrowly shining and impunctate; median length of labrum approximately equal to basal width; mandibles bidentate; cheeks about equal to eyes in width; wings subhyaline, recurrent veins reaching 2nd submarginal cell rather distant from base and apex, these spaces about equal; tarsal segments of legs slender and simple, unmodified, hind basitarsus with a very low, anterior tubercle near apical third, mid and hind spurs brownish or piceous; pubescence entirely pale, rather copious but thin over most of head and thorax, quite elongate on thorax dorsally and laterally, very thin and inconspicuous on abdominal terga; punctures deep and distinct, rather coarse and quite close in general, close but distinct on cheeks, vertex and upper part of face, becoming densely crowded and very fine on clypeus; scutum and scutellum shining, punctures distinct but not crowded, scutellum with a median, narrow, impunctate line; pleura dull, punctures shallow but contiguous, almost crowded; lateral faces of propodeum smooth but rather dull, punctures vague and indefinite, posterior face more densely tessellate, with closer but obscure punctures, dorsal area dull and velvety, becoming narrowly striate along upper margin; abdominal terga more shining, median punctures rather fine and slightly separated, becoming slightly closer toward sides, rather uniformly distributed on 4 and 5, 6 rather closely and shallowly punctate across base, but punctures becoming fine, sparse and indefinite apically, margins of terga shallowly but rather broadly depressed, invaded by fine punctures which do not attain apical rims; tergum 6 with a small, median, semicircular emargination, 7 narrowly produced medially, with a deep, semicircular emargination; sternum 2 broadly rounded apically, margin yellowish-hyaline, covering in large part sterna 3 and 4, 3 with a narrow, median, triangular emargination which is entirely filled with elongate, converging setae (fig. 33); 4 somewhat produced api-

cally across median third, this area quite densely setose, 5-8 entirely retracted, 6 with a rounded, median, apical lobe; genital armature as shown (fig. 35).

DISTRIBUTION — Alberta to Nova Scotia, south to Iowa, Tennessee and Georgia, April to July.

FLOWER RECORDS — *Barbarea*, *Cercis*, *Chrysanthemum*, *Geranium*, *Hydrangea*, *Rubus*, *Trifolium*, *Vaccinium*, *Vicia* and *Viola*. This is recorded by Robertson (1929) on *Arabis*, *Astragalus*, *Cardamine*, *Claytonia*, *Collinsia*, *Ellisia*, *Erigenia*, *Fragaria*, *Gillenia*, *Hypoxis*, *Lithospermum*, *Mertensia*, *Nothoscordum*, *Pentstemon*, *Polymonium*, *Psoralea*, *Uvularia* and *Zizia*.

Osmia (Chenosmia) collinsiae Robertson

(Figs. 32-35)

Osmia major Robertson, 1902. Ent. News 13, p. 79. ♂ (not ♀).

Osmia collinsiae Robertson, 1905. Canad. Ent. 37, p. 236. ♂.

Osmia collinsiae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Nothosmia) collinsiae Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 121.

Osmia (Chenosmia) collinsiae Sinha, 1958. Univ. Kansas. Sci. Bul. 39, p. 235.

FEMALE — Length 11 mm.; deep blue; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, much nearer to each other; clypeus broadly convex, considerably produced apically, median area of margin nearly straight, narrowly shining and impunctate; labrum very slightly longer than basal width; mandibles obscurely 4-dentate, as shown (fig. 32); cheeks somewhat broader than eyes; wings lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments of legs simple and unmodified, mid and hind spurs piceous; pubescence largely fuscous and quite dense on clypeus, becoming whitish between antennae and eyes but with intermixed light and dark hairs around ocelli and on vertex; scutum with largely pale pubescence, but with scattered, erect, fuscous hairs, that on pleura, scutellum and propodeum entirely yellowish-white; pubescence of legs largely pale basally, but becoming fuscous on the more apical segments; basal abdominal tergum with elongate, whitish pubescence, this becoming shorter on the following terga, pale on 2, fuscous and erect on 3-5, 6 with sub-

appressed, thin tomentum which does not obscure the surface; scopa entirely black; punctures deep, distinct and rather close in general, slightly separated behind ocelli, but deep and distinct, becoming quite closely crowded and finer on face below, especially on clypeus, fine, close and rather shallow on cheeks below; densely crowded over much of scutum but becoming slightly separated in center of disc posteriorly, slightly separated, in part, on scutellum, pleura dull with shallow and contiguous punctures; lateral faces of propodeum somewhat shining, but rather minutely roughened, posterior face becoming rather densely tessellate and with minute and obscure punctures, dorsal area velvety, becoming very obscurely and narrowly substriate along upper margin; abdominal terga more shining, punctures fine, quite close but distinctly separated in center of terga 1-6, becoming very close at extreme sides, minute and densely crowded on 6, apical margins narrowly depressed, shining and impunctate.

MALE — Length 8-9 mm.; almost brassy green on head and thorax dorsally, but otherwise more bluish; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; clypeus rather strongly convex, somewhat produced apically, median area of margin narrowly shining and impunctate; mandibles bidentate; cheeks very slightly broader than eyes; wings very lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsus without a median tubercle; mid and hind spurs piceous; pubescence entirely pale on head and thorax, yellowish-white above and on front of face, somewhat more whitish on cheeks, pleura and legs; quite copious and elongate on face, cheeks and dorsum of thorax; pubescence of abdominal terga very thin and obscure, suberect, entirely pale; punctures deep and distinct, rather close and coarse in general, rather coarse and distinct on vertex and upper part of face, becoming contiguous below ocelli, very fine and densely crowded below antennae and on clypeus, becoming somewhat more shallow and indefinite but very close on cheeks, punctures close and distinct over most of scutum, becoming slightly separated only in center of disc, those on scutellum more definitely but not widely separated, somewhat more coarse than on scutum; pleura rather dull, punctures rather shallow, but subcontiguous; lateral faces of propodeum dull, very finely roughened, posterior face becoming more densely tessellate, dorsal area very finely roughened or sub-

striate in large part; abdominal terga shining, punctures quite deep and distinct, rather close and uniform in general, becoming somewhat more shallow and indistinct on the more apical terga, those on 6 becoming rather obscure apically; margins of all terga narrowly impressed, shining and impunctate; tergum 6 with a median, rounded, apical emargination, 7 broad and rather short, with a quite deep, median, emargination, more or less angulate on each side; sternum 2 rather broadly outcurved, covering in large part the following sterna, 3 with a rather deep, triangular, median emargination which is fringed with rather short, non-converging hairs (fig. 33), median third of 4 somewhat produced apically, quite densely, elongate setose on each side of a median, non-setose, depressed line (fig. 34); sterna 5-8 entirely retracted, median area of 6 rather broadly produced medially; genital armature as shown (fig. 35).

DISTRIBUTION — Minnesota to Maine, south to Illinois and North Carolina, April to August.

FLOWER RECORDS — *Cercis*, *Claytonia*, *Geranium*, *Lupinus*, *Pedicularis*, *Rubus*, *Trifolium*, *Vicia* and *Viola*. Additional records by Robertson (1929) include *Astragalus*, *Cardamine*, *Collinsia*, *Dicentra*, *Erythronium*, *Nepeta* and *Pentstemon*.

Osmia (Chenosmia) illinoensis
Robertson

(Fig. 33)

- Osmia illinoensis* Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 347. ♂.
Osmia illinoensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Osmia (Nothosmia) illinoensis Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 83.
Osmia (Chenosmia) illinoensis Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 235.

FEMALE—Length 11 mm.; brilliant green; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus broadly convex, considerably produced apically, median area of margin very slightly incurved, narrowly blackened and shining, with a series of shallow pits; median length of labrum about equal to basal width; dentate margin of mandibles much as in *distincta* (fig. 32); cheeks much broader than eyes; wings subhyaline basally, becoming lightly infuscated toward apical margin, 2nd recurrent vein reaching 2nd submarginal

cell considerably nearer apex than 1st does to base; coxae, trochanters, femora, tibiae and hind basitarsi strongly metallic-green, other tarsal segments chiefly black, mid and hind spurs piceous; pubescence largely pale on cheeks below, on pleura and propodeum, the face, vertex, scutum and scutellum with short, suberect, whitish pubescence interspersed with elongate and erect fuscous hairs; basal abdominal tergum covered with elongate and rather dense whitish pubescence, that on the following terga pale, short and thin, but erect and quite evident, that on 6 subappressed, very fine and inconspicuous, scopa entirely black; punctures fine, close, deep and rather distinct in general, subcontiguous or crowded over most of head and thorax, but pleura rather dull, with dense, somewhat shallow, confluent punctures; lateral faces of propodeum somewhat smoother but dull, posterior face rather dull, punctures dense but very shallow and obscure, dorsal area rather smooth and velvety, becoming very narrowly and finely striate along upper margin; abdomen shining, punctures fine, quite close but not crowded on terga 1-5, uniformly fine and crowded on 6, apical margins very slightly and narrowly impressed, these areas deeply punctate nearly to the rims.

MALE — Length 8-9 mm.; brilliant green; face considerably longer than distance between eyes above; eyes convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus convex, somewhat produced apically, margin nearly straight, the edge narrowly blackened, shining and impunctate, with a few, minute crenulations; median length of labrum slightly less than basal width; mandibles distinctly bidentate; cheeks about equal to eyes in width; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsi with a small tubercle near apical third, the more apical tarsal segments dark, but basitarsi and remainder of legs brilliant green, mid and hind spurs piceous; pubescence entirely yellowish-white, rather long, erect and copious on head, thorax and basal abdominal tergum, short and erect, but rather copious on terga 2-6; punctures close and rather coarse over most of head and thorax, deeper and more distinct on vertex and dorsum of thorax, crowded on pleura, lateral faces of propodeum somewhat smoother but tessellate, posterior face with shallow, scattered and vague punctures, dorsal area somewhat velvety, becoming narrowly, irregularly striate along upper margin; abdominal terga shining, quite deeply and closely punctate in general, apical margins rather

narrowly depressed, partially invaded by very fine punctures, but apical rims narrowly shining and impunctate; tergum 6 with a very small and obscure, median, apical emargination, 7 not metallic, quite broad and triangularly produced, with a subtriangular and rather shallow, median emargination; sternum 2 broadly outcurved apically, covering sternum 3 in large part and base of 4, 3 with a deep, triangular, median emargination which is partially filled with more or less convergent setae (fig. 33), 4 broadly produced apically, very slightly incurved and sparsely, finely setose medially, 5-8 entirely retracted and submembraneous.

A study of the genital armature of *ilinoensis* was not possible because of insufficient material.

DISTRIBUTION — Illinois to Texas, no seasonal data available but from the flower records it appears to be vernal, as most species in this genus.

FLOWER RECORDS — Robertson (1929) has recorded this species on *Astragalus*, *Fragaria*, *Hypoxis*, *Lithospermum* and *Ranunculus*.

Osmia (Chenosmia) inermis
(Zetterstedt)
(Figs. 32-34)

Anthophora (Osmia) inermis Zetterstedt, 1838. Ins. Lapponica 1, p. 466. ♀.

Osmia parietina Smith, 1844. Zoologist 2, p. 743. ♀.

Osmia globosa Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 36. ♀.

Osmia vulpecula Gerstaecker, 1869. Stettin. Ent. Ztg. 30, p. 335. ♀.

Osmia globosiformis Cockerell, 1910. Canad. Ent. 42, p. 311. ♂.

Osmia (Melanosmia) inermis Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 34.

Osmia (Chenosmia) inermis Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 235.

FEMALE — Length 10 mm.; entirely black, without metallic tints; face slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, somewhat nearer to each other; clypeus broadly convex, apical margin considerably produced, median area quite straight, with a shining, impunctate rim; median length of labrum about equal to basal width; mandibles 3-dentate, as shown (fig. 32); cheeks considerably broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base;

tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence of head, thorax and basal abdominal tergum yellowish-white, and whitish on basal segments of legs, but becoming black on tibiae and tarsi; scopa black, pubescence on abdominal terga 3-5 black and erect, black apically and pale basally on 2, pale and obscure on 6; punctures rather fine but deep and distinct, close over most of head and thorax, densely crowded on face, slightly separated only in center of scutum; pleura dull, with densely crowded punctures, lateral and posterior faces of propodeum smooth, but dull, without distinct punctures, dorsal area velvety, not becoming definitely striate along dorsal margin; punctures of abdominal terga very fine and slightly separated medially on 1-5, becoming very close at extreme sides, apical margins only slightly depressed, punctures more minute and sparse, the rims slightly reddened and impunctate, punctures of 6 minute and densely crowded.

MALE—Length 9 mm.; entirely black, without metallic tints; face not much longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; clypeus only slightly convex, apical margin considerably produced, quite straight and narrowly impunctate medially; mandibles bidentate; cheeks considerably broader than eyes; wings subhyaline, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments slender and unmodified, anterior margin of hind basitarsus with a triangular, submedian tubercle; mid and hind spurs blackish; pubescence entirely yellowish-white, rather copious and erect over entire head and thorax, pale on basal abdominal tergum and in large part on tergum 2, discs of following terga with erect, more or less fuscous but rather thin pubescence; punctures rather deep and distinct but fine and close in general, crowded beneath pubescence on lower part of face, more coarse and distinct above and on cheeks, slightly separated in center of scutum and distinct but quite close on scutellum; pleura dull, with rather shallow, subcontiguous punctures; lateral faces of propodeum rather smooth but dull, punctures close but vague and indistinct, posterior face dull and tessellate punctures hardly evident, dorsal area velvety, not definitely striate along upper margin; punctures of abdominal terga minute, but quite close on 1 and 2, slightly separated medially on 3 and 4, more minute and vague on 5, and becoming rather sparse and indefinite on 6, apical margins rather broadly impressed and impunctate, more or less brownish-hyaline, that of tergum 6 with a shallow,

median emargination, 7 quite broad but with a deep, rounded, median emargination; sternum 2 broadly rounded apically, covering much of the following sternum, 3 with a very deep, triangular, median emargination which is to a considerable degree filled with fine, converging setae (fig. 33), median area of 4 subtruncate (fig. 34), 6 with a somewhat rounded, median, apical lobe which has a very slight median emargination; genital armature resembling that of *O. virga* (fig. 35), with broad, subtruncate penis valves, but tips of gonocoxites not so narrow and elongate (much as in *sandhouseae*, fig. 31).

DISTRIBUTION — This is holarctic and has been found in eastern North America in Labrador, Quebec, the New England states and Wisconsin, from May to July.

FLOWER RECORDS — *Rubus*, *Salix* and *Vaccinium*.

Osmia (Chenosmia) proxima Cresson

Osmia proxima Cresson, 1864. Ent. Soc. Phila.

Proc. 3, p. 32. ♂.

Osmia sericea Cresson, 1864. Ent. Soc. Phila.

Proc. 3, p. 27. ♂.

Osmia melanotricha Lovell and Cockerell, 1907.

Psyche 14, p. 16. ♀.

Osmia (Nothosmia) proxima Sandhouse, 1939.

Ent. Soc. Wash. Mem. 1, p. 129.

Osmia (Chenosmia) proxima Sinha, 1958.

Univ. Kans. Sci. Bul. 39, p. 235.

FEMALE — Length 8 mm.; dark blue; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from each other and margin of vertex, slightly more distant from eyes; clypeus convex, considerably produced apically, margin straight, narrowly polished and impunctate medially, but with a few irregular striations; median length of labrum about equal to basal width; mandibles not much broadened apically, dentition about as in *atriventris* (fig. 32); cheeks slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence largely whitish on head and thorax, clypeus with erect, more or less fuscous hairs, and a few erect fuscous hairs on face above antennae; pubescence of thorax entirely white, rather short and thin, somewhat copious behind wing bases; basal abdominal tergum entirely pale pubescent, scopa black, discal pubescence of the terga very short and incon-

spicuous, erect and dark on 3-5, 6 with dense, subappressed, silvery pubescence; punctures quite deep and distinct, rather close in general, close but not crowded on vertex and cheeks, becoming rather densely crowded below ocelli and especially on clypeus, crowded on scutum anteriorly and laterally, but becoming well separated medially toward scutellum, the latter with somewhat finer punctures and a narrow median impunctate line; pleura dull, punctures rather shallow but subcontiguous; lateral and posterior faces of propodeum rather smooth but dull, dorsal area velvety, becoming very narrowly and obscurely substriate along upper margin; abdominal terga polished, punctures minute, well separated, becoming quite close at extreme sides, apical margins narrowly depressed, somewhat invaded by sparse, minute punctures, only the very narrow rims impunctate, tergum 6 minutely and densely punctate.

MALE — Length 8 mm.; bluish-green, but dorsum of head and thorax somewhat more brassy green; face considerably longer than distance between eyes above, eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, considerably nearer margin of vertex; clypeus only slightly convex, considerably produced apically, margin nearly straight, narrowly polished and impunctate medially; labrum considerably shorter than its basal width; mandibles bidentate; cheeks subequal to eyes in width; wings subhyaline basally, becoming faintly infuscated apically, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsus with a very small tubercle near apical third, mid and hind spurs piceous; pubescence entirely whitish, rather dense on lower part of face, on cheeks, and on posterior areas of thorax; punctures deep and distinct, quite close in general, close but not crowded on vertex, becoming more densely crowded below ocelli and on clypeus, very fine and close on cheeks below; punctures quite fine and close on scutum laterally and anteriorly, becoming slightly separated medially toward scutellum, this with distinctly but not widely separated punctures and with a median, impunctate line; punctures of pleura nearly contiguous; lateral faces of propodeum quite smooth but dull, dorsal area of posterior face velvety, becoming very narrowly and obscurely substriate along upper margin; abdominal terga shining, punctures minute, distinctly but not widely separated, becoming somewhat closer at extreme sides, apical margins largely impunctate; tergum 6 rather shallowly and sparsely punctate toward sides apically, the margin with a rather shal-

low but distinct, median, semicircular emargination, 7 rather broadly produced medially, with a deep, semicircular emargination; sternum 2 rather broadly outcurved apically, largely covering 3 and base of 4, 3 with a deep, median, triangular, apical emargination which is entirely filled with converging setae, 4 rounded apically, this area rather finely and closely setose, 5-8 entirely retracted, submembranous; genital armature resembling that in *albiventris* (fig. 35).

DISTRIBUTION — Alaska to Nova Scotia, south to Idaho, Wyoming, Illinois and Georgia, May to September.

FLOWER RECORDS — *Houstonia*, *Pentstemon*, *Rubus* and *Trifolium*.

Although the name *sericea* has precedence over *proxima*, the latter name has been commonly in use, and was selected by Sandhouse (1939).

***Osmia (Chenosmia) tersula* Cockerell**
(Figs. 34 & 35)

Osmia tersula Cockerell, 1912. *Canad. Ent.* 44, p. 358. ♂

Osmia subarctica Cockerell, 1912. *Canad. Ent.* 44, p. 357. ♀

Osmia (Nothosmia) tersula Sandhouse, 1939. *Ent. Soc. Wash. Mem.* 1, p. 116.

Osmia (Chenosmia) tersula Sinha, 1958. *Univ. Kans. Sci. Bul.* 39, p. 235.

FEMALE — Length 9-10 mm.; dark blue, with greenish tints, legs blackish; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, each other and margin of vertex; clypeus convex, considerably produced apically, median third of margin straight, narrowly shining and obscurely striate; median length of labrum about equal to basal width; mandibles not much broadened apically, with an apical and an inner tooth and an upper bevelled edge (resembling *inermis*, fig. 32); cheeks much broader than eyes; wings subhyaline basally, becoming faintly infuscated apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence of head and thorax largely pale, rather long and copious, but cheeks below with a few dark hairs behind eyes; scopa largely black, but sometimes with intermixed pale hairs; basal abdominal tergum long white pubescent, discs of the following terga with thin and short, inconspicuous, erect hairs, entirely pale on 2 and 3, becoming somewhat more elongate and darker, especially

at sides, on 4 and 5, 6 rather densely covered with short, subappressed, pale pubescence; punctures in general quite deep and distinct, close but not crowded on vertex and cheeks, becoming densely crowded below ocelli and over clypeus, crowded and rather fine on scutum laterally and anteriorly, becoming rather well separated in center of disc, scutellum distinctly and quite closely punctate in large part, but punctures becoming crowded around posterior and lateral margins; pleura shining, punctures rather shallow but close; lateral faces of propodeum rather smooth but dull or finely tessellate, posterior face becoming very obscurely punctate, dorsal area tessellate and dull but rather smooth, becoming very finely and obscurely striate along upper margin; abdominal terga shining, punctures fine and quite close across base of each disc, becoming rather widely separated toward the broad, depressed, apical margins which are entirely impunctate, punctures somewhat closer at extreme sides, tergum 6 finely and densely punctate.

MALE — Length 8 mm.; bluish-green, becoming somewhat more olive-green on upper portions of head and thorax; face only slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus slightly convex, considerably produced apically, the broad apical margin nearly straight, narrowly shining and impunctate; median length of labrum about equal to basal width; mandibles bidentate; cheeks subequal to eyes in width; wings subhyaline basally, becoming faintly infuscated apically and in region of marginal cell, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsus with a robust, triangular, median tubercle, mid and hind spurs piceous; pubescence of head, thorax and basal abdominal tergum copious and elongate, entirely yellowish-white, largely obscuring surface around antennae and on clypeus, that on terga 2-6 entirely pale, rather short but erect and quite copious, more elongate on 4-6 laterally; punctures in general deep and distinct, close but not crowded on vertex and cheeks, becoming densely crowded below ocelli, fine and dense on clypeus beneath dense pubescence; punctures very close on scutum laterally and anteriorly, becoming slightly separated in center of disc, close but distinct on scutellum, becoming crowded around posterior margin; pleura somewhat shining, but punctures close in large part, lateral faces of propodeum smooth but rather dull, posterior face more tessellate, punctures hardly evident,

dorsal area dull and velvety, becoming very narrowly and obscurely substriate along upper margin; abdominal terga shining, punctures quite deep and distinct, uniformly close to margins of apical depressed areas which are quite broad and entirely impunctate; apical margin of tergum 6 with a shallow but distinct, median emargination, 7 rather broadly produced medially, with a semicircular, median emargination; sternum 2 broadly outcurved apically, covering sternum 3 and base of 4 in large part, apical margin of 3 broadly emarginate medially, fringed with setae which converge but do not meet medially; sternum 4 produced apically, median third straight, slightly thickened and densely setose (fig. 34), 5-8 entirely retracted, apical margin of 6 broadly produced medially; genital armature as shown (fig. 35).

DISTRIBUTION — Alaska to Hudson's Bay and New Brunswick, south to Colorado, Wisconsin and Michigan, in June.

FLOWER RECORD — *Rubus*.

Osmia (Chenosmia?) virga Sandhouse
(Figs. 33 & 35)

- Osmia (Nothosmia) virga* Sandhouse, 1939.
Ent. Soc. Wash. Mem. 1, p. 130. ♂.
Osmia (Chenosmia?) virga Sinha, 1958. Univ.
Kans. Sci. Bul. 39, p. 253.

MALE — Length 7.5-8 mm.; bluish-green, but face, vertex and dorsum of thorax somewhat more olive-green, legs black; face slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, much nearer margin of vertex; clypeus convex, somewhat produced apically, the broad apical margin nearly straight, very narrowly shining and impunctate; median length of labrum slightly less than basal width; mandibles bidentate; cheeks very slightly broader than eyes; wings subhyaline, becoming very faintly infuscated toward apical margin, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsus with a very low and inconspicuous tubercle near apical third, mid and hind spurs piceous; pubescence entirely pale, largely yellowish-white on face and dorsum of thorax, otherwise more whitish, copious and elongate on face and clypeus, cheeks below, on basal abdominal tergum and over most of thorax; discs of abdominal terga 2-5 with short, erect but quite copious, yellowish pubescence which does not hide the surface; punctures in general deep and

distinct, rather coarse and close but not crowded on vertex, becoming somewhat closer but more shallow on cheeks, quite densely crowded below ocelli, very fine and densely crowded on clypeus beneath pubescence; punctures quite uniformly coarse and close on scutum, being very slightly separated only in center of disc, those of scutellum close but not crowded, becoming fine and obscure around posterior margin; pleura dull, punctures rather shallow but largely contiguous, with a restricted area beneath tegulae which is more shining and sparsely punctate; lateral faces of propodeum somewhat shining and shallowly, obscurely punctate along anterior margin, becoming smoother but dull posteriorly, posterior face more tessellate, with shallow, obscure, scattered punctures, dorsal area smooth but velvety, becoming rather broadly striate along upper margin; abdominal terga shining, punctures quite deep and distinct but

rather fine, rather uniformly close but not crowded, quite evenly distributed to the rather broad, depressed and entirely impunctate, apical margins; punctures of tergum 6 much finer and more sparse in general, apical margin with a shallow median, emargination, 7 rather broadly produced apically, with a semicircular, median emargination; sternum 2 broadly out-curved apically, largely covering 3 and base of 4, apical margin of 3 with a rather large, triangular, median emargination which is largely filled with elongate, convergent setae (fig. 33), 4 rather broadly produced apically, median area quite straight, surface rather uniformly, finely setose across entire plate; sterna 5-8 entirely retracted, submembranous; genital armature as shown (fig. 35).

DISTRIBUTION — Wisconsin to Massachusetts and Virginia, April and May.

FLOWER RECORD — *Salix*.

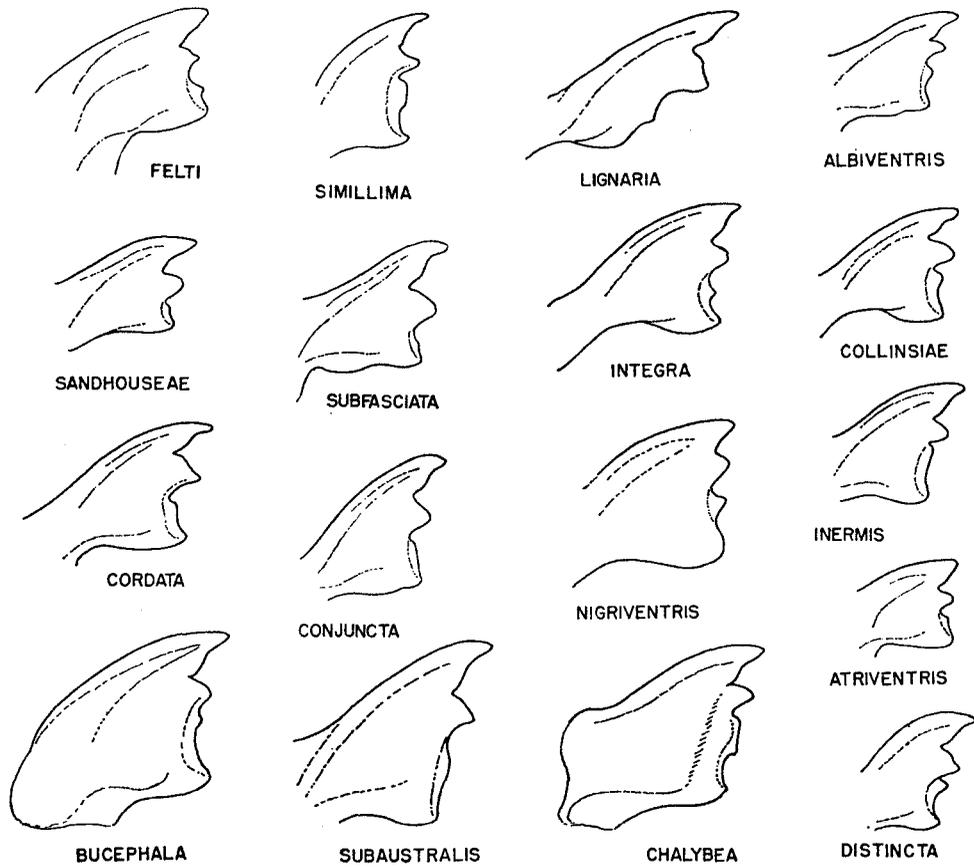


Figure 32—Mandibles in females of *Osmia*.

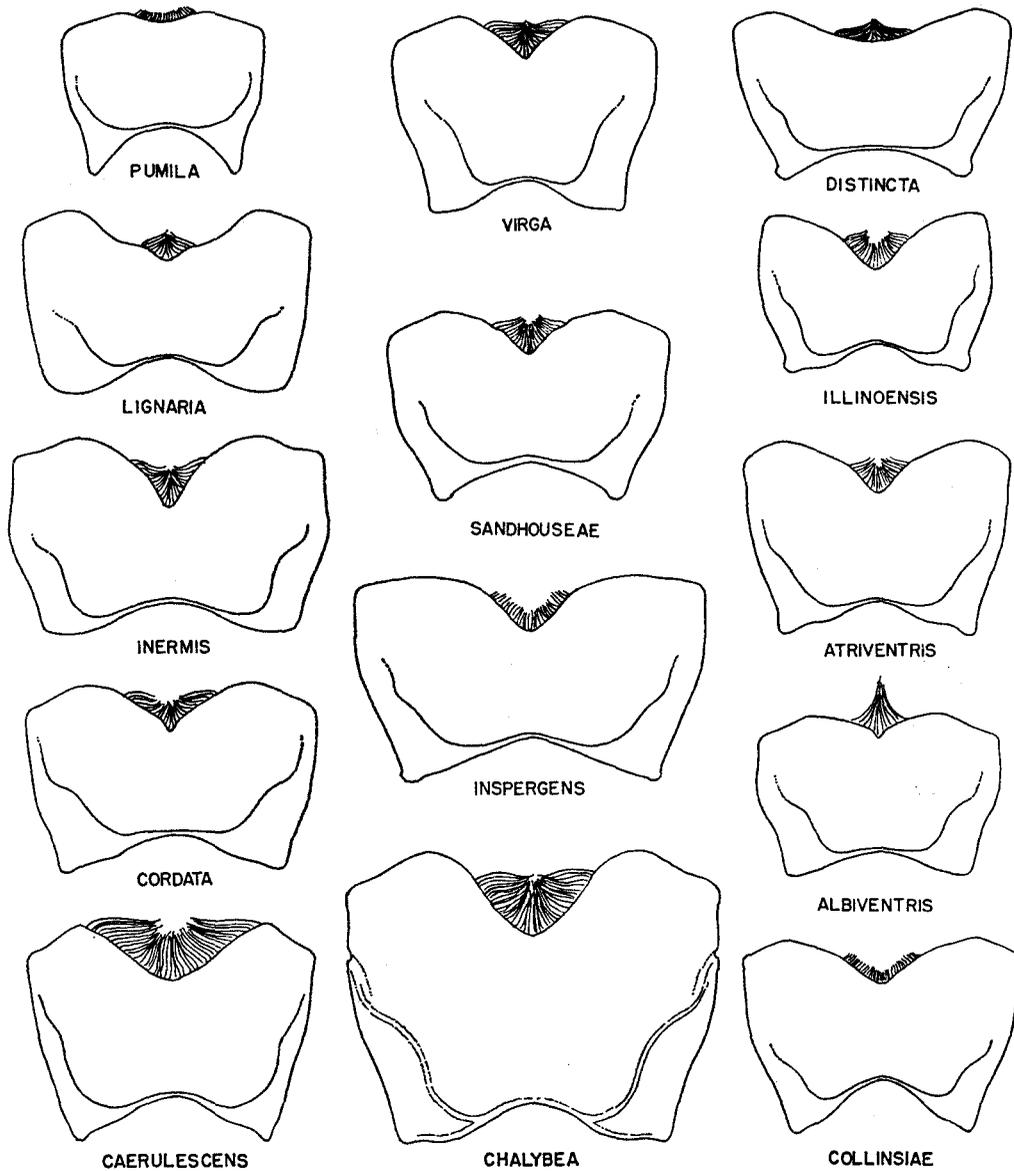


Figure 33—Abdominal sternum 3 in males of *Osmia*.

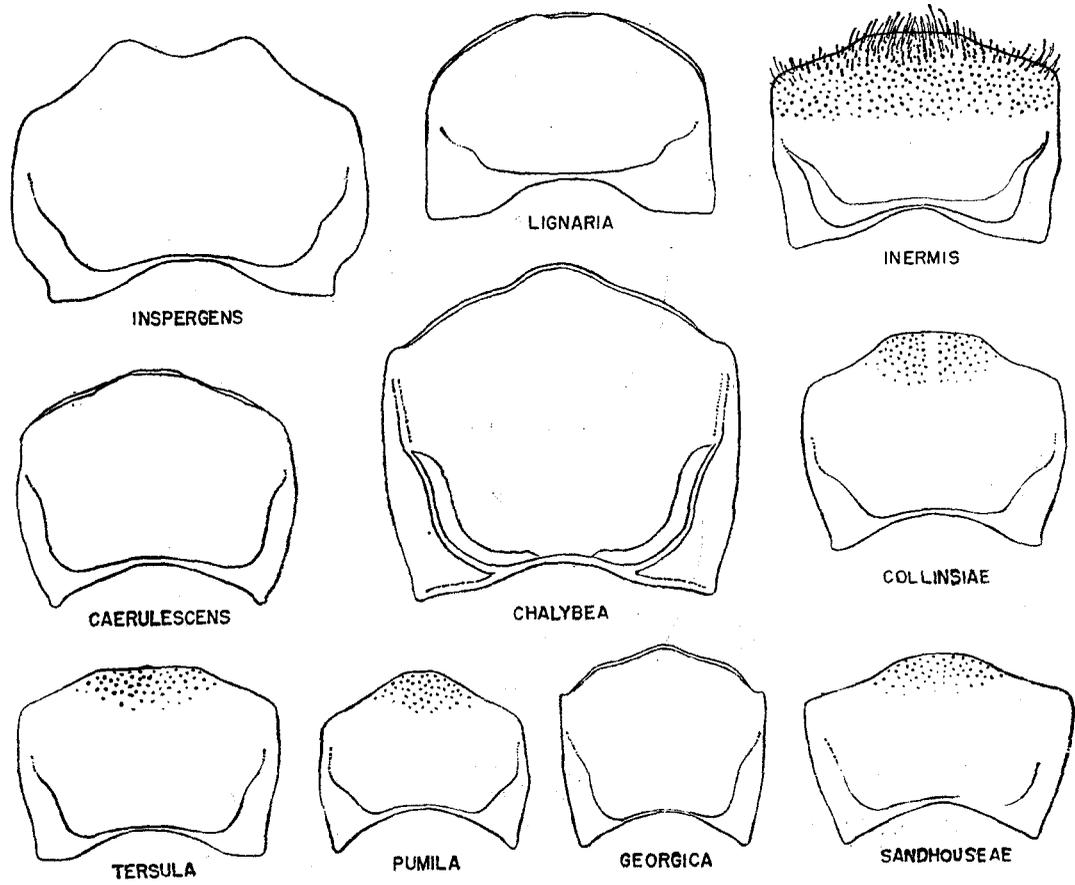


Figure 34—Abdominal sternum 4 in males of *Osmia*.

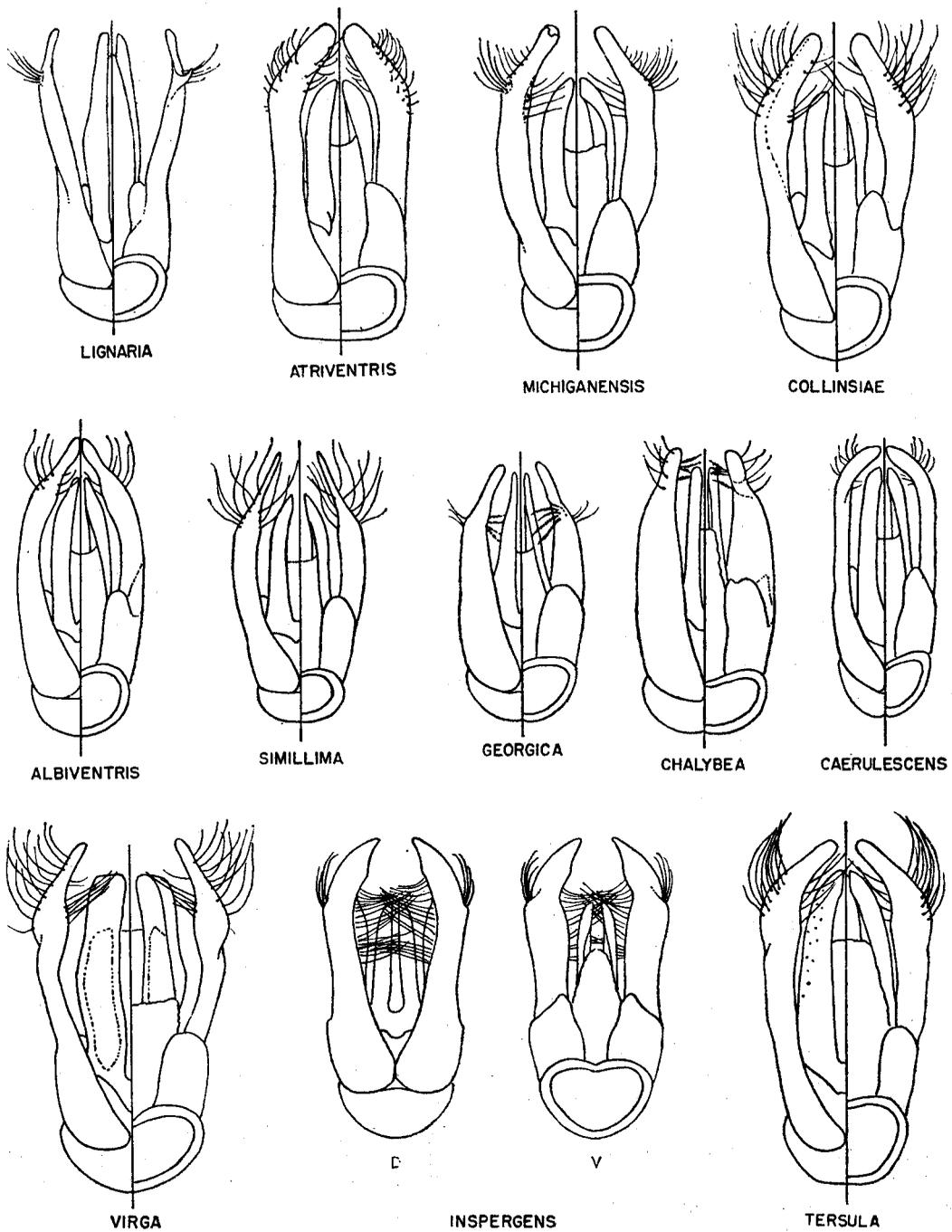


Figure 35—Dorsal and ventral views of genital armature in males of *Osmia*.

Megachile Latreille

(Fig. 1)

- Megachile* Latreille, 1802. Hist. Nat. Formis. p. 434. Type: *Apis centuncularis* Linnaeus. Desig. by Curtis, 1828.
- Anthophora* Fabricius (not Latreille), 1804. Systema Piezatorum, p. 372. Type: *Apis centuncularis* Linnaeus. Pres. desig.
- Megachile* subg. *Eutricharaea* Thomson, 1872. Hym. Scand., 2, p. 228. Type: *Apis argentata* Fabricius. Monob.
- Gnathocera* Provancher, 1883. Nat. Canad. 13, p. 232. Preocc. Type: (*Gnathocera cephalica* Provancher) = *Megachile pugnatus* Say. Monob.
- Megachile* subg. *Paramegachile* Friese, 1899. Die Bienen Europas, v. 5, p. 34. Type: *Apis argentata* Fabricius. Desig. by Mitchell, 1934.
- Chelostomoides* Robertson, 1901. Canad. Ent. 33, p. 231. Type: (*Megachile rufimanus* Robertson) = *Chelostoma rugifrons* Smith. Monob. and orig. desig.
- Anthemois* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 168. Type: (*Megachile infragilis* Cresson) = *Apis centuncularis* Linnaeus. Monob. and orig. desig.
- Cerantias* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 168. Preocc. Type: *Megachile pugnatus* Say. Orig. desig.
- Gnathodon* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 168. Preocc. Type: *Megachile georgica* Cresson. Monob. and orig. desig.
- Oligotropus* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 168. Type: *Oligotropus campanulae* Robertson. Monob. and orig. desig.
- Xanthosarus* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 168. Type: *Megachile latimanus* Say. Monob. and orig. desig.
- Cyphopyga* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 169. Type: *Megachile montivaga* Cresson. Monob. and orig. desig.
- Sayapis* Titus, 1905. Ent. Soc. Wash. Proc. 7, p. 154. Proposed to replace *Gnathocera* Provancher and *Cerantias* Robertson.
- Megalochila* Schulz, 1906. Spolia Hym., p. 64. Emend.
- Megachile* subg. *Paramegalochila* Schulz, 1906. Spolia Hym., p. 71. Emend.
- Megachile* subg. *Delomegachile* Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey Bul. 22, p. 745. Type: (*Megachile vidua* Smith) = *Megachile frigida* Smith. Monob.
- Sarogaster* Robertson, 1918. Ent. News 29, p. 92. Proposed to replace *Gnathodon* Robertson.
- Megachiloides* Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 154. Type: *Megachiloides oenotherae* Mitchell. Monob.
- Megachile* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 295-361. Revision.
- Megachile* subg. *Litomegachile* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 301 & 308. Type: *Megachile brevis* Cresson. Orig. desig.
- Megachile* subg. *Leptorachis* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 301 & 308. Type: *Megachile petulans* Cresson. Orig. desig.
- Megachile* subg. *Argyropile* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 302 & 308. Type: *Megachile parallela* Smith. Orig. desig.
- Megachile* subg. *Neomegachile* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 302 & 307. Type: *Megachile chichimeca* Cresson. Orig. desig.
- Megachile* subg. *Cressoniella* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 302 & 307. Type: *Megachile zapoteca* Cresson. Orig. desig.
- Megachile* subg. *Xeromegachile* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 302 & 309. Type: *Megachile integra* Cresson. Orig. desig.
- Megachile* subg. *Phaenosarus* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 303 & 309. Type: *Megachile fortis* Cresson. Orig. desig.
- Megachile* subg. *Pseudocentron* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 303 & 307. Type: *Megachile pruina* Smith. Orig. desig.
- Megachile* subg. *Acentron* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 303 & 307. Type: *Megachile albitarsis* Cresson. Orig. desig.
- Megachile* subg. *Melanosarus* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 303 & 307. Type: *Megachile xylocopoides* Smith. Orig. desig.
- Megachile* subg. *Derotropis* Mitchell, 1936. Amer. Ent. Soc. Trans. 62, pp. 119 & 156. Type: *Megachile pascoensis* Mitchell. Orig. desig.
- Megachile* subg. *Argyropile* Mitchell, 1943. Pan-Pacific Ent. 19, p. 16. (key)
- Megachile* subg. *Chelostomoides* Mitchell, 1956. Pan-Pacific Ent. 32, p. 134. (key)

Megachile is a cosmopolitan group of non-metallic, usually robust, black bees. The basal abdominal tergum is concave anteriorly, but not carinate. The posterior face of the propodeum and the metanotum are nearly perpendicular, with no dorsal pitted area. The scutellum is broad, its hind margin nearly straight, with rather large axillae which are not conspicuously protuberant and never acute. The pleura and tubercles lack carinae and the notaulices are linear. In the front wings both recurrent veins are received by the 2nd submarginal cell. The maxillary palpi are 3 segmented, while the mandibles are 3- to 5-dentate.

In the males the front coxae usually are spinose, and the front tarsi are often much dilated and modified. Tergum 6 is more or less vertical, usually with a subapical carina which forms the actual apex of the abdomen. Tergum 7 and the true apical margin of 6 are ventral in position. Sterna 1-4 commonly are exposed, 5-8 retracted and highly modified.

Typically these are leaf-cutters, the females cutting circular or oval pieces of leaves which are used as cell linings and caps. These cells are constructed in a variety of locations, many species nesting in the soil, sometimes gregariously, while others make their tunnels in rotting wood, or use borings or cavities in wood or in plant stems. One group of species, the subgenus *Chelostomoides*, does not cut leaves, but uses resin in the construction of the cells. This group appears to be related to other groups in other parts of the world, which have somewhat similar habits, and it is probable that these will eventually be separated from *Megachile* as a distinct genus.

Summary of key to females of *Megachile*

- A—Mandibles without distinct, bevelled, cutting edges—couplet 2 (below)
- ^{1 of} B—Mandibles 5-dentate—couplet 8 (p. 110)
_{between}
- C—Mandibles 3-dentate—*oenotheae* (p. 110)
- D—Abdominal sterna with white apical fasciae beneath the scopa—couplet 18 (p. 110)
- E—Mandible lacking a cutting edge between the two inner teeth—couplet 22 (p. 111)

- F—Sternum 6 either bare, or with a bare apical rim—couplet 29 (p. 111)
- G—Inner-most tooth or angle of mandible either rounded or broadly truncate, never acute—couplet 33 (p. 111)
- H—Tergum 6 concave in profile—couplet 41 (p. 112)
- I—Mandible slightly angulate between the two inner teeth—*mendica* (p. 112)
- J—Mandible without an angle between the two inner teeth—couplet 44 (p. 112)

Summary of key to males of *Megachile*

- A—Abdominal sternum 4 retracted, entirely covered by sternum 3—couplet 2 (p. 112)
- B—Carina of tergum 6 entire, more or less rounded—couplet 7 (p. 112)
- C—Front coxal spines much reduced or lacking—couplet 15 (p. 113)
- D—Mid tibial spurs absent—couplet 20 (p. 113)
- E—Front basitarsi dilated, usually excavated anteriorly, and usually pale in color—couplet 26 (p. 113)
- F—Mandibles 4-dentate—couplet 36 (p. 114)
- G—Apical margin (not carina) of tergum 6 lacking evident teeth—couplet 39 (p. 114)
- H—Tergum 7 terminating in a conspicuous, median, apical spine—*frugalis* (p. 114)
- I—Tergum 7 not spinose—couplet 42 (p. 114)

KEY TO SPECIES

Females

- Mandibles with bevelled, cutting edges that occupy the intervals between distinct, angulate teeth 7
Mandibles lacking distinct, bevelled, cutting edges 2
- Thorax and abdominal terga 2 and 3 densely covered with fulvous pubescence .. (*Archimegachile*) *lanata* Fabricius (p. 181)
Pubescence of thorax and abdomen white or greyish, with possible black intermixture (*Chelostomoides*) 3

3. Clypeus deeply excavated medially to the practical obliteration of the outer surface except at extreme sides; mandibles very long and slender
rugifrons (Smith) (p. 187)
 Clypeus flattened, unmodified; mandibles relatively short and broad 4
4. Clypeal margin entire
georgica Cresson (p. 186)
 Clypeal margin denticulate or emarginate 5
5. Abdominal tergum 5 with a conspicuous, entire, white, apical fascia; clypeal margin with a rather broad, shallow, median emargination in the center of which is a small denticle
exilis parexilis Mitchell (p. 184)
 Fascia of tergum 5 reduced and inconspicuous; clypeal margin with a narrow, median emargination which is almost as deep as it is wide, lacking the median denticle 6
6. Pubescence of abdominal tergum 6 entirely pale; wings subhyaline; size rather small (10-11 mm.).
campanulae campanulae Robertson (p. 182)
 Tergum 6 with erect black hairs in addition to the white tomentum; wings infuscated; larger (11-12 mm.).
campanulae wilmingtongi Mitchell (p. 184)
- 7(1). Mandibles more or less distinctly 5-dentate (including the inner angle of the dentate margin) 8
 Mandibles with at most but four distinct teeth 17
8. Mid basitarsi equal in length to their tibiae; the two apical mandibular teeth separated from the three inner teeth by a long cutting edge (*Melanosarus*) .. 9
 Mid tibiae usually somewhat longer than their basitarsi; if teeth grouped as above, then cutting edge very short .. 10
9. Wings very deeply infuscated, purplish; abdomen with numerous rather large and deep punctures
xylocopoides Smith (p. 171)
 Wings less deeply infuscated, not purplish, hind wings nearly subhyaline; punctures of abdomen very minute and sparse .. *bahamensis* Mitchell (p. 169)
- 10(8). Emargination between 3rd and 4th mandibular teeth deeper than it is long, fully occupied by the bevelled cutting edge, 4th tooth very narrow 11
 Emargination between 3rd and 4th teeth not so deep, usually lacking the cutting edge, 4th forming an obtuse angle (*Megachile*) 13
11. Apex of sternum 6 thickened, produced slightly beyond apex of tergum; lateral ocelli nearer eyes than to margin of vertex
fortis Cresson (p. 156)
 Apex of sternum 6 neither thickened nor protuberant; lateral ocelli slightly nearer margin of vertex than to eyes (*Xanthosarus*) 12
12. Black pubescence of scutum more extensive covering more than half of disc, and often extending onto scutellum
perihirta Cockerell (p. 159)
 Black pubescence of scutum covering little more than half of disc, usually not invading scutellum
latimanus Say (p. 157)
- 13(10). Scopa black on apical abdominal sternum
nivalis Friese (p. 129)
 Scopa entirely pale 14
14. Abdominal tergum 6 in profile showing abundant, long and erect pubescence 15
 Tergum 6 in profile showing only short, appressed or suberect pubescence .. 16
15. Pubescence of tergum 6 entirely dark ..
centuncularis (Linnaeus) (p. 124)
 Tergum 6 with appressed golden tomentum and erect dark hairs
relativa Cresson (p. 129)
- 16(14). Tergum 6 concave in profile, covered with appressed silvery tomentum
montivaga Cresson (p. 127)
 Tergum 6 straight in profile, its pubescence entirely blackish or fuscous
inermis Provancher (p. 126)
- 17(7). Mandibles 3-dentate, a long bevelled cutting edge between 2nd tooth and inner angle; glossa and labial palpi exceedingly long, reaching beyond middle of the abdomen
(*Megachiloides*) *oenotherae* (Mitchell) (p. 141)
 Mandibles 4-dentate; glossa and labial palpi of ordinary length 18
18. Abdominal sternum with distinct, entire, white, apical fasciae beneath the scopa (*Eutricharaea*) 19
 Abdominal sternum not fasciate 21
19. Apical margin of clypeus angulate medially, slightly emarginate on each side
apicalis Spinola (p. 120)
 Clypeal margin nearly straight, lacking a median angle 20
20. Abdomen with black hairs visible at sides of terga 2-6 in dorsal view, tergum 6

- without pale tomentum
 .. (?) *rotundata* (Fabricius) (p. 122)
 Black hairs visible at sides of terga 5 and
 6 only, entirely pale on 2-4; tergum 6
 usually with some subappressed pale
 tomentum ... *concinna* Smith (p. 121)
- back 21(18). Bevelled cutting edge definitely ab-
 de of jaw it
 slopes away
 sent between the two inner mandibular
 teeth 22
 A bevelled cutting edge present between
 the two inner teeth 27
22. Abdominal tergum 6 in profile showing no
 erect pubescence, covered with silvery,
 appressed tomentum
 VER-GRAY
 (*Megachile*) *montivaga* Cresson
 (p. 127)
 Tergum 6 in profile showing abundant,
 erect, black pubescence (*Sayapis*) .. 23
23. Cheek with a conspicuous process on the
 inferior, posterior angle
 not bottom
 *pugnata* Say (p. 179)
 Inferior angle of cheek without such a
 process 24
24. Clypeus with long, erect, black pubescence
 ... *frugalis frugalis* Cresson (p. 173)
 Pubescence of clypeus entirely pale ... 25
25. Clypeal margin with a very broad and
 shallow, median, emarginate area, the
 median portion of which is slightly
 thickened and produced
 *policaris* Say (p. 176)
 Clypeal margin with a shallow incurved
 area on each side of center which is
 occupied by a low obtuse angle 26
26. Legs bright ferruginous
 *inimica inimica* Cresson (p. 174)
 Legs black. *inimica sayi* Cresson (p. 176)
- 27(21). Abdominal sternum 6 with central
 area largely bare, or with an apical bare
 rim or ridge extending beyond the apical
 fringe of short hairs 28
 Sternum 6 uniformly covered with hairs,
 lacking the bare apical rim 32
28. Third mandibular tooth truncate, emar-
 gination between it and 2nd tooth very
 short, lacking any bevelled cutting edge
 29
 Third mandibular tooth acute, a rather
 deep emargination between it and 2nd
 tooth, occupied in part by a short cut-
 ting edge 30
29. Abdominal sternum 6 with a bare rim
 extending beyond the apical fringe; ter-
 gum 6 in profile showing not erect pu-
 bescence
 (*Acentron*) *albitarsis* Cresson (p. 165)
 Sternum 6 without a bare apical rim; ter-
 gum 6 in profile showing abundant,
 short, erect pubescence
 (*Leptorachis*) *petulans* Cresson (p. 163)
- 30(28). Apical rim of sternum 6 reflexed
 abruptly, forming a right angle with
 the surface of the plate (*Argyropile*)
 31
 Apical rim of sternum 6 not reflexed; mid
 basitarsi with fuscous or blackish pu-
 bescence covering outer face
 (*Pseudocentron*) *pruina* Smith (p. 167)
31. Abdominal tergum 6 concave in profile,
 entirely covered with closely appressed
 pale tomentum, without erect basal
 hairs. *townsendiana* Cockerell (p. 161)
 Tergum 6 very nearly straight in profile,
 with erect hairs toward the sides basally
 *parallela* Smith (p. 159)
- 32(27). Fourth or inner mandibular tooth
 rounded or broadly truncate (*Delomeg-
 achile*) 33
 Fourth or inner-most tooth or angle of
 mandible acute 40
33. Inner mandibular tooth broadly truncate
 34
 Inner mandibular tooth rounded 37
34. At least some of the abdominal terga with
 entire, conspicuous, white, apical fas-
 ciae 35
 Abdomen entirely lacking fasciae 36
35. Scopa black on sternum 6 and in part on 5
 *ingenua* Cresson (p. 137)
 Scopa entirely pale fulvous
 *frigida frigida* Smith (p. 133)
- 36(34). Scopa entirely black
 *gemula* Cresson (p. 134)
 Scopa entirely fulvous
 *frigida appalachensis* Mitchell
 (p. 134)
- 37(33). Abdominal terga with conspicuous,
 entire, white, apical fasciae
 *addenda* Cresson (p. 131)
 Abdomen not at all fasciate 38
38. Scopa entirely black 39
 Scopa red or fulvous
 *melanophoea melanophoea* Smith
 (p. 138)
39. Pubescence of clypeus entirely black; ter-
 gum 2 with some black pubescence
 across apical margin, the disc largely
 pale pubescent
 *mucida* Cresson (p. 140)
 Pubescence of clypeus pale in large part
 and that of tergum 2 entirely pale
 *melanophoea submelanophoea* Mitchell
 (p. 140)

- 40(32). Abdominal tergum 6 concave in profile (*Litomegachile*) 41
 Tergum 6 straight in profile 43
41. Abdomen viewed from above showing abundant black pubescence at the sides of terga 2-6 .. *texana* Cresson (p. 118)
 Abdomen viewed from above showing little or no black pubescence along the sides 42
42. Scopa entirely pale, and abdominal terga with but a slight amount of black pubescence .. *brevis brevis* Say (p. 114)
 Scopa black on sternum 6, abdominal terga with much black pubescence on the discs
 .. *brevis pseudobrevis* Mitchell (p. 116)
- 43(40). Mandible with a slight angle between 3rd and 4th teeth, approaching a 5-dentate condition; scopa fulvous; abdominal tergum 6 lacking white tomentum (*Litomegachile*) *mendica* Cresson (p. 117)
 Mandible not angulate as above; scopa white, sometimes black on apical sterna; tergum 6 with white or pale tomentum (*Xeromegachile*) 44
44. Lateral ocelli much nearer each other than to margin of vertex; large and robust (15 mm.) 45
 Lateral ocelli subequally distant from each other and margin of vertex ... 46
45. Clypeal margin with a narrow, median, incurved area in the center of which is a minute denticle
 .. *deflexa* Cresson (p. 146)
 Clypeal margin straight and entire
 .. *dakotensis* Mitchell (p. 145)
- 46(44). Abdominal tergum 6 convex in profile, somewhat flattened or compressed on each side apically
 .. *rubi* Mitchell (p. 152)
 Tergum 6 straight in profile, not compressed 47
47. Clypeal margin smooth, straight and entire; punctures on supraclypeal area crowded .. *integrella* Mitchell (p. 150)
 Clypeal margin minutely crenulate; punctures of supraclypeal area separated by at least their own diameter 48
48. Scopa on sternum 5 entirely pale
 .. *integra* Cresson (p. 148)
 Scopa black across apical portion of sternum 5 *brimleyi* Mitchell (p. 143)
- Males*
1. Sternum 4 of abdomen retracted (*Chelostomoides*) 2
 Sternum 4 exposed 6
2. Mandible without an inferior angle or tooth *rugifrons* (Smith) (p. 187)
 Inferior margin of mandible angulate or toothed 3
3. Front tarsi dark, only slightly dilated and flattened 4
 Front tarsi ferruginous, basal segments dilated and flattened 5
4. Smaller (9 mm.); wings subhyaline
 .. *campanulae campanulae* Robertson (p. 182)
 Larger (11 mm.); wings strongly infuscated
 .. *campanulae wilmingtوني* Mitchell (p. 184)
- 5(3). Front coxae with well developed, though short, spines
 .. *georgica* Cresson (p. 186)
 Front coxal spines reduced to minute, inconspicuous tubercles
 .. *exilis parexilis* Mitchell (p. 184)
- 6(1). Carina of tergum 6 entire, more or less rounded 7
 Carina of tergum 6 usually with a distinct, median emargination, this sometimes obscured by lateral denticulations or crenulations 14
7. Glossa exceedingly long, nearly attaining tip of abdomen, and segment 2 of labial palpus about four times length of 1st ..
 .. (*Megachiloides*) *oenotherae* Mitchell (p. 141)
 Glossa of normal length, and segments 1 and 2 of labial palpus subequal (*Xeromegachile*) 8
8. Front tarsi simple, neither dilated nor excavated 9
 Front basitarsi dilated and either yellowish or ferruginous in color, anterior margin more or less excavated 11
9. Lateral ocelli equidistant from margin of vertex and each other
 .. *integrella* Mitchell (p. 150)
 Lateral ocelli much nearer each other than to margin of vertex 10
10. Front tarsi yellow, contrasting with the dark mid and hind tarsi and with the other segments of the legs
 .. *dakotensis* Mitchell (p. 145)
 Front tarsi not contrasting with the remainder of the legs, usually piceous, but sometimes more or less ferruginous ..
 .. *deflexa* Cresson (p. 146)
- 11(8). Hind basitarsi pale testaceous, very short, length only slightly greater than basal width .. *integra* Cresson (p. 148)
 Hind basitarsi dark, relatively narrow and elongate 12

- spur is hard and very st
12. Inferior mandibular projection robust, very broadly truncate
(*Phaenosarus fortis* Cresson (p. 156)
Inferior mandibular projection slender and acute 13
13. Carina of tergum 6 triangular in outline, subacute; tergum 7 also triangularly pointed *rubi* Mitchell (p. 152)
Carina of tergum 6 broadly rounded, sub-crenulate; tergum 7 obtuse
..... *brimleyi* Mitchell (p. 143)
- 14(6). Front coxal spines absent, or reduced to dentiform tubercles 15
Front coxal spines well developed 19
15. Lower margin of mandible straight, lacking any basal inferior tooth or protuberance
(*Archimegachile lanata* (Fabricius) (p. 181)
Mandible with a distinct and acute, basal, inferior tooth (*Megachile*) 16
16. Abdomen nearly impunctate; lateral ocelli much nearer each other than to margin of vertex; larger (13 mm.)
..... *inermis* Provancher (p. 126)
Smaller; abdomen distinctly punctate . 17
17. Clypeal margin with a distinct median tubercle; surface of tergum 6 above carina polished and sparsely punctate
..... *relativa* Cresson (p. 129)
Clypeal margin not tuberculate; surface of tergum 6 tuberculate or closely punctate 18
18. Coxal spines represented by dentiform tubercles; carina of tergum 6 with a distinct median emargination, surface above the carina dull, finely rugoso-punctate .. *montivaga* Cresson (p. 127)
Coxal spines entirely lacking; carina of tergum 6 with median emargination obscured or lacking, surface above carina with numerous small tubercles, punctures obscure
..... *centuncularis* (Linnaeus) (p. 124)
- 19(14). Mid tibial spurs absent 20
Mid tibial spurs present 25
- big black 20. Mandibles 3-dentate; mid basitarsus pro-
um tuberant at base beneath (*Xanthosarus*) 21
- arsus still 2. very slightly
Mandibles 4-dentate; mid basitarsus simple 22
21. Mid basitarsal protuberance narrow and keel-shaped
..... *perihirta* Cockerell (p. 159)
Mid basitarsal protuberance robust, broad and quadrate
..... *latimanus* Say (p. 157)
- 22(20). Mid tibia with a spur-like apical projection; lower margin of mandible with a median, acute angle or tooth tooth is small
(*Pseudocentron pruina* Smith (p. 167) mandi
Mid tibia without an apical projection, either dilated or angulate, or not; lower margin of mandible lacking a median angle or tooth 23
But do a hog basal
23. Mid tibia dilated apically; front basitarsus not much produced apically, subequal in length to joints 2-5 combined (*Acentron albitarsis* Cresson (p. 165)
Mid tibia not dilated apically, but inner margin slightly angulate just before apex; anterior margin of front basitarsus much produced apically (*Melanosarus*) 24
24. Mid and hind tarsi blackish
..... *xylocopoides* Smith (p. 171)
Mid and hind tarsi ferruginous
..... *bahamensis* Mitchell (p. 169)
- 25(19). Front basitarsi dilated, usually yellowish or ferruginous 26
Front basitarsi simple, blackish 35
26. Mandible 3-dentate; abdomen elongate and parallel-sided; claws usually with sharp, basal teeth (*Sayapis*) 27
Mandible 4-dentate; abdomen more robust; claws without basal teeth simply clef†
..... (*Delomegachile*) 30
27. Front basitarsal scale produced apically fully to tip of 3rd segment
..... *policaris* Say (p. 176)
Apex of basitarsal scale not attaining tip of 3rd segment 28
28. Apex of basitarsal scale attaining tip of 2nd segment; anterior fringe on lower margin of scale black on basal third ..
..... *pugnata* Say (p. 179)
Apex of basitarsal scale not attaining tip of 2nd segment; anterior fringe on lower margin of scale uniformly colored over entire length 29
29. Legs bright ferruginous
..... *inimica inimica* Cresson (p. 174)
Legs dark. *inimica sayi* Cresson (p. 176)
- 30(26). Front basitarsi mostly blackish
..... *gemula* Cresson (p. 134)
Front basitarsi pale in color 31
31. Median teeth on apical margin (not carina) of tergum 6 slender and spine-like
..... *melanophoea* Smith (p. 138)
Median teeth of tergum 6 not spine-like ..
..... 32
32. Front basitarsi distinctly narrower than their tibiae *ingenua* Cresson (p. 137)

- Front basitarsi equalling or exceeding their tibiae in width 33
33. Front basitarsi exceeding their tibiae in width, nearly as wide as long 34
Front basitarsi subequal to their tibiae in width, length much exceeding their width *mucida* Cresson (p. 140)
34. Median abdominal terga with entire, white, apical fasciae
..... *frigida frigida* Smith (p. 133)
Abdomen with only traces of white, apical fasciae, and then usually only on tergum 5
..... *frigida appalachensis* Mitchell (p. 134)
- 35(25). Mandibles 4-dentate 36
Mandibles 3-dentate 38
36. Apical margin (not carina) of tergum 6 without conspicuous teeth; front coxae bare anteriorly, with a dense patch of red bristles anterior to each spine
..... (*Delomegachile*) *addenda* Cresson (p. 131)
Apical margin of tergum 6 with four conspicuous teeth; front coxae pubescent anteriorly, lacking red bristles (*Argyropile*) 37
37. Larger (13 mm.); carina of tergum 6 broader, surface just above emargination broadly impressed
..... *parallela* Smith (p. 159)
Smaller (10 mm.); carina of tergum 6 narrowed apically, slightly curved ventrad, emargination small, upper surface not impressed
..... *townsendiana* Cockerell (p. 161)
- 38(35). Tergum 6 usually pale tomentose, apical margin (not carina) without evident teeth 39
Apical margin of tergum 6 with either median or lateral teeth, or both; tergum 5 at most with pale tomentum across base 41
39. Carina of tergum 6 entire laterad of the definite, median emargination; mid tooth of mandible slightly emarginated, mandible thus approaching a 4-dentate condition
..... (*Leptorachis*) *petulans* Cresson (p. 163)
Carina of tergum 6 denticulate laterally, obscuring the median emargination; mandibles distinctly 3-dentate (*Eutricharaea*) 40
40. Cheek below with an angulate process beneath base of mandible; lower margin of posterior face of front femora more or less distinctly rimmed with yellow toward apex; gonocoxites of genital armature largely bare, slightly dilated below apex .. *concinna* Smith (p. 121)
Cheek not angulate; front femora not rimmed with yellow; gonocoxites conspicuously setose apically, tips slender and strongly recurved dorsally
..... (?) *rotundata* Fabricius (p. 122)
- 41(38). Tergum 7 produced medially to form a conspicuous apical spine; lateral teeth of apical margin (not carina) of tergum 6 conspicuous, median teeth in-evident (*Sayapis*)
..... *frugalis frugalis* Cresson (p. 173)
Tergum 7 not spinose; apical margin of tergum 6 with evident though small, median and lateral teeth, median pair carinate, lateral pair acute (*Litomegachile*) 42
42. Median teeth of apical margin of tergum 6 nearer each other than to the lateral teeth, or these distances subequal
..... *mendica* Cresson (p. 117)
Median teeth of tergum 6 nearer the lateral teeth than to each other 43
43. Carina of tergum 6 quite deeply emarginate medially
..... *texana* Cresson (p. 118)
Median emargination of carina of tergum 6 more indistinct, often obscured by the lateral irregular denticulations or crenulations 44
44. Pubescence of abdomen black in part
..... *brevis pseudobrevis* Mitchell (p. 116)
Pubescence of abdomen entirely pale
..... *brevis brevis* Say (below)

***Megachile (Litomegachile) brevis brevis* Say**
(Figs. 36-38)

Megachile brevis Say, 1837. Boston Jour. Nat. Hist. 1, p. 407. ♂ ♀.

Megachile languinosa Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 190. ♀ ♂.

? *Megachile nupta* Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 268. ♀.

Megachile perbrevis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 127. ♂.

Megachile brevis Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 39. (biology)

Megachile brevis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile brevis Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 220. (biology)

Megachile (Litomegachile) brevis Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 13.

Megachile (Litomegachile) brevis Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1057. (larva)

Megachile (Litomegachile) brevis brevis Michener, 1953. Kans. Univ. Sci. Bul. 35, pp. 1659-1748. (biology)

mendica - median teeth smaller; area between less concave
brevis - median teeth larger; area between wider & more concave

FEMALE—Length 9-12 mm.; black, including tegulae and legs, spurs yellowish; eyes slightly convergent below; clypeal margin nearly straight, median third narrowly shining and impunctate; mandibles 4-dentate, with bevelled edges between 2nd and 3rd, 3rd and 4th (fig. 38); lateral ocelli subequally distant from eyes and margin of vertex; cheeks slightly narrower than eyes; punctures deep, distinct and rather coarse, well separated between eyes and ocelli and on clypeus and supra-clypeal area medially, closer between ocelli, across upper part of face, below ocelli and on lateral margins of clypeus, finer and more shallow and vague on cheeks; pubescence white, rather copious around antennae and inner orbits on cheeks, especially below, and on thorax laterally and posteriorly, largely black on vertex, scutum and scutellum; punctures of scutum close, moderately coarse, slightly separated across disc medially, those on axillae and scutellum somewhat closer and finer, shallow and rather densely crowded on pleura, propodeum somewhat smoother, punctures very fine, shallow and indistinct; mid and hind basitarsi nearly as broad as their tibiae; tegulae minutely and rather closely punctate; wings sub-hyaline, becoming faintly clouded along apical margin, veins piceous; abdominal terga 2-5 shallowly grooved or depressed toward basal margin, apical margins more abruptly depressed laterally, rims very narrowly yellowish-hyaline; basal tergum with copious, elongate, erect, whitish pubescence, discal pubescence of tergum 2 somewhat shorter but entirely whitish, that on 3-5 black in part, 2-5 with entire, whitish, apical fasciae; punctures close and fine on terga 1 and 2, somewhat more widely separated on 3-5, 6 distinctly concave in profile, with rather abundant, erect pubescence, blackish toward base becoming pale apically; sternum 6 well covered with scopal hairs, these largely pale, apical margin with a dense fringe of short, more fuscous hairs, scopa yellowish-white, sternal plates quite coarsely and closely punctate, narrowly yellowish-hyaline apically.

MALE—Length 7-9 mm.; black, including tegulae and legs, spurs testaceous; eyes slightly convergent below; cheeks somewhat narrower than eyes; clypeal margin obscured by a dense, elongate, white fringe, nearly straight, but median area very slightly incurved; mandibles conspicuously 3-dentate, with an acute, sub-basal inferior process; apical segment of flagellum narrow and elongate; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes; punctures deep and distinct, but not very coarse, rather close across vertex, and between eyes and ocelli, becoming very fine, close and obscure on the more shining

cheeks, rather coarse and quite closely crowded below ocelli, but becoming minute and densely crowded on supra-clypeal area and sides of face beneath pubescence, but upper half of clypeus with distinct, rather coarse and quite close punctures evident, these becoming minute and densely crowded apically where surface is obscured by pubescence; pubescence largely pale on head and thorax, with only a few more yellowish hairs interspersed on vertex and scutum; pubescence quite copious and erect around antennae, on sides of face and on clypeus apically, elongate and quite copious on cheeks below and on thorax laterally and posteriorly, somewhat thinner but erect and quite copious on vertex and dorsum of thorax; punctures quite deep, distinct and close over most of scutum and scutellum, relatively fine, slightly separated along mid-line of scutellum, quite densely crowded and fine on pleura, propodeum somewhat more shining; front coxal spines well developed but rather short, sub-acute, quite densely long pubescent; mid tibial spurs well developed; all basitarsi much narrower than their tibiae; tegulae minutely and rather closely punctate; wings subhyaline, veins brownish to piceous; abdominal terga 2-4 quite deeply depressed toward basal margin, apical margins narrowly and abruptly depressed, more deeply so laterally except on 4, margins narrowly yellowish-hyaline, and yellowish or whitish fasciate, discal pubescence copious and erect on terga 1 and 2, somewhat shorter but erect and rather conspicuous on 3-5; terga 1 and 2 very closely and finely punctate, punctures more distinctly separated and somewhat coarser on 3 and 4, quite coarse and close over 5 which has a thin, basal yellowish or whitish, tomentose band and a dense, apical, entire fascia of the same color; tergum 6 whitish tomentose in large part dorsally, carina with a small, median emargination, which is obscured by the irregular, more lateral crenulations, median teeth of apical margin nearer lateral teeth than to each other; sterna 1-4 exposed, apical margins depressed and yellowish-hyaline, conspicuously fringed with elongate, pale hairs, punctures close and fine on 1 and 2, somewhat coarser and more widely separated on 3 and 4; setose area of sternum 5 extensive (fig. 36), exceedingly minute; sternum 6 with numerous, scattered, robust setae on each side, apical lobe broad and short, not acutely angulate; gonocoxities constricted above base, compressed apically, the apex acute (fig. 37).

DISTRIBUTION—This is one of the most widely occurring species of bees in North America, ranging from the Atlantic to the Pacific, both in the United States and in southern Canada, throughout the season.

FLOWER RECORDS—*Asclepias*, *Astragalus*, *Bidens*, *Chrysanthemum*, *Erigeron*, *Fagopyrum*, *Gossypium*, *Haplopappus*, *Helianthus*, *Hieraceum*, *Hypericum*, *Kuhniastera*, *Lupinus*, *Medicago*, *Melilotus*, *Ocimum*, *Oenothera*, *Phaseolus*, *Polygonum*, *Psoralioides*, *Rhus*, *Rubus*, *Salvia*, *Solidago*, *Stachys*, *Suriana*, *Tephrosia*, *Trifolium* and *Vicia*. The following additional genera are listed by Robertson (1929): *Abutilon*, *Acerates*, *Amorpha*, *Apios*, *Aster*, *Blephilia*, *Boltonia*, *Brauneria*, *Campanula*, *Cassia*, *Ceanothus*, *Cephalanthus*, *Cicuta*, *Coreopsis*, *Cornus*, *Cynoglossum*, *Desmodium*, *Dianthera*, *Erechthites*, *Eryngium*, *Eupatorium*, *Gerardia*, *Helenium*, *Heliopsis*, *Hibiscus*, *Hydrophyllum*, *Impatiens*, *Krigia*, *Lactuca*, *Lepachys*, *Lespedeza*, *Lineria*, *Lippia*, *Lobelia*, *Ludvigia*, *Lycopus*, *Lythrum*, *Marrubium*, *Nepeta*, *Pentstemon*, *Petalostemum*, *Physostegia*, *Psoralea*, *Pycnanthemum*, *Rosa*, *Rudbeckia*, *Ruellia*, *Sabatia*, *Sagittaria*, *Scutellaria*, *Silphium*, *Strophostyles*, *Teucrium*, *Tradescantia*, *Verbena* and *Verbesina*.

***Megachile (Litomegachile) brevis pseudobrevis* Mitchell**

Megachile (Litomegachile) brevis var. *pseudobrevis* Mitchell, 1936. Amer. Ent. Soc. Trans. 61, p. 20. ♀ ♂.

Megachile (Litomegachile) pseudobrevis Michener, 1947. Amer. Midland Nat. 38, p. 450. (taxonomy)

Although this has been accorded specific status by Michener (1947), the occurrence of intergrading forms in the southeast convinces us that it is more properly to be considered subspecific in rank. It agrees with typical *brevis* in all structural details, the chief difference being that in the female the scopa of sternum 6 is black, and the black pubescence is more conspicuous on the vertex, scutum and the more apical, abdominal terga, including tergum 6. In the male, the discal pubescence of terga 3-5 is to a considerable degree black. In typical *brevis* the scopa is white on sternum 6, with only the apical, dense fringe of hairs at all dark, and in the male the pubescence of the abdomen is almost entirely pale. Specimens collected in the Northeast usually fit the description of typical *brevis*, while in the Southeast, especially along the Coastal Plain and into Florida, *pseudobrevis* is the prevalent form.

DISTRIBUTION—Florida to North Carolina; April to October, in Florida, March to December.

FLOWER RECORDS—*Azelia*, *Chrysopsis*, *Erigeron*, *Galactia*, *Helenium*, *Helianthus*, *Lupinus*, *Melilotus*, *Opuntia*, *Polygonum*, *Rhus*, *Rubus*, *Solidago*, *Suriana*, *Trilisa* and *Vaccinium*. Michener (1947) records this subspecies on *Gaylussacia*.

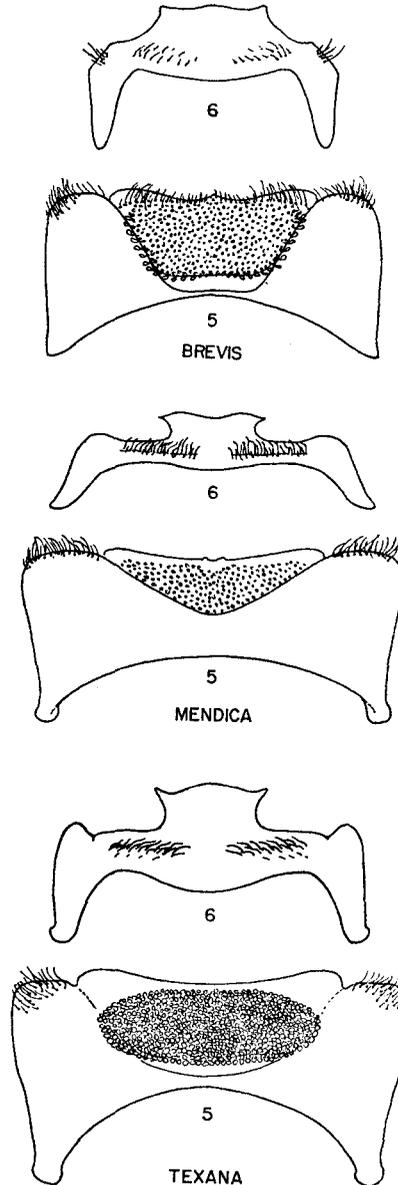


Figure 36
Sterna 5 and 6 in males of *Megachile (Litomegachile)*.

***Megachile (Litomegachile) mendica*
Cresson**

(Figs. 36-38)

- Megachile mendica* Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 126. ♀.
Megachile mendica Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 39. (biology)
Megachile mendica Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Litomegachile) mendica Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 26.
Megachile (Litomegachile) mendica mendica Michener, 1947. Amer. Midland. Nat. 38, p. 449. (flower records)
Megachile mendica Koerber and Medler, 1958. Wisc. Acad. Sci., Arts and Letters 47, p. 56. (biology)

FEMALE—Length 11-13 mm.; black, including tegulae and legs, spurs pale yellow; eyes very slightly convergent below; clypeal margin straight and entire; mandibles 4-dentate, but emargination between 3rd and 4th teeth slightly angulate, bevelled edges between 2nd and 3rd, and 3rd and 4th (fig. 38); lateral ocelli subequally distant from eyes and margin of vertex; cheeks below subequal to eyes in width, narrowed above; punctures deep and distinct, rather fine, quite close but not crowded across vertex, becoming more fine, shallow and close on cheeks, face below ocelli more rugose, clypeus and supra-clypeal area shining, punctures well separated medially, becoming quite close on each side; pubescence whitish, quite copious and rather elongate around antennae and along inner margins of eyes, on cheeks below, becoming rather thin above, and over lateral and posterior areas of thorax, the vertex, scutum and scutellum largely black pubescent; scutum and scutellum rather dull, punctures in general fine and crowded, slightly separated in center of scutum, quite densely crowded on axillae, scutellum and pleura, propodeum somewhat smoother; mid and hind basitarsi slightly narrower than their tibiae; tegulae minutely and rather closely punctate; wings sub-hyaline, veins piceous; abdominal terga 2-5 shallowly grooved across base, basal margin of the groove slightly carinate and complete, apical margins narrowly depressed laterally but not medially, narrowly white fasciate, fasciae more or less interrupted on the more basal terga, discal pubescence short, erect, rather dense, entirely black on terga 2-5, basal tergum with rather thin but long and erect, entirely pale pubescence, without a distinct apical fascia; terga shining, punctures fine and well separated medially, becoming somewhat closer laterally; tergum 6 straight in profile, with no erect hairs evident, but some erect,

rather sparse pubescence evident toward sides in dorsal view, surface very densely and finely punctate and more or less covered with fus-cous, appressed tomentum; sternum 6 rather thinly covered with scopal hairs, the more apical of these black, scopa otherwise yellow; sterna 1 and 2 quite closely, uniformly punctate, 3-5 more coarsely and sparsely so, apical margins very narrowly yellowish-hyaline.

MALE—Length 8-10 mm.; entirely black, including tegulae and legs, spurs yellow; eyes slightly convergent below; clypeal margin nearly straight, but median third very slightly produced, shining and impunctate, very slightly incurved; mandible 3-dentate (fig. 38), with a triangular, basal, inferior process; apical segment of flagellum slender and elongate; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks very slightly narrower than eyes; punctures deep and distinct, rather fine, slightly separated across vertex, becoming somewhat finer and more shallow and vague on cheeks, densely crowded below ocelli, entire face around and below antennae densely and finely rugose beneath dense pubescence which completely hides surface; pubescence of face yellowish-white, that on cheeks greyish-white, quite copious and elongate below, greyish-white on thorax laterally and posteriorly, becoming somewhat more yellowish and with a few, intermixed, dark hairs on vertex and scutum; scutum dull, punctures rather fine and densely crowded except near center where they are very slightly separated, those on axillae and scutellum very densely crowded; pleura dull, subrugose, punctures closely crowded; propodeum somewhat smoother, with close minute, shallow and obscure punctures; front coxal spines well developed, quite slender and elongate, densely long pubescent posteriorly; mid tibial spurs rather short but well developed; all basitarsi much narrower than their respective tibiae; tegulae shining, very minutely and rather closely punctate; wings subhyaline, veins more brownish-piceous; abdominal terga 2-4 rather deeply grooved toward base of each, apical margins very narrowly depressed, especially laterally, very narrowly yellowish-hyaline; punctures of terga 1 and 2 very fine and close, uniform, somewhat coarser and well separated medially on 3 and 4, becoming slightly closer laterally, apical margin of 4 depressed across entire width; tergum 5 narrowly pale tomentose across base, apical margin very deeply and narrowly depressed, not fasciate, punctures rather coarse and close throughout; tergum 6 densely pale tomentose medially, carina with a deep, evenly rounded emargination, margin on each side very minutely crenulate, median teeth of apical margin fully as near each other as each one is to the lateral tooth;

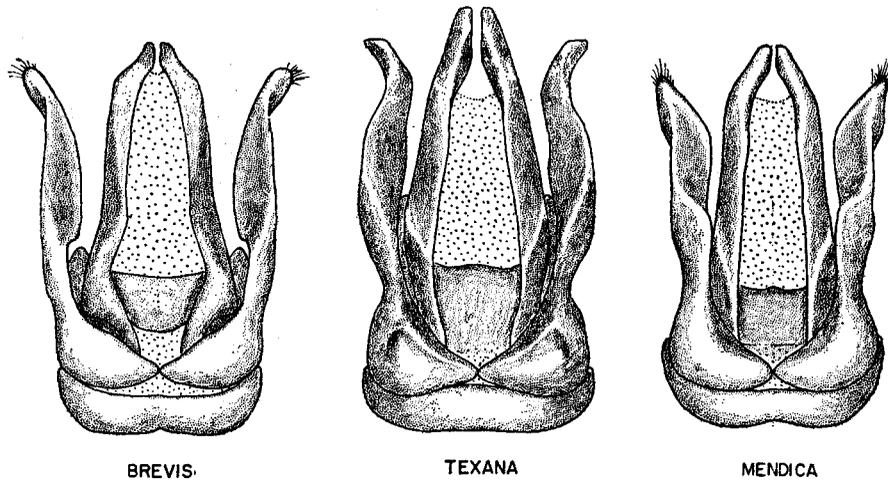


Figure 37—Genital armatures in males of *Megachile* (*Litomegachile*)

setose area of sternum 5 restricted, setae minute (fig. 36); sternum 6 with a single, transverse row of robust, curved setae on each side, other setae minute, apical lobe broad and short, lateral angles acute; gonocoxites of genital armature narrowed above base, compressed apically, apex subacute and flexed (fig. 37).

DISTRIBUTION—This is a widely distributed species in the United States, occurring from coast to coast, and from Maine to Florida in the East. It is in flight throughout the season.

FLOWER RECORDS—*Amorpha*, *Aralia*, *Asclepias*, *Aster*, *Baptisia*, *Bidens*, *Borrichia*, *Ceanothus*, *Cephalanthus*, *Chrysanthemum*, *Chrysopsis*, *Cicuta*, *Cirsium*, *Clematis*, *Cosmos*, *Crataegus*, *Crotalaria*, *Daucus*, *Erigeron*, *Eriogonum*, *Eupatorium*, *Flaveria*, *Galactia*, *Gerardia*, *Haplopappus*, *Helenium*, *Helianthus*, *Hypericum*, *Ilex*, *Itea*, *Linaria*, *Medicago*, *Melilotus*, *Monarda*, *Nyssa*, *Ocimum*, *Oenothera*, *Opuntia*, *Phaseolus*, *Polygonum*, *Rhus*, *Richardia*, *Rubus*, *Rudbeckia*, *Senecio*, *Solidago*, *Specularia*, *Spiraea*, *Stachys*, *Suriana*, *Tephrosia*, *Trifolium*, *Trilisa*, *Vaccinium*, *Veronica*, *Vicia* and *Zinnia*. Additional records by Robertson (1929) include the following: *Acerates*, *Agastache*, *Apios*, *Blephilia*, *Boltonia*, *Brauneria*, *Camassia*, *Cassia*, *Coreopsis*, *Desmodium*, *Diospyros*, *Eryngium*, *Gaura*, *Impatiens*, *Lepachys*, *Lespedeza*, *Lycopus*, *Lythrum*, *Nepeta*, *Prunella*, *Pse-dera*, *Psoralea*, *Pycnanthemum*, *Rosa*, *Salix*,

Silphium, *Strophostyles*, *Symphoricarpus*, *Teucrium*, *Verbena* and *Verbesina*. Three additional records are given by Michener (1947), *Cyrilla*, *Gaylussacia* and *Pyrropappus*.

Megachile (*Litomegachile*) *texana*
Cresson

(Figs. 36 & 37)

- Megachile texana* Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 125. ♂. (♀ misdet.)
Megachile generosa Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 125. ♀.
Megachile schizmatum Cockerell, 1908. Ann. Mag. Nat. Hist. (8) 1, p. 267. ♂.
Megachile vernonensis Cockerell, 1912. Canad. Ent. 44, p. 354. "♀" = ♂.
Megachile generosa Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 38. (biology)
Megachile generosa Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (*Litomegachile*) *texana* Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 32.
Megachile (*Litomegachile*) *texana texana* Michener, 1947. Amer. Midland Nat. 38, p. 449. (flower records)
Megachile texana Krombein, 1953. Ent. Soc. Wash. Proc. 55, p. 84. (biology)

FEMALE—Length 11-14 mm.; entirely black, including tegulae and legs, spurs yellowish; eyes very slightly convergent below; clypeal margin straight and simple; mandibles distinctly 4-dentate, bevelled edges between 2nd and 3rd and between 3rd and 4th; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes;

punctures quite deep and distinct, rather fine, well separated across vertex, becoming somewhat more fine, shallow, close and obscure on cheeks, very close and deep below ocelli, very fine and densely crowded beneath dense pubescence along inner margins of eyes, slightly separated on clypeus and supraclypeal area medially, becoming somewhat closer laterally; pubescence whitish, rather short but dense around antennae and along inner margins of eyes, on cheeks, below, becoming somewhat short and thinner above, short but rather dense on thorax laterally and posteriorly, black on vertex, and over most of scutum and scutellum, scutello-mesothoracic suture with some very fine, obscure, pale tomentum, and scutum with some whitish pubescence anteriorly; scutum dull, punctures rather fine, irregular, well separated in center, and to some degree between notaulices and tegulae, becoming very close antero-laterally and along posterior margin; punctures slightly separated in median area of scutellum, becoming finer and densely crowded laterally and on axillae; pleura very finely and densely punctate above, becoming somewhat more coarsely and distinctly so below; propodeum somewhat smoother, punctures very minute, close and obscure; mid and hind basitarsi nearly as broad and about as long as their tibiae; tegulae very minutely and closely punctate; wings subhyaline, faintly clouded apically, veins piceous; abdominal terga 2-5 with complete, transverse, basal grooves, basal margin of each distinctly carinate, apical margins rather deeply depressed laterally, less so medially, margins very narrowly hyaline and completely white fasciate, fasciae thin medially, becoming broader and dense laterally; discal pubescence short but erect, entirely black, basal tergum with some blackish pubescence on each side, otherwise relatively pale, apical fascia very thin but complete; punctures fine, very close on terga 1 and 2, becoming more distinctly separated on 3-5, somewhat coarser and more sparse toward apical margin of each plate; tergum 6 distinctly concave in profile, with abundant, erect pubescence evident, this largely black, with the more apical pubescence subappressed and pale, punctures very fine and densely crowded; sternum 6 rather well covered with black scopal hairs, with a dense, apical fringe of very short, blackish hairs, scopa otherwise yellowish-white, becoming black only at extreme sides of sternum 5; sterna closely and deeply punctate, very finely so on the more basal plates, becoming more coarse and sparse on the more apical plates.

MALE—Length 10-12 mm.; entirely black, including tegulae and legs, spurs yellowish; eyes very slightly convergent below; clypeal margin very slightly produced medially, this

area narrowly polished and impunctate, very slightly incurved; mandibles 3-dentate, with a triangular, basal, inferior process; apical segment of flagellum slender and elongate; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width; punctures deep and distinct, rather coarse and well separated across vertex; becoming finer, closer and more obscure on cheeks, those below ocelli coarse and contiguous, lateral areas of face and supraclypeal area finely and densely rugose beneath dense pubescence, upper margin of clypeus coarsely and very closely punctate, punctures becoming minute and dense toward apical margin; pubescence around antennae and over lower half of face creamy-white, dense and quite elongate, more snowy-white and copious on cheeks below, becoming thin above, white on thorax laterally and posteriorly, black on vertex and on central area of scutum, with a few, erect, black hairs on scutellum; punctures of scutum close and rather coarse, slightly separated only in median area of disc, very close on scutellum and densely crowded on axillae; pleura dull, punctures densely crowded, propodeum somewhat more shining, with shallow and rather vague punctures evident; front coxal spines rather short but well developed, narrowly rounded apically, densely long pubescent posteriorly; mid tibial spurs short but well developed; all basitarsi relatively slender and short; tegulae very minutely and quite closely punctate; wings subhyaline, veins more piceous; abdominal terga 1-4 rather deeply grooved across base, basal margin of groove conspicuously carinate, apical margins of terga narrowly depressed, deeply so toward sides across entire width of the more apical terga, with entire, white fasciae which are dense laterally, quite thin or interrupted medially; discal pubescence entirely pale, elongate, quite erect and conspicuous, on tergum 1, shorter on the following segments, blackish toward apical margin of each; punctures fine and close on terga 1 and 2, more distinctly separated on 3 and 4, rather coarse and somewhat closer on 5, apical margins of discs of 4 and 5 considerably overhanging the depressed apical rims laterally; tergum 6 quite broadly and densely whitish tomentose above, carina with a deep, semicircular, median emargination, margins on each side subentire, median teeth of apical margin considerably nearer lateral teeth than to each other; sterna 1-4 exposed, shining, rather closely and coarsely punctate on the more basal plates, becoming rather sparse on the more apical plates, apical margins depressed, yellowish-hyaline, quite densely fasciate on 2 and 3; setose area of sternum 5 rather restricted, rounded laterally, finely setose (fig. 36); sternum 6 with widely separated, more or less linear, trans-

verse areas of robust, curved setae; gonocoxites constricted above base, compressed apically, apex acute and flexed (fig. 37).

DISTRIBUTION—This is another widely distributed species, ranging from the Atlantic to the Pacific in the United States and southern Canada, and is in flight throughout the season.

FLOWER RECORDS—*Afzelia*, *Asclepias*, *Baptisia*, *Crotalaria*, *Elephantopus*, *Eupatorium*, *Galactia*, *Helenium*, *Kuhnistera*, *Liatris*, *Medicago*, *Melilotus*, *Opuntia*, *Oxydendrum*, *Phaseolus*, *Rhus*, *Rubus*, *Silphium*, *Stachys*, *Tephrosia*, *Trifolium* and *Vicia*. Robertson (1929) lists the following: *Acerates*, *Aster*, *Blephilia*, *Dianthera*, *Helianthus*, *Nepeta*, *Psoralea*, *Pycnanthemum*, *Strophostyles* and *Verbena*. Michener (1947) gives two additional records, *Pyrrhopappus* and *Serinea*.

Megachile (Eutricharaea) apicalis Spinola

Megachile apicalis Spinola, 1808. Insectorum Liguria 2, p. 259. ♀.

Megachile mixta Costa, 1863. Accad. delle Sci. Fis. e Mat. Napoli. Atti 1 (2), p. 44. ♀.

Megachile dimidiati-ventris Dours, 1873. Rev. Mag. Zool. (3) 1, p. 300. ♀.

Megachile virginiana Mitchell, 1926. Amer. Ent. Soc. Trans. 52, p. 113. ♀.

Megachile (Eutricharaea) apicalis Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 417.

FEMALE—Length 8 mm.; black, including legs, tegulae more brownish-piceous, spurs pale yellow; eyes very slightly convergent below; clypeal margin distinctly angulate medially, shallowly incurved on each side of this; mandibles 4-dentate, but with a slight angle and a low bevelled edge between 3rd and 4th teeth; lateral ocelli subequally distant from eyes and margin of vertex; cheeks much narrower than eyes; vertex deeply and distinctly but closely and rather finely punctate, punctures becoming finer and closer on cheeks

above, rather coarse and irregular below; face below ocelli rather coarsely rugoso-punctate, becoming somewhat more finely so laterally, median area of supraclypeal area shining and impunctate, becoming very closely punctate laterally, clypeus with a median, sparsely punctate, shining line, finely and densely punctate on each side; pubescence greyish-white on face and cheeks, rather copious around antennae, on face laterally and on cheeks below, becoming short but rather dense above, vertex with thin, erect and somewhat darker hairs; thorax rather short, pale pubescent laterally and posteriorly, quite densely so around tubercles and behind wing bases, scutum with largely pale more erect, very sparse, short and obscure pubescence, that on scutellum somewhat more elongate and erect; dorsum of thorax very closely and rather coarsely punctate throughout, pleura with much coarser, contiguous punctures below, becoming finer but densely crowded above; lateral faces of propodeum somewhat smoother but with close, shallow and fine punctures, posterior face somewhat more shining, punctures very minute and quite vague; mid and hind basitarsi about as broad but distinctly shorter than their tibiae, front tarsi relatively slender and simple; tegulae very finely and quite closely punctate; wings subhyaline, slightly clouded apically, veins piceous; abdominal terga 2 and 3 with very shallow, transverse, basal grooves or impressions, these only subcarinate at most, apical margins of 2-5 rather deeply depressed laterally, but not at all medially, densely white fasciate toward sides, but these widely interrupted or very narrow medially; basal tergum with rather copious, elongate, pale pubescence which does not obscure surface, becoming very densely pale tomentose laterally, with a very narrow, apical, connecting fascia; discal pubescence of terga 2-5 very short, rather obscure, largely fuscous, hairs becoming slightly more conspicuous but more sparse apically, punctures of 1 and 2 rather fine and close medially but disc of 2 with a dull sublateral area where they are obscure or absent, those of 3-5 somewhat more coarse and sparse, quite irregular, becoming somewhat finer and closer in the depressed apical margins; tergum 6 about straight in profile, with numerous, suberect, fuscous hairs evident, broadly rounded apically in dorsal view, pubescence entirely dark, surface very minutely and quite closely punctate; scopa pale yellowish on sterna 2-4, black on 5 and 6, the more basal sterna very finely and closely punctate, punctures becoming somewhat coarser and less close on the more apical terga, apical margins narrowly depressed, with conspicuous, white fasciae.

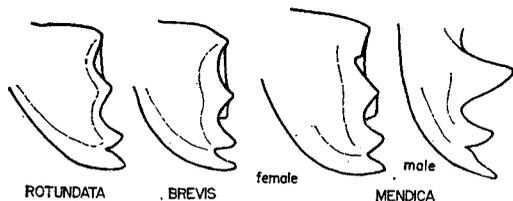


Figure 38
Mandibles in species of *Megachile (Litomegachile)* and *M. (Eutricharaea)*.

MALE—This sex is so nearly identical with the male of *rotundata* that the two are nearly

impossible to separate with any degree of confidence.

DISTRIBUTION — Records of this species in North America are few, but at least some of them seem to be quite positive. Two females have been collected in Virginia, the last one in 1931, by Timberlake. A female has been seen labelled "Canada," and a male, possibly this species, bears the label "New Jersey." A female, bearing no locality data, according to the label was dug from the ground July 12, 1883. It is not clear, therefore, that it has been entirely successful in becoming established on this continent. In the Old World it occurs in Europe and the Mediterranean region.

FLOWER RECORD—*Centaurea cyanus*.

Megachile (Eutricharaea) concinna
Smith

(Fig. 39)

Megachile concinna Smith, 1879. Descr. N. Sp. Hym., p. 79, n. 53. ♀.

Megachile (Eutricharaea) argentata Krombein, 1958. Hym. Amer. North of Mex., Syn. Cat., U.S.D.A. Agr. Monog. 2, First Suppl., p. 244. (misident.)

FEMALE—Length 9 mm.; black, including legs, tegulae yellowish anteriorly, spurs entirely yellow; eyes slightly convergent below; clypeal margin straight and entire; mandibles 4-dentate, a bevelled edge between the 3rd and 4th teeth; lateral ocelli considerably nearer margin of vertex than to eyes; cheeks much narrower than eyes; vertex rather dull, punctures slightly separated on each side, but otherwise densely crowded, becoming very fine and indistinct on cheeks, rather coarse just below base of mandibles; face quite densely rugoso-punctate below ocelli, becoming more distinct but very fine and close laterally, supra-clypeal area with shining spaces between rather sparse punctures just above clypeus but becoming closely punctate laterally, clypeus with a rather distinct, impunctate, median line, closely and deeply punctate on each side; pubescence of face yellowish-white, rather dense but not very long around antennae, below ocelli and along inner orbits, clypeus and vertex with erect and rather sparse, yellowish hairs, cheeks densely white tomentose above, pubescence becoming more elongate and erect below; thorax with rather short, whitish pubescence laterally and posteriorly, this rather dense around tegulae and back of wing bases, somewhat more elongate on propodeum; scutum with rather thin, short

but erect, more fuscous or yellowish pubescence, becoming whitish anteriorly, scutellum with longer, erect, yellowish hairs, the scutello-mesothoracic suture faintly tomentose; dorsum of thorax uniformly, densely and finely punctate throughout; pleura somewhat shining below, punctures distinct but rather close, becoming densely crowded above; lateral faces of propodeum rather dull, surface with numerous, close but fine punctures, posterior face dull, punctures minute, close and rather vague; mid and hind basitarsi nearly as broad as their tibiae, but definitely shorter, the front tarsi quite slender; tegulae minutely and rather obscurely punctate; wings subhyaline, veins piceous; abdominal terga 2 and 3 very shallowly grooved across base, the grooves hardly carinate, apical margins of terga rather deeply depressed laterally but only slightly so medially if at all, with entire, whitish, apical fasciae, these quite dense laterally; basal tergum with rather thin, elongate, pale pubescence, discal pubescence of 2-4 very short, largely fuscous, that on 5 somewhat more elongate and conspicuous apically; punctures of terga 1-4 rather deep and distinct but fine and close, becoming somewhat more sparse toward apical margin of 5, 6 straight in profile, with numerous dark, suberect hairs visible, surface very finely and densely punctate, usually with a more or less extensive patch of pale tomentum; scopa pale yellowish or whitish on sterna 2-5, black on 6, with a few black hairs at sides of 5, punctures of sterna deep, distinct and rather close and fine, apical margins narrowly depressed, with entire, white, apical fasciae.

MALE—Length 7 mm.; black, tegulae more or less yellowish-testaceous, spurs yellow, legs largely black; eyes slightly convergent below; median third of clypeus slightly produced and shallowly incurved; mandibles 3-dentate, inferior process submedian, rather slender and acute; apical segment of flagellum slender and unmodified; lateral ocelli slightly nearer margin of vertex than to eyes; cheeks considerably narrower than eyes, still narrower below, with a small, acute tubercle just below base of mandible; vertex dull, punctures well separated on each side but densely crowded medially, very fine and quite close on cheeks, face below ocelli densely rugoso-punctate, becoming more distinctly but very closely punctate laterally, punctures minute and densely crowded below antennae and on clypeus; face with dense, yellow or yellowish-white pubescence which largely hides surface, more whitish on cheeks, somewhat yellowish and rather dense above, becoming elongate below, rather thin, erect and sparse on vertex; pubescence of thorax short, quite dense, white or yellowish laterally and posteriorly, more erect but rather

thin, either yellowish or whitish dorsally, the scutello-mesothoracic suture narrowly tomentose; dorsum of thorax uniformly, finely and densely punctate, pleura somewhat shining below, punctures distinct but quite close, becoming densely crowded above; lateral faces of propodeum relatively smooth, with only very fine and rather close punctures, posterior face dull, punctures minute, rather close above, becoming sparse below; front coxal spines rather short, subtriangular, apex narrowly rounded, quite densely pubescent, and anterior surface of coxae pubescent, more or less obscuring the spines; front tarsi dark, simple and unmodified, with a quite distinct but rather short, posterior, white fringe; front femora more or less carinate below apically, inner face of this area yellow and carinate border of the posterior face narrowly yellow, femora otherwise dark; mid and hind tarsi slender and simple; mid tibial spurs well developed; tegulae minutely and obscurely punctate; wings subhyaline, veins piceous; abdominal terga 2-5 rather narrowly grooved across base, basal margins subcarinate, apical margins of the terga rather deeply depressed, especially laterally, only obscurely so medially, 2-4 with dense, apical, whitish or yellowish fasciae; tergum 1 with rather copious, elongate and erect, yellowish or whitish pubescence, somewhat obscurely pale fasciate apically, tergum 2 with shorter but quite dense and erect pale pubescence, with some dark hairs at extreme sides, discal pubescence of 3 and 4 suberect, largely pale, very fine and obscure; tergal punctures very fine and close throughout; tergum 5 fasciate basally but not apically, rather coarsely rugoso-striate, with suberect, rather conspicuous, largely pale pubescence; tergum 6 densely pale tomentose throughout, only the median, emarginate area of the low, inconspicuous carina exposed, median teeth of apical margin inevident, lateral angles very low and obscure; tergum 7 very low, transverse, largely hidden, not at all produced medially; sterna 1-4 exposed, quite closely and finely punctate, apical margins depressed, with dense, pale, apical fasciae; setose area of sternum 5 quite limited in area, subtriangular, apical margin nearly straight, setae very fine, becoming rather elongate apically (fig. 39); sternum 6 with narrow, transverse, setose lobes on each side that are slightly separated medially, apical lobe inevident; gonocoxites narrowed above base, compressed toward apex, somewhat abruptly narrowed just before the rounded tips which are slightly emarginate below, lacking conspicuous setae.

DISTRIBUTION—Although *concinna* was described from the West Indies, it belongs to an Old World group and probably

was introduced from Africa during the early part of the nineteenth century. It appeared in the United States after World War II, and is now distributed from Florida and Alabama to Pennsylvania and Ohio in the East, and established as far west as California. It was first believed by this writer to be *argentata*, which explains the misidentification in the Catalog of Hymenoptera (Krombein, 1958). It is in flight from March, in Florida, to October.

FLOWER RECORDS—In North America this has been collected on *Asclepias*, *Bidens*, *Melilotus* and *Polygonum*.

Megachile derelictula Cockerell (Barbados) and *Megachile multidens* Fox (Jamaica) are very similar to *concinna* and quite possibly synonymous.

***Megachile (Eutricharaea) ? rotundata*
(Fabricius)**

(Figs. 38 & 39)

Apis rotundata Fabricius, 1787. Mantissa Insectorum 1, p. 303.

Apis pacifica Panzer, 1798. Faunae Ins. German. 55, p. 16.

Megachile imbecilla Gerstaecker, 1869. Stettin. Ent. Ztg. 30, p. 359. ♀.

Megachile (Eutricharaea) rotundata Krombein, 1948. Ent. Soc. Wash. Proc. 50, p. 14.

Megachile (Eutricharaea) rotundata Stephen and Torchio, 1961. Pan-Pacific Ent. 37, p. 85. (biology)

FEMALE—Length 8-9 mm.; black including legs, the tegulae more brownish-testaceous, spurs yellow; eyes very slightly convergent below; clypeal margin nearly straight, with a very shallow and rather short, incurved, or emarginate area on each side of center; mandibles 4-dentate, a bevelled edge between 3rd and 4th teeth, where the margin is very slightly angulate; lateral ocelli subequally distant from eyes and margin of vertex; cheeks slightly narrower than eyes; punctures of vertex fine and close but quite deep and distinct, becoming somewhat more shallow and obscure on cheeks, irregularly so below; face below ocelli densely rugose, supraclypeal area closely and rather coarsely punctate on each side, with some shining, impunctate spaces apically in center, clypeus with a very narrow, obscure, shining and sparsely punctate median line, punctures on each side rather coarse and densely crowded; pubescence yellowish-white, rather short on face and cheeks, rather dense around antennae and on face laterally, thin, erect and rather elongate on vertex, hairs yellowish or dark; pubescence of cheeks more whitish, short above, somewhat more elongate

below; thorax short, white pubescent laterally and posteriorly, quite densely so around tubercles and behind wing bases, more yellowish, very short and inconspicuous on scutum, scutellum with more elongate, erect, yellowish hairs; dorsum of thorax densely punctate throughout, punctures rather coarse in center, punctures of pleura somewhat shallower but contiguous, becoming somewhat finer and crowded above; lateral faces of pleura somewhat shining, very minutely and quite closely punctate, posterior face somewhat more shin-

ing, punctures irregular, minute and vague; all basitarsi shorter and somewhat narrower than their tibiae; tegulae with only a few, scattered, minute and obscure punctures; wings subhyaline, veins piceous; abdominal terga 2 and 3 very shallowly grooved across base, these not carinate, apical margins of 2-5 rather abruptly depressed laterally but not medially, with entire, whitish, apical fasciae that are quite dense laterally, narrow medially; tergum 1 with rather copious but thin, elongate, whitish pubescence that is rather dense laterally, 2-4 with very short, fuscous, discal pubescence, 3-6 with conspicuous, black hairs evident on each side in dorsal view; punctures fine and close on the more basal terga, disc of 2 with a dull, sublateral, impunctate area; punctures of 3-5 quite deep, distinct, and well separated; tergum 5 quite similar to 4, 6 nearly straight in profile, with numerous, suberect, fuscous hairs evident, without pale tomentum, surface very finely and quite densely punctate; scopa entirely pale on sterna 2-4, pale basally but more or less black apically and laterally on 5, entirely black on 6; the more basal sterna very closely and rather finely punctate, punctures becoming somewhat more coarse and sparse on the more apical sterna, apical margins narrowly depressed, distinctly white fasciate.

MALE—Length 7-8 mm.; black, tegulae somewhat more brownish or testaceous, front tarsi in part yellowish, spurs yellow; eyes very slightly convergent below; median third of clypeal margin very slightly incurved; mandibles 3-dentate, inferior process sub-basal, slender and acute; apical segment of flagellum slender and simple; lateral ocelli subequally distant from eyes and margin of vertex; cheeks considerably narrower than eyes; vertex rather dull, punctures very close, rather fine but deep and distinct, these becoming somewhat finer and more shallow on cheeks; face below ocelli rather finely rugoso-punctate, clypeus very finely and densely rugose; pubescence of face and vertex yellow, dense around antennae and over lower portion of face, supra-clypeal area with very dense, sub-appressed, upwardly directed hairs that completely hide surface, clypeal pubescence more erect, slightly downcurved at tips, but largely obscuring surface, that on vertex thin and erect, yellowish on cheeks above, becoming white, very long and dense below; pubescence of thorax more whitish, quite dense laterally and posteriorly, yellowish or whitish on dorsum, more elongate and erect on scutellum; dorsum of thorax dull, surface densely and finely rugoso-punctate, punctures of pleura somewhat coarser but densely crowded; lateral faces of propodeum rather smooth, with only exceedingly minute, vague punctures, posteri-

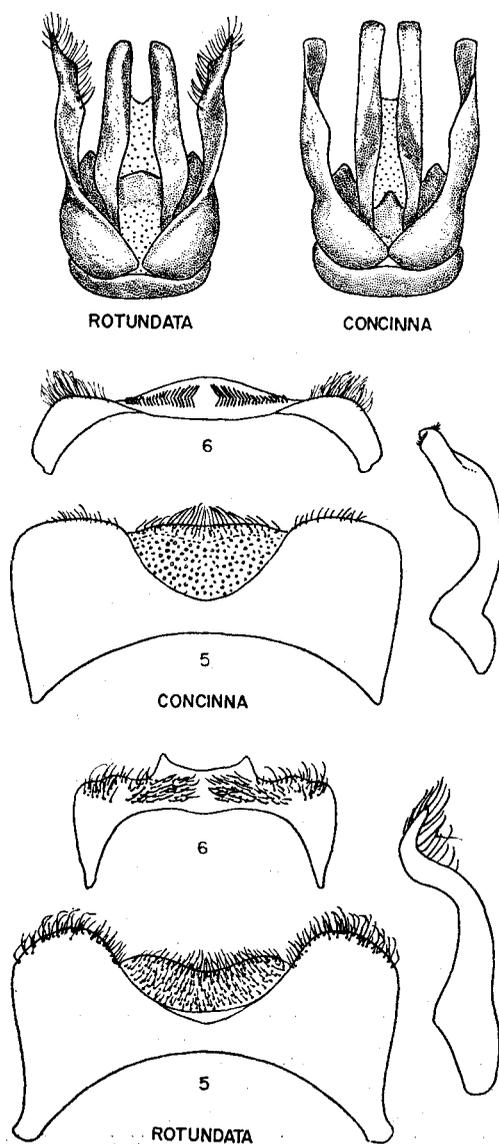


Figure 39
Genital armature and sterna 5 and 6 in males
of *Megachile (Eutricharaea)*.

or face somewhat more shining, with minute, vague and sparse punctures; front coxal spines spatulate, rather broad and quite short, densely white pubescent posteriorly, coxae rather densely white pubescent laterally but largely bare toward inner side, no red bristles evident; front tarsi slender and simple, with a very short but rather dense, posterior fringe, segments 2 and 3 yellow at base, 4 and 5 largely yellow; front tibiae dark, and front femora largely dark on posterior face, apical half of anterior face quite conspicuously yellow, lower margin only obscurely carinate and yellow not invading margin of posterior face; mid tibial spurs well developed, mid and hind tarsi slender and simple; tegulae minutely and closely punctate; wings subhyaline, somewhat clouded apically, veins piceous; basal grooves of abdominal terga very shallow, subcarinate, apical margins of 2-5 rather deeply depressed laterally but not medially, with dense, complete, whitish or yellowish fasciae; basal tergum with copious, erect, entirely pale pubescence, becoming very dense laterally, disc of 2 rather densely covered with suberect, pale hairs which do not hide surface, 3 and 4 with shorter, more obscure, suberect pubescence which is dark at least in part; punctures of terga close medially, fine on 2 and somewhat coarser on 3 and 4, discs of 2 and 3 with dull sublateral, impunctate areas on each side; tergum 5 densely pale tomentose across base, with sub-erect, somewhat darker hairs apically, apical margin deeply depressed laterally but not in center, punctures rather irregular but quite coarse and close, apical margin not fasciate; tergum 6 very densely pale tomentose, largely hiding surface, carina very low and irregularly crenulate, median emargination very obscure, apical margin without distinct median teeth, and lateral angles very obscure; tergum 7 transverse, flattened, not at all produced medially; sterna 1-4 exposed, finely and rather closely punctate, punctures becoming very fine apically on 4, 2 and 3 quite deeply depressed apically, yellowish-hyaline, with quite dense fringes of rather elongate, white hairs; sternum 5 quite broadly incurved apically, median area occupied by the very short, transverse setose area, the setae very fine and dense; setose areas of sternum 6 slightly separated medially, setae very fine and quite dense, apical lobe broad and very short, deeply incurved medially, resulting in a pair of sublateral, more or less acute lobes; gonocoxites of genital armature strongly narrowed above base, strongly and rather obliquely compressed, down-curved apically, but tip elongate, very narrow, at right angles to the sub-apical part, inner surface of apical half very conspicuously long setose.

DISTRIBUTION—This is another Old World species, and was introduced into the United States apparently some time during or just after World War II. It now ranges from Virginia to Massachusetts, west to California, and is in flight during June, July and August.

FLOWER RECORDS—*Asclepias*, *Melilotus*, *Polygonum*, *Solidago* and *Veronica*.

There is a degree of uncertainty regarding the identity of this species. A female specimen in the Copenhagen Museum that is indicated as the type is in close agreement with *centuncularis* Linnaeus, and bears little resemblance to the species which has been accepted by European taxonomists as *rotundata*. There is a possibility that this concept of *rotundata* is based on another type specimen. Moreover, the original brief description seems to suggest this species rather than *centuncularis*.

Megachile (Megachile) centuncularis
(Linnaeus)

(Figs. 41 & 42)

- Apis centuncularis* Linnaeus, 1758. Syst. Nat. 10, p. 575.
Megachile fragilis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 127. ♂.
Megachile leoni Titus, 1906. Ent. Soc. Wash. Proc. 7, p. 150. ♀.
Anthemois centuncularis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Anthemois) centuncularis Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 158.
Megachile (Megachile) centuncularis Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1057. (larva)
Megachile centuncularis Medler, 1959. Canad. Ent. 91, pp. 113-115. (biology)

FEMALE—Length 10-11 mm.; entirely black, including tegulae and legs, spurs yellow; eyes very slightly convergent below; clypeus rather strongly convex, apical margin straight, narrowly shining and impunctate medially; mandibles distinctly 5-dentate; lateral ocelli slightly nearer margin of vertex than to eyes; cheeks subequal to eyes in width; punctures rather coarse, but shallow, well separated on vertex laterally, somewhat closer medially, and closely crowded below ocelli, becoming fine, close and obscure on cheeks; punctures rather coarse and well separated on clypeus and supra-clypeal area medially, becoming close laterally and along upper margin of clypeus; pubescence quite copious, largely yellowish on head and thorax, but with some darker hairs

in region of ocelli and on vertex laterally; pubescence long and copious around antennae and on sides of face below, on clypeus and over most of thorax laterally and posteriorly, dorsum of thorax somewhat more thinly pubescent; punctures of scutum coarse, close and distinct, not very deep, slightly separated only in center of disc, scutellum and axillae with densely crowded punctures; punctures of pleura rather shallow, quite close and coarse, surface rather dull, propodeum somewhat more shining, punctures minute and rather close and obscure; mid and hind basitarsi nearly as broad as their tibiae, but considerably shorter; tegulae shining, with very fine and rather close punctures; wings subhyaline, faintly clouded apically, veins testaceous-piceous; abdominal terga 2-4 with complete, transverse grooves which are submedian near center, somewhat nearer basal margin at extreme sides, punctures fine, rather well separated medially, becoming somewhat closer laterally, those on apical portions of discs somewhat closer than those on basal side of grooves, apical margins not at all depressed medially, somewhat depressed toward extreme sides where there are quite densely yellowish fasciate; tergum 5 not grooved, punctures slightly separated, rather fine and irregular, apical margins slightly depressed, with a complete yellowish fascia; discal pubescence suberect, rather dense, entirely yellow on terga 1 and 2, short, black and erect on 3-5, but with yellowish hairs evident at sides as viewed from above, 6 very slightly concave in profile, with abundant, erect and rather elongate, black hairs evident, surface very finely, closely and deeply punctate across base, these becoming very fine, densely crowded and obscure toward the apex; sternum 6 largely bare and shining, with a subapical fringe of elongate hairs, and a more nearly apical fringe of shorter hairs, apex produced slightly beyond this fringe, yellowish-hyaline; scopa orange-yellow, sternal plates closely, quite uniformly punctate, punctures very fine on the more basal segments, becoming quite coarse and close on the more apical sterna, no sternal fasciae evident.

MALE—Length 8-9 mm.; black including legs, tegulae somewhat more brownish-testaceous, spurs yellow; clypeal margin nearly straight, very slightly and narrowly produced medially, mandibles distinctly 3-dentate, with a triangular, basal, inferior process; apical segment of flagellum slender and elongate; lateral ocelli subequally distant from eyes and margin of vertex; cheeks about as broad as eyes; punctures deep and distinct, slightly separated on vertex toward each side, rather finely crowded on face medially and below ocelli; cheeks very finely and quite closely punctate, pubescence yellowish, quite dense

and elongate around antennae and over face below, rather short but faintly yellowish and quite copious on cheeks below, minutely and densely crowded over lower part of face and clypeus; scutum closely, rather coarsely and distinctly punctate throughout, punctures densely crowded laterally and over scutellum and axillae, very close on pleura; propodeum somewhat shining, smooth, punctures minute and quite close posteriorly; all basitarsi slender and simple, much shorter than their tibiae; middle spurs well developed; tegulae shining, minutely and rather closely punctate; wings subhyaline, veins piceous; basal transverse grooves evident on terga 2 and 3, these together with 1 and 4, quite closely and regularly punctate, apical margins slightly depressed laterally, discal pubescence erect and pale on terga 1 and 2, dark in part on 3-5, base of 5 with a rather large patch of appressed, yellowish tomentum, apical margin depressed, densely yellowish fasciate; tergum 6 shining, with minute and very close punctures and scattered, more or less distinct, well separated nodules, the carina only slightly produced, very shallowly emarginate apically, median teeth of apical margin carinate and broad, lateral teeth very low and subacute; sterna 1-4 exposed, yellowish-hyaline apically, with rather dense fringes of pale yellowish hair, punctures close and rather fine on the more basal terga, becoming somewhat coarser but still close apically; setose area of sternum 5 much restricted, densely setose (fig. 41); setose areas of sternum 6 nearly meeting, apical lobe very small and narrow, barely evident; gonocoxites robust, flexed ventrally, reflexed at tip (fig. 42).

DISTRIBUTION—This is a holarctic species, its range extending from the Pacific to the Atlantic in Canada and the northern half of the United States. In the east it has been recorded from Nova Scotia to Minnesota, Iowa, Illinois and Virginia, and is in flight from May to September.

FLOWER RECORDS—*Melilotus* and *Trifolium*. Medler (1959) records it visiting *Epilobium angustifolium* and *Solidago* sp., and states that it is an effective pollinator of alfalfa (*Medicago sativa*). In the Revision of *Megachile* (Mitchell, 1935) the following additional, genera are listed: *Althaea*, *Psoralea*, *Centaurea*, *Carduus*, *Grindelia*, *Helianthus*, *Inula*, *Taraxacum* and *Vernonia*. Robertson (1929) lists a number of genera, not previously cited. However, he believed *centuncularis* and *relativa* to be synonymous, making his records uncertain.

In the revision (Mitchell, 1935) this species is recorded from Enterprise and St. Augustine, Florida. In view of the general picture the distribution of this species presents, these records seem highly improbable.

***Megachile (Megachile) inermis*
Provancher**

(Figs. 40-42)

- Megachile simplex* Provancher, 1882. Nat. Canad. 13, p. 229. ♂. Preocc.
Megachile inermis Provancher, 1888. Addit. Corr. Faune Ent. Canad. Hym., p. 323. ♂.
Megachile simplicissima Dalla Torre, 1896. Cat. Hym. 10, p. 449. (new name)
Megachile sapellonis Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 6, p. 7. ♀.
Megachile temporalis Friese, 1903. Ztschr. System. Hym. Dipt. 3, p. 247. ♂.
Cyphopyga inermis Titus, 1906. Ent. Soc. Wash. Proc. 7, p. 150.
Megachile decipiens Lovell and Cockerell, 1907. Psyche 14, p. 19. ♂.
Megachile (Anthemois) inermis Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 171.
Megachile inermis Stephen, 1956. Pan-Pacific Ent. 32, pp. 95-101. (biology)
Megachile inermis Koerber and Medler, 1958. Wisc. Acad. Sci., Arts & Letter 47, p. 56. (biology)
Megachile inermis Medler, 1958. Canad. Ent. 90, pp. 325-327. (biology)

FEMALE—Length 15-20 mm.; entirely black, including tegulae and legs; eyes parallel; clypeal margin about straight, with a slight but rather broad, median protuberance and a narrow but rather deep emargination on each side, margin at extreme sides with an oblique, subapical groove beyond which the surface is shining and impunctate; mandibles conspicuously 5-dentate, a bevelled cutting edge between the 2nd and 3rd teeth (fig. 40); lateral ocelli considerably nearer eyes than to margin of the very broad vertex; width of cheeks about twice that of eyes; vertex shining, punctures rather deep and distinct, variable in size, rather close medially, becoming more sparse laterally, especially between ocelli and eyes, punctures on cheeks minute, slightly separated and quite evenly distributed; face below ocelli rather coarsely rugoso-punctate, supraclypeal area and clypeus more or less shining and sparsely punctate medially, punctures becoming rather close and quite deep on lateral margins; pubescence whitish, rather dense around antennae and at sides of face, elongate and pale on cheeks below, but rather thin, becoming shorter and thinner above, whitish and dense on thorax laterally and

posteriorly, with erect and elongate black hairs on vertex, between ocelli, and to some degree between antennae; scutum and scutellum with erect and conspicuous, blackish pubescence, becoming pale peripherally; scutum somewhat shining, punctures quite deep and distinct, slightly separated medially, becoming densely crowded laterally and anteriorly; scutellum rather dull, punctures closely crowded and rather fine, very fine and dense on axillae; pleura somewhat shining below between fine and close but slightly separated punctures, these becoming very fine and quite densely crowded above; propodeum somewhat more shining and smooth; mid and hind basitarsi somewhat shorter and narrower than their tibiae; tegulae somewhat shining, smooth and impunctate in large part, but with some very minute, rather close punctures anteriorly and on inner sides; wings subhyaline, veins brownish-testaceous; terga 2-5 with complete but rather shallow sub-basal grooves, basal margins quite distinct but not definitely carinate, apical margins of terga narrowly depressed, whitish fasciate, the fasciae more or less interrupted on the more basal terga, pubescence of basal tergum elongate and rather copious, entirely whitish, discs of following terga with short but erect, rather conspicuous hairs, these blackish on each disc apically, to some degree pale toward base, punctures very fine or minute, slightly separated, rather obscure, becoming slightly coarser and closer at extreme sides; tergum 6 nearly straight in profile, with short and rather inconspicuous, suberect hairs evident, these largely black, surface rather densely covered with very fine appressed dark tomentum which does not hide surface, this very densely and finely punctate; sternum 6 well covered with pale scopal hairs, with a dense, apical fringe of very short hairs; scopa otherwise pale yellowish, the sterna closely and deeply punctate, finely so on the more basal segments, becoming rather coarse apically, apical margins narrowly yellowish-hyaline, not at all fasciate.

MALE—Length 11-15 mm.; entirely black, including tegulae and legs, spurs testaceous; eyes subparallel; clypeal margin nearly straight, with a very slight, median protuberance, densely covered with an elongate, pale fringe; mandible with an elongate, basal, rather broadly carinate, inferior process, apical margin with a small, median tooth which is approximate to the apical tooth (fig. 40); apical segment of flagellum narrow and elongate; lateral ocelli much nearer eyes than to margin of the very broad vertex; width of cheeks about twice that of eyes; punctures of vertex rather fine and shallow, quite close medially, becoming rather well separated and irregular between eyes and ocelli, close and

fine on cheeks, face below ocelli more closely rugoso-punctate, punctures becoming very fine and densely crowded below antennae and on clypeus; pubescence quite copious, dense and elongate around antennae and over lower part of face, on cheeks below, on thorax laterally and posteriorly, becoming somewhat thinner but still quite elongate on vertex and dorsum of thorax, with a few dark hairs intermixed with generally pale pubescence on vertex and scutum; punctures rather fine and close over most of scutum, being slightly separated only in center, densely crowded elsewhere; somewhat finer and crowded over most of clypeus, being slightly separated only in midline, very fine and densely crowded on axillae; pleura rather smooth, punctures very fine and quite close; propodeum somewhat smoother but rather dull, surface largely obscured by pubescence; coxal spines represented by low dentiform tubercles; all basitarsi much shorter and narrower than their tibiae, the apical tarsal segments becoming more or less reddish; mid tibial spurs short but well developed; tegulae shining, with scattered irregular minute punctures; wings subhyaline, veins brownish-testaceous; terga 2-4 rather deeply grooved basally, grooves complete, their basal margins somewhat carinate, apical margins of terga rather abruptly depressed, especially toward sides, rather densely white fasciate, but fasciae rather widely interrupted medially on the more basal terga, 1 and 2 with rather elongate, entirely pale, erect pubescence, discal pubescence of 3 and 4 suberect, largely black, 3-5 more or less densely fasciate across base, and 5 with a complete, apical fascia; punctures of terga very minute and well separated throughout, 6 somewhat shining, surface very minutely and rather closely, shallowly punctate, deeply depressed just before the carina medially, the carina rather broadly and shallowly emarginate medially, entire laterally, median teeth of apical margin inevident, lateral teeth small but distinct and acute; tergum 7 clearly evident, transverse, rather short, the broad, dorsal area rather broadly excavated and shining, apical margin blunt; setose area of sternum 5 very extensive, setae rather robust (fig. 41); sternum 6 with an extensive setose area on each side of mid-line, the setae robust, spine-like, apical lobe inconspicuous, transverse and very short; gonocoxites robust, with small, basal, carinate protuberances, constricted medially, apical half broadly dilated, long setose on inner face (fig. 42).

DISTRIBUTION—British Columbia to Nova Scotia, south to New Mexico, Texas and Georgia, June to September.

FLOWER RECORDS—*Baptisia*, *Carduus*, *Inula*, *Lathyrus*, *Nepeta*, *Pentstemon*,

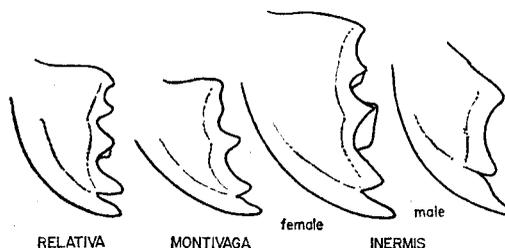


Figure 40

Mandibles in species of *Megachile* (*Megachile*).

Polymnia, *Rhododendron*, *Rubus*, *Sanicula*, *Taraxacum*, *Tephrosia* and *Vernonia*.

Megachile* (*Megachile*) *montivaga
Cresson

(Figs. 40-42)

Megachile montivaga Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 124. ♀ ♂.

Cyphopyga montivaga Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile montivaga Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 219. (biology)

Megachile (*Anthemois*) *montivaga* Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 167.

FEMALE—Length 11-13 mm.; entirely black, including tegulae and legs, spurs testaceous; eyes very slightly convergent below; clypeus slightly convex, apical margin nearly straight, mandibles 4-dentate, but margin between 3rd and 4th teeth slightly angulate (fig. 40); lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width; punctures of vertex quite deep and distinct, close, not very coarse, becoming somewhat more shallow and close on cheeks, finer and more densely crowded below ocelli and along inner margins of eyes, but supraclypeal area and clypeus with shining spaces medially, punctures becoming quite deep, distinct and close laterally; pubescence of head and thorax entirely pale, rather copious but short around antennae, on inner orbits, cheeks below, and thorax laterally and posteriorly; vertex, scutum and scutellum with very short, sparse and inconspicuous pubescence, but apparently entirely pale; punctures of scutum quite close, deep, distinct, not very coarse, slightly separated in center of disc; punctures of scutellum finer than on scutum, slightly separated medially, becoming crowded laterally, very fine and densely crowded on axillae; punctures of pleura distinctly but

not widely separated below, rather deep and distinct, becoming somewhat finer and very close above; propodeum relatively smooth and somewhat shining; basitarsi of all legs somewhat narrower and shorter than their tibiae; tegulae very finely and rather closely punctate, becoming impunctate along outer margins; wings lightly infuscated, veins piceous; abdominal terga 2-4 quite deeply grooved across base, basal margins of grooves somewhat carinate, tergum 5 with a similar, very shallow groove which is nearly obliterated medially; apical margins depressed only toward sides on terga 2 and 3, quite deeply depressed across entire width of 4 and 5, quite densely white fasciate, the fasciae more or less interrupted on the more basal terga; discs of terga somewhat shining, finely and rather sparsely punctate medially, becoming somewhat closer only at extreme sides, but punctures basad of grooves, somewhat closer and deeper, although finer; discal pubescence very short, fine and inconspicuous, entirely pale, but that on tergum 1 relatively elongate and thin; tergum 6 distinctly concave in profile, with no erect hairs visible, surface very finely and closely punctate, punctures becoming in-evident apically, surface very finely white tomentose toward apex, with scattered, more or less erect, pale hairs in addition; sternum 6 with scattered scopal hairs toward base, but quite bare over apical half, with an apical fringe of very short, pale hairs; scopa otherwise pale yellow, sterna closely, deeply and finely punctate on the more basal segments, becoming somewhat more sparse and coarse apically, apical margins very narrowly yellowish-hyaline, but not fasciate.

MALE—Length 9-11 mm.; black, tegulae more or less testaceous, legs somewhat reddened, spurs yellow; eyes slightly convergent below; clypeal margin nearly straight; mandible, with a sharply acute, sub-basal, inferior process; apical segment of flagellum narrow and elongate; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly broader than eyes; punctures of vertex rather fine, deep and distinct, close medially, but somewhat more widely separated laterally, those on cheeks uniformly close and fine, somewhat coarser and slightly separated just below anterior ocellus, otherwise very fine and densely crowded over most of face, slightly separated only in center of clypeus and along its upper margin; pubescence entirely pale on head and thorax, white and quite dense around antennae and over lower half of face, on cheeks below, becoming rather short above, and dense and white on thorax laterally and posteriorly, becoming rather short and fine on on vertex and dorsum of thorax, with a few shorter, inconspicuous, darker hairs evident

on vertex; scutum dull, punctures quite shallow, not very coarse, slightly separated medially, becoming closer anteriorly and posteriorly, uniformly close and fine on scutellum, and very fine and crowded on axillae; pleura dull, punctures fine and uniformly crowded; propodeum somewhat smoother, shining; basitarsi much shorter and narrower than their respective tibiae, mid tibial spurs rather short but well developed, front coxal spines represented by acute, dentiform tubercles; tegulae minutely and rather closely punctate; wings subhyaline, veins brownish-piceous; terga 2-4 with complete, transverse, basal grooves, basal margin of these rather distinctly carinate, apical margins of the terga rather deeply depressed laterally but not medially, depressed areas densely white fasciate; tergum 1 with rather long, erect, entirely whitish pubescence, that on 2 very short and inconspicuous but evident, discal pubescence on 3 and 4 largely lacking but 5 with sparse, erect and rather elongate, pale hairs; tergum 1 very closely and finely punctate, punctures becoming successively more distinct and somewhat more coarse on the more apical terga, well separated but not sparse on 5, 6 dull, punctures fine and densely crowded except across the narrow base, rather strongly protuberant medially, carina with a shallow, median emargination and slightly, irregularly crenulate on each side, median teeth of apical margin carinate, much nearer the acute, slender, lateral teeth than to each other; tergum 7 clearly evident, short, transverse, quite deeply concave just back of margin; sterna 1-4 exposed, punctures quite close and rather fine, apical margins of 2-4 abruptly and quite deeply depressed, clear hyaline, rather conspicuously fringed with elongate, whitish hairs; setose area of sternum 5 broad and extensive, setae elongate (fig. 41); sternum 6 with an extensive area of long, robust, recurved setae on each side of mid-line, apical lobe transverse, slightly produced medially; gonocoxites slender, conspicuously protuberant at base, constricted medially, rounded apically (fig. 42).

DISTRIBUTION—California to Nova Scotia, south to Mexico, Illinois and North Carolina, June to September.

FLOWER RECORDS—*Argemone*, *Campanula*, *Carduus*, *Centaurea*, *Cirsium*, *Coreopsis*, *Geranium*, *Gutierrezia*, *Helianthus*, *Lactuca*, *Medicago*, *Opuntia*, *Rosa*, *Verbena* and *Vernonia*. Robertson (1929) lists the following additional genera: *Asclepias*, *Blephilia*, *Brauneria*, *Dianthera*, *Monarda*, *Oenothera*, *Parthenium*, *Pentstemon*, *Rudbeckia*, *Scrophularia*, *Silphium*, and *Verbesina*.

***Megachile (Megachile) nivalis* Friese**

Megachile nivalis Friese, 1903. Ztchr. System. Hym. Dipt. 3, p. 246. ♀. (♂ misdet.)
Megachile (Anthemois) santiamensis Mitchell, 1934. Amer. Ent. Soc. Trans. 59, p. 311. ♀.
Megachile (Anthemois) nivalis Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 174.
Megachile (Anthemois) nivalis Mitchell, 1942. Pan-Pacific Ent. 18, p. 115. ♂ ♀.

Although the female of this species is easy to recognize, it is very similar to *relativa* and in most characters is hardly distinguishable from that species. Tergum 6 in the female is straight in profile, with no erect hairs visible, although in the dorsal view a few black erect hairs may be seen toward the sides at base. Also this plate is entirely black pubescent, with no yellowish or golden tomentum at all evident. The scopal hairs on sterna 5 and 6 are entirely black, with the remainder of the scopa yellow as in *relativa*. In all other essential characters, allowing for individual variations, it agrees with *relativa*. The male, also, appears to agree with *relativa* and in fact cannot be separated from it. A few males have been collected under circumstances which would suggest their relationship to female *nivalis*. These have been studied and compared quite fully with *relativa* males, in the hope of finding some constant and reliable difference, but without success. It is possible of course that the true male has not yet been discovered.

DISTRIBUTION—Alaska to Idaho, Colorado, Minnesota, Quebec and Maine, June to August.

FLOWER RECORDS—*Eleagnus* and *Taraxacum*.

***Megachile (Megachile) relativa* Cresson**

(Figs. 40-42)

Megachile relativa Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 126. ♀.
Megachile (Xanthosarus) exclamans Viereck, 1916. Conn. State Geol. and Nat. Hist. Surv. Bul. 22, p. 743. ♀.
Megachile aspera Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 158. ♀.
Megachile (Anthemois) relativa Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 162.
Megachile relativa Medler and Koerber, 1958. Ent. Soc. Amer. Ann. 51, pp. 337-344. (biology)
Megachile relativa Koerber and Medler, 1958.

Wisc. Acad. Sci., Arts & Letters 47, p. 56. (biology)

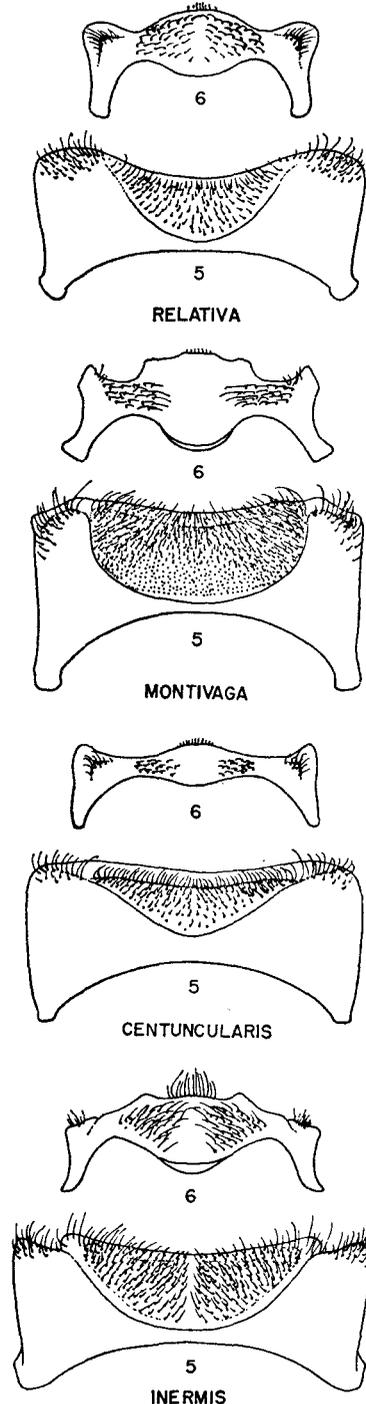


Figure 41
 Sterna 5 and 6 in males of *Megachile* (*Megachile*).

FEMALE—Length 9-12 mm.; entirely black, including tegulae and legs, spurs yellow; eyes very slightly convergent below; clypeal margin nearly straight, obscurely crenulate; mandibles 5-dentate (fig. 40); lateral ocelli much nearer margin of vertex than to eyes; cheeks very slightly broader than eyes; punctures on vertex rather fine and shallow, to some degree separated, but rather irregular, becoming slightly more coarse and close on cheeks, face below ocelli more rugose, supra-clypeal area rugose laterally but with a shining space medially, clypeus with rather shallow but quite close punctures; pubescence whitish, more or less erect and copious around antennae, lower half of face, and on cheeks; whitish and rather copious on thorax laterally and posteriorly, the vertex, scutum and scutellum with erect but rather thin and sparse, black pubescence; scutum shining medially where the punctures are well separated, quite shallow and rather coarse, becoming densely crowded laterally and anteriorly, those on scutellum and axillae somewhat finer and very close except in mid-line of scutellum; pleura somewhat shining below, punctures shallow and rather coarse, slightly separated, becoming closely crowded above where the surface is dull; propodeum smooth and somewhat shining; mid and hind basitarsi slightly shorter and narrower than tibiae; tegulae very finely and obscurely punctate anteriorly, otherwise smooth and impunctate; wings subhyaline, veins piceous; terga 2-4 with shallow, sub-basal grooves, their basal margins faintly carinate, apical margins of terga depressed laterally but not medially, these lateral areas quite densely whitish fasciate, discal pubescence erect and blackish, more copious, elongate and entirely white on basal tergum; punctures of basal tergum fine, well separated but not sparse, somewhat coarser on the more apical terga, apical margin of 5 depressed and whitish fasciate across entire width, 6 straight in profile, with a few, robust, erect, but rather short hairs evident, surface rather densely covered with yellowish, appressed tomentum; sternum 6 sparsely covered with scopal hairs and with an apical fringe of very short yellow hairs; scopa otherwise yellow, the sterna closely, deeply and rather finely punctate basally, punctures becoming somewhat more sparse on the more apical plates, apical margin of each sternum very narrowly yellowish-hyaline, not fasciate.

MALE—Length 8-10 mm.; entirely black, tegulae becoming testaceous along margins, legs somewhat reddened; eyes slightly convergent below; clypeal margin nearly straight, with a distinct and rather robust median tubercle; mandible 3-dentate, with a rather narrow, sub-basal, inferior process which is

subtruncate apically; apical segment of flagellum slender and elongate; lateral ocelli considerably nearer margin of vertex than to eyes; cheeks somewhat broader than eyes; punctures rather fine, slightly separated across vertex posteriorly, rather sparse between ocelli and eyes, becoming more regularly close on cheeks above, densely crowded or rugose below; face below ocelli rather coarsely rugosopunctate, becoming finely so below antennae and over clypeus; pubescence whitish, quite long and copious around antennae and lower part of face, on cheeks below and on thorax laterally and posteriorly; vertex, scutum and scutellum with more or less intermixed light and dark hairs which are quite long and erect but rather thin; scutum rather dull, punctures close, rather shallow, not very coarse, slightly separated only in center of disc; punctures of scutellum slightly separated along mid-line, but otherwise quite uniformly close, those on axillae much finer and densely crowded; pleura rather dull, punctures shallow, quite close and rather vague; propodeum relatively smooth and shining; basitarsi quite short and slender, the more apical tarsal segments to some degree yellowish; mid tibial spurs short but well developed; tegulae shining, rather uniformly, minutely and rather closely punctate; wings subhyaline, veins piceous; terga 2-4 shallowly grooved or depressed across base, basal margin of grooves not distinctly carinate, apical margins of terga depressed only toward sides, depressed medially only on 4 and 5, pale apical fasciae evident at extreme sides of the more basal terga, more or less complete on 4 and 5, discal pubescence rather thin and short, largely pale, but with dark hairs evident toward sides on all except basal tergum which is covered with quite copious, elongate, whitish pubescence; punctures very fine, surface shining, rather close on tergum 2 barely evident on 1, quite sparse on 3 and 4, becoming somewhat coarser laterally, but still well separated, 5 with somewhat closer and coarser punctures throughout; tergum 6 shining, carina very low, broadly and shallowly incurved medially, punctures fine and close above carina, becoming somewhat more coarse and sparse laterally, median teeth of apical margin broadly carinate, widely separated, relatively near the short, acute, lateral teeth; tergum 7 quite prominent, broad and short, with a deep excavation on dorsal surface; sterna 1-4 exposed, closely but rather vaguely punctate, apical margins of 2-4 broadly yellowish-hyaline and with thin, apical fringes of pale hairs; setose area of sternum 5 restricted, finely setose (fig. 41); sternum 6 sparsely setose on each side, apical lobe inevident; gonocoxites slender, protuberant basally, apex acute (fig. 42).

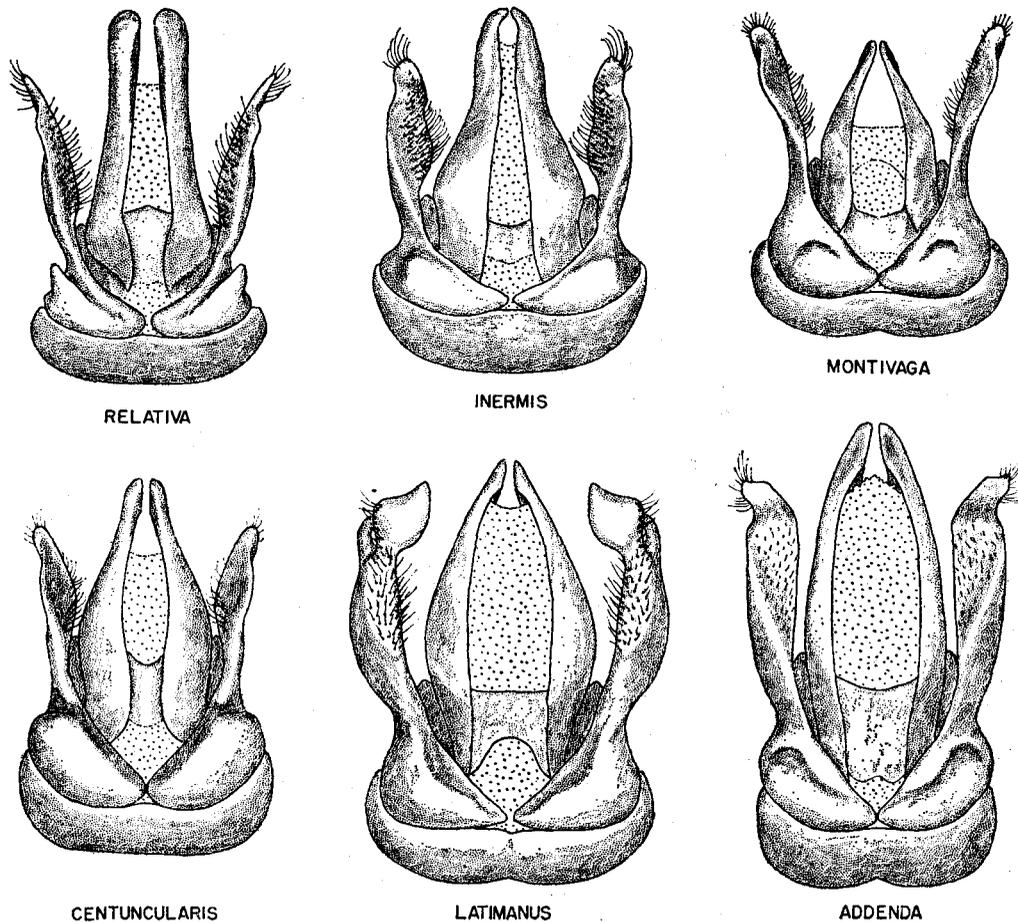


Figure 42—Genital armatures in males of *Megachile* (*Megachile*) and in *M. latimanus* and *M. addenda*.

DISTRIBUTION—Mackenzie to Newfoundland, south to California, Illinois, Tennessee and Georgia, May to October in the more southern parts of its range.

FLOWER RECORDS—*Aster*, *Baptisia*, *Brassica*, *Chrysanthemum*, *Epilobium*, *Geranium*, *Houstonia*, *Melilotus*, *Physallis*, *Ranunculus*, *Rhodora*, *Rosa*, *Rubus*, *Rudbeckia*, *Solidago*, *Trifolium* and *Zizia*.

***Megachile* (*Delomegachile*) *addenda*
Cresson**

(Figs. 42-45)

Megachile addenda Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 124. ♀ ♂.

Megachile manumuskini Viereck, 1902. Canad. Ent. 34, p. 328. ♀ ♂.

Megachile addenda Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile (*Delomegachile*) *addenda* Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 178.

FEMALE—Length 11-14 mm.; entirely black, including tegulae and legs, spurs more testaceous; eyes subparallel; clypeal margin very slightly incurved and finely crenulate; mandibles 4-dentate, a bevelled edge between 3rd and 4th teeth, 4th narrowly rounded or acute (fig. 43); lateral ocelli slightly nearer eyes than to margin of vertex; cheeks very slightly broader than eyes; vertex shining, punctures fine, slightly separated across posterior margin, becoming more minute laterad of ocelli, considerably closer and finer on cheeks; face below ocelli rather finely rugosopunctate, punctures somewhat separated on supra-clypeal area medially and on mid-line of clypeus, becoming quite close and fine laterally; pubescence white, rather dense and elongate around antennae and over lower half of face, on cheeks below, and on thorax laterally and posteriorly, becoming thin but still

white on cheeks above, vertex and scutum with considerable rather short, erect, black pubescence, this somewhat more elongate on scutellum; scutum shining, punctures fine, well separated in center but close to almost crowded elsewhere, those on scutellum somewhat more sparse, very fine and close on axillae; pleura quite densely punctate beneath copious pubescence; propodeum smoother, somewhat shining, only vaguely and minutely punctate; front and mid basitarsi quite broad, slightly narrower but very much shorter than tibiae, hind basitarsi nearly equalling their tibiae in length and breadth; tegulae shining, with scattered, very minute and slightly separated punctures; wings subhyaline basally, becoming faintly infuscated apically, veins brownish-piceous; abdominal terga 2-5 with transverse, quite deep, complete grooves, these occupying nearly half of each disc, basal margins sharply and conspicuously carinate, apical margins of terga quite abruptly but narrowly depressed, occupied by dense, entire, white, apical fasciae; basal tergum with more erect, loose pubescence which is white laterally, more or less fuscous medially, discal pubescence of following terga short but copious, entirely black; punctures on the more basal terga very fine and quite close, becoming slightly more distinct and separated but still close on the more apical terga; tergum 6 distinctly concave in profile, with abundant, erect, blackish pubescence evident over most of disc, but the more apical hairs becoming densely appressed; sternum 6 well covered with black, scopal hairs, with a somewhat bare, shining, median, apical area, a short dense fringe apically; scopa otherwise yellowish-white, the sterna very closely and finely punctate on basal segments, becoming somewhat more coarse and sparse apically, apical margins of the sterna narrowly yellowish-hyaline, entirely lacking fasciae.

MALE—Length 10-13 mm.; entirely black, including tegulae and legs, spurs more brownish-testaceous; eyes subparallel; clypeal margin straight, slightly crenulate; mandible 4-dentate, with a narrow, elongate, subacute, basal, inferior process, 3rd tooth very low and inconspicuous (fig. 43); apical segment of flagellum slender and elongate; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly broader than eyes; punctures of vertex, fine but distinct, rather close medially, becoming more widely separated laterally, very close and fine on cheeks, becoming crowded below; face below ocelli with densely crowded punctures, those on supra-clypeal area and sides of face minute and densely crowded beneath dense pubescence, considerably coarser but very close on clypeus dorsally, becoming minute and densely crowded apically; pub-

escence quite copious and elongate, yellowish-white on face and clypeus, white and quite dense on cheeks and on thorax laterally and posteriorly, vertex with some erect, more or less fuscous pubescence interspersed with pale long hairs, and scutum pale pubescent anteriorly, but with a patch of fuscous hairs across posterior half, scutellum with a few fuscous hairs interspersed among the pale; scutum rather closely but distinctly punctate, punctures slightly separated medially, becoming close laterally and posteriorly, scutellum somewhat more finely but quite closely punctate, those on axillae very fine and crowded; pleura dull, with densely crowded punctures beneath copious pubescence; propodeum smooth and somewhat shining, with only very minute and obscure punctures; front coxal spines well developed, rather short, quite slender, acute at tip, coxa with an obscure patch of short, decumbant, brownish hairs at base of each spine; middle spurs short but well developed; all basitarsi short, simple and narrow, front and mid tarsi rather prominently white fringed posteriorly; tegulae shining, minutely and quite closely punctate; wings subhyaline, veins brownish-testaceous; terga 2-5 with complete, basal, transverse grooves, basal margin of each conspicuously carinate, apical margins of terga deeply depressed, conspicuously and densely white fasciate, pubescence of basal tergum and grooves of 2-4 whitish, the more apical discal pubescence of 2-5 erect and black; punctures of all terga minute, rather well separated but not sparse, becoming quite close toward depressed margins of all; tergum 6 somewhat shining, largely bare, with only very fine, erect hairs, very finely and closely punctate, carina consisting of a pair of rounded, irregularly crenulate lobes delimiting a broad, rounded emargination, median teeth of apical margin hardly evident, lateral teeth small and acute but distinct; tergum 7 acutely pointed medially; sterna 1-4 exposed, surface shining, very minutely and rather closely punctate, apical margins narrowly yellowish-hyaline, rather densely fringed with long, white hairs; setose area of sternum 5 quite extensive, finely setose (fig. 44); sternum 6 with indefinite, lateral, sparsely setose areas that are slightly separated, apical lobe short and broad, acutely angulate laterally; gonocoxites narrowed above base, flattened apically, apex narrowly produced and recurved (fig. 45).

DISTRIBUTION—Ontario, Quebec and the New England states, south to Florida, west to California, April to July.

FLOWER RECORDS—*Amorpha*, *Baptisia*, *Hieraceum*, *Hypericum*, *Oenothera*, *Opuntia*, *Pentstemon*, *Polycodium*, *Psoralea*, *Rubus*, *Tephrosia* and *Vaccinium*. Robert-

son (1929) records *addenda* on *Asclepias*, *Coreopsis*, *Dianthera*, *Gillenia* and *Rosa*.

***Megachile (Delomegachile) frigida*
frigida Smith**

(Figs. 43-45)

- Megachile frigida* Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 193. ♂.
Megachile monardarum Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 6, p. 11. ♀.
Megachile frigida Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 338.
Megachile vidua Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 337.
Megachile (Delomegachile) vidua Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 200.
Megachile (Delomegachile) frigida Mitchell, 1944. Pan-Pacific Ent. 20, p. 135.
Megachile frigida Stephen, 1956. Pan-Pacific Ent. 32, pp. 95-101. (biology)

FEMALE — Length 12-15 mm.; entirely black, including tegulae and legs, spurs testaceous; eyes subparallel; clypeal margin very shallowly incurved, the narrow median area very slightly produced, narrowly shining and impunctate; mandibles 4-dentate, inner tooth

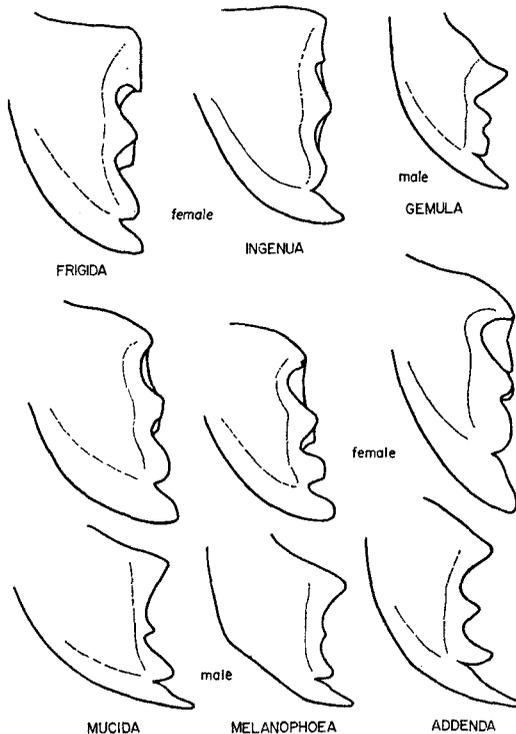


Figure 43
Mandibles in species of *Megachile*
(*Delomegachile*).

broadly truncate (fig. 43); lateral ocelli subequally distant from eyes and margin of vertex; cheeks considerably wider than eyes; punctures of vertex relatively coarse and distinct, quite close medially, becoming well separated laterally between eyes and ocelli, cheeks minutely and quite closely punctate throughout; face below ocelli rather densely rugoso-punctate, becoming very finely so on sides of face, supraclypeal area more or less shining medially, punctures minute and vague, becoming close and rather deep laterally, clypeus with a median, impunctate line, punctures quite close and deep on each side; pubescence yellowish-white and rather copious around antennae and over lower half of face, on cheeks below, and on thorax laterally and posteriorly, vertex with more or less fuscous, erect pubescence, a quite dense line of erect fuscous hairs above anterior ocellus and below lateral ocelli; scutum and scutellum with extensive areas of erect, fuscous hairs, scutum rather narrowly pale pubescent anteriorly; punctures of scutum and scutellum quite deep and distinct, close in large part, slightly separated only in center of scutum, close throughout on scutellum and fine and densely crowded on axillae; pleura rather dull, punctures very close, rather coarse below, becoming fine and densely crowded above; propodeum somewhat smoother and more shining, with only very vague and minute punctures evident; hind basitarsi somewhat narrower and shorter than their tibiae, fore and mid basitarsi much shorter than their tibiae; tegulae shining, with close, minute punctures; wings subhyaline, veins brownish-testaceous; terga 2-4 shallowly grooved across base, basal margin of grooves only very slightly carinate, tergum 5 with only a subcarinate basal impression, apical margins of terga rather narrowly and slightly depressed laterally, these whitish fasciate laterally, completely so on 4 and 5, discal pubescence of 1 and 2 copious, erect and entirely pale, 3-5 with conspicuous, erect and rather elongate blackish pubescence; punctures of terga minute, slightly separated medially, becoming slightly coarser laterally on the more apical plates; tergum 6 about straight in profile, with abundant, rather short, erect, black pubescence and with rather dense, subappressed, fuscous hairs; sternum 6 rather well covered with yellowish hairs, these becoming somewhat more sparse toward apex which is densely fringed with short dark hairs; scopa otherwise golden yellow, the more basal sterna, very closely and finely punctate, becoming somewhat more coarse and sparse toward apex, apical margins of each plate rather narrowly yellowish-hyaline, fasciae not evident.

MALE — Length 11-15 mm.; black, tegulae

more testaceous, spurs yellow and front legs in large part yellow; clypeal margin beneath beard nearly straight, slightly crenulate medially; mandibles distinctly 4-dentate, upper margin quite strongly flexed, lower margin somewhat angulate medially, margin straight from this to tip of basal, acute, inferior process; apical segment of flagellum quite broadly dilated; lateral ocelli subequally distant from eyes and margin of vertex; cheeks very much broader than eyes, inferior margin with an acute, robust tubercle just beneath base of mandible, and a pair of slightly oblique lines of dense, pale pubescence just above; punctures of vertex very fine and densely crowded medially, becoming slightly more coarse and distinct laterally, minute and densely crowded on cheeks, somewhat more coarsely rugosopunctate below ocelli, but very fine and densely crowded beneath pubescence on clypeus, supraclypeal area and sides of face; pubescence copious, yellowish and very dense around antennae and lower half of face, supraclypeal hairs directed upward, clypeal hairs outward and downward; cheeks with very short and rather sparse pale hairs, these becoming more erect and elongate on vertex; thorax with yellowish-white hairs laterally and posteriorly, dorsum with somewhat more copious, elongate, pale yellowish hairs, with no evident dark admixture; punctures of scutum, scutellum, axillae and pleura very fine and densely crowded, propodeum somewhat smoother, with only close, minute and vague punctures evident; front coxal spines narrow and much elongated, pubescent posteriorly only at base, coxa with a dense, patch of ferruginous setae at base of the spine, and dense, creamy pubescence laterally, the surface yellow; front tarsi broadly dilated and deeply excavated, entirely yellow, conspicuously broader than tibiae, with a broad, yellowish, posterior fringe; tibiae rather narrowly yellow at apex, otherwise fuscous on outer surface; posterior margin of femora fuscous, sharply carinate above, but otherwise largely pale yellow or testaceous, subcarinate below, lower surface toward base with a pair of conspicuous, longitudinal, brownish, integumental stripes, conspicuously fringed posteriorly toward base; mid and hind tarsi relatively short and narrow, but little modified, mid tarsi densely pale tomentose, hind tarsi with an elongate, prominent, anterior fringe; tegulae somewhat shining, very minutely and closely punctate; wing subhyaline, veins brownish-testaceous; terga 2-4 shallowly grooved across base, apical margins depressed laterally, with pale, apical fasciae at sides of 2 and 3, and a complete one on 4, 1 and 2 and base of 3 with copious, elongate, erect, pale yellowish pubescence, 4 and 5 and apex of 3 with largely fuscous pubescence; punctures fine and quite

close but not crowded throughout; tergum 5 only inconspicuously fasciate apically, if at all; tergum 6 shining, very finely or minutely, closely punctate, carina rather low and not very broad, with a rather shallow, median, emargination, subentire on each side, median teeth of apical margin rather broadly carinate, somewhat nearer to each other than to lateral angles, lateral teeth not evident; tergum 7 acute medially, barely evident; sterna 1-4 exposed, surface shining, with exceedingly minute and hardly evident punctures, apical margins rather narrowly depressed and yellowish-hyaline, largely bare; setose area of sternum 5 short but quite broad, setae fine and short (fig. 44); sternum 6 with rather narrow, transverse, densely setose areas that nearly meet medially, apical lobe well developed, slightly produced medially, lateral angles narrowly produced and acute; gonocoxites gradually narrowed above base, slightly dilated and sinuate above, with a low, subapical, ventral protuberance, the apex narrowly produced (fig. 45).

DISTRIBUTION—Alaska to Newfoundland, south to Arizona, Michigan and Pennsylvania, June to August.

FLOWER RECORDS—*Apocynum*, *As-tragalus*, *Campanula*, *Epilobium*, *Malvastrum*, *Medicago*, *Melilotus*, *Monarda*, *Pentstemon*, *Rosa*, *Trifolium*, *Verbena* and *Vicia*.

Megachile (Delomegachile) frigida
appalachensis Mitchell

Megachile (Delomegachile) vidua var. *appalachensis* Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 205. ♀ ♂.

This occurs in the southern Appalachians and differs from typical *frigida* in both sexes in the entire absence of the abdominal fasciae. It possibly averages slightly larger than the typical form.

DISTRIBUTION—New York, down the Appalachians to Georgia, June to September.

FLOWER RECORDS—*Apocynum*, *Baptisia*, *Coreopsis*, *Galax*, *Koelia*, *Pentstemon*, *Rhododendron*, and *Vernonia*.

Megachile (Delomegachile) gemula
Cresson
(Figs. 43-45)

Megachile gemula Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 118. ♂. (♀ misdet.)

Megachile avara Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 123. ♂.

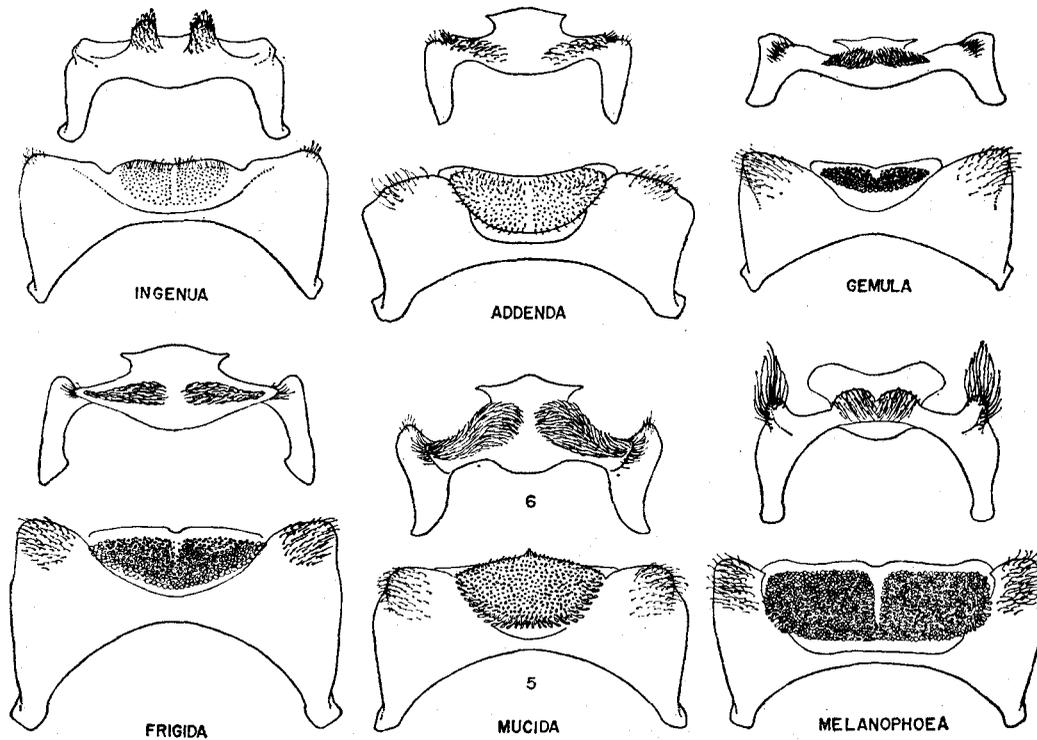


Figure 44—Sterna 5 and 6 in males of *Megachile* (*Delomegachile*).

Megachile Vancouveriensis Provancher, 1888.

Addit. Corr. Faune Ent. Canad. Hym. p. 424. ♂.

Megachile vancouverensis Titus, 1906. Ent. Soc. Wash. Proc. 7, p. 151.

Megachile albula Lovell and Cockerell, 1907. Psyche 14, p. 18. ♂.

Megachile (*Delomegachile*) *gemula* Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 181.

FEMALE — Length 12-15 mm.; entirely black, including tegulae and legs, spurs more brownish-testaceous; eyes subparallel; clypeal margin nearly straight, with a short, median area narrowly shining and impunctate; mandibles 4-dentate, inner tooth very broadly truncate; lateral ocelli subequally distant from eyes and margin of vertex; cheeks slightly broader than eyes; vertex somewhat shining, punctures rather fine, quite close medially, becoming somewhat more widely separated laterally, minute and close on cheeks; face below ocelli with moderately coarse, contiguous punctures, becoming minutely and closely punctate laterally, supra-clypeal area somewhat shining and sparsely punctate medially, becoming close at sides, somewhat separated in mid-line of clypeus, becoming quite densely crowded but rather coarse on each side; pubescence of head

pale in part but intermixed with fuscous or blackish hairs over lower half of face and on cheeks medially and above, vertex with some very short, dark hairs and long, erect, pale hairs; thorax with rather dense and elongate pale pubescence laterally and posteriorly, scutum and scutellum covered quite densely with rather long, pale yellowish or whitish hairs, with varying amounts of fuscous hairs intermixed over posterior half of scutum; punctures of scutum quite deep and distinct, not very coarse, rather well separated medially but otherwise quite close or densely crowded, those on scutellum somewhat finer, sparse on midline but close laterally, very fine and close on axillae; pleura rather dull, with rather fine and densely crowded punctures; propodeum somewhat smoother but dull, punctures hardly evident; mid and hind basitarsi rather broad but distinctly shorter than tibiae, front tarsi rather short and slender; legs in large part short black pubescent, outer face of mid basitarsi with more brownish pubescence; tegulae somewhat shining, very minutely and closely punctate; wings sub-hyaline, becoming faintly infuscated apically, veins brownish-testaceous; abdominal terga 2-4 shallowly grooved across base, basal margins of the grooves quite distinct but hardly carinate, 4

with a basal impression but not a definite groove; apical margins shallowly depressed, but completely lacking fasciae; discal pubescence of terga 1 and 2 and base of 3 erect, entirely pale, but rather thin, that on 4-6 and apex of 3 erect, rather dense but short, entirely black; surface of terga shining, punctures minute, slightly separated in large part, becoming close toward extreme sides; tergum 6 about straight, with abundant, erect, blackish hairs evident in profile; sternum 6 rather well covered with dark scopal hairs, bare in part toward tip, with a dense fringe of short, fuscous hairs; scopa otherwise entirely black, basal sterna very closely and finely punctate, but punctures somewhat more widely separated on the more apical sterna, apical margins very narrowly yellowish-hyaline, sternal fasciae not evident.

MALE — Length 8-11 mm.; black, including tegulae and legs in large part; eyes very slightly convergent below; clypeal margin nearly straight, with a very small, median emargination; mandibles distinctly 4-dentate (fig. 43), with an acute, basal inferior process, which is very broadly triangular, with a broad base; apical segment of flagellum very slightly dilated; lateral ocelli very slightly nearer margin of vertex than to eyes; cheeks somewhat broader than eyes, somewhat excavated below lower end of eye, lower margin of this produced as a prominent, carinate tubercle; punctures of vertex quite deep and distinct, rather coarse, slightly but not widely separated, becoming closer on cheeks above, but more densely, irregularly rugose below, face below ocelli with relatively coarse, close punctures, these nearly contiguous, lateral areas of face and supraclypeal area becoming densely and very finely rugose, punctures of clypeus beneath pubescence rather coarse and quite close above, becoming very fine and densely crowded below; pubescence copious, elongate and yellowish-white on face and clypeus, somewhat more white and quite copious on cheeks below, thin above, and whitish on thorax laterally and posteriorly, vertex and dorsum of thorax with elongate, erect but somewhat thinner pubescence, with a few dark hairs interspersed and a considerable amount of shorter, blackish pubescence on vertex laterally and on upper part of cheeks; scutum quite closely, deeply and distinctly punctate throughout, punctures of scutellum slightly finer but very close, and axillae with very fine, densely crowded punctures; pleura rather dull, punctures very close, rather coarse below, becoming fine above; propodeum somewhat smoother but dull, with only exceedingly minute and vague punctures evident; front coxal spines rather short but erect and rather slender, subacute, surface of coxa with a small patch of short, fuscous setae

just anterior to the spine; mid tibial spurs rather short but distinct; front basitarsi somewhat dilated and quite deeply excavated, although largely black, becoming somewhat yellowish along posterior margin, following segments also yellow along posterior margin, segments 1-3 with a prominent posterior fringe of elongate, white hairs; tegulae somewhat shining, very minutely and closely punctate; wings subhyaline, veins brownish-testaceous; terga 2-4 shallowly depressed at base, but hardly grooved, basal margin abrupt but not carinate, apical margins of terga rather broadly depressed, more so laterally, these with thin and obscure, whitish, apical fasciae at extreme sides of 2 and 3, a more complete one on 4; terga 1 and 2 with rather elongate but thin, erect, pale pubescence, discal pubescence on 3 and 4 rather elongate, pale basally, becoming blackish apically and largely black on 5; punctures of all terga very fine, well separated or sparse medially, becoming somewhat closer at extreme sides; tergum 5 not fasciate, punctures minute and well separated throughout, 6 closely and minutely punctate above, carina consisting of a pair of triangular, sublateral, carina-like lobes which form a rounded, median, emarginate area, median teeth of apical margin subacute, quite distinct but carinate, much more widely separated from each other than to the obscure, lateral angles which are hardly produced as definite teeth; tergum 7 short, but rather broad and transverse, not at all angulate medially, but bearing an apical tuft of elongate pubescence; sterna 1-4 largely exposed, shining, very minutely and quite sparsely punctate in general, apical margins depressed, more or less yellowish-hyaline, but not at all fasciate, the plates largely bare; setose area of sternum 5 very short, transverse, with short, scale-like setae (fig. 44); sternum 6 with a transverse, linear patch of long, flexed setae on each side, apical lobe broad and very short, angulate at each side; gonocoxites constricted near base, flattened and dilated apically, flexed ventrally, apex narrowly produced (fig. 45).

DISTRIBUTION—Mackenzie to Nova Scotia, south to California and Georgia, April to August.

FLOWER RECORDS—*Apocynum*, *Asclepias*, *Baptisia*, *Campanula*, *Chrysanthemum*, *Clematis*, *Coreopsis*, *Geranium*, *Gerrardia*, *Hydrangea*, *Philadelphus*, *Pycnanthemum*, *Rhododendron*, *Rubus*, *Rudbeckia*, *Solidago*, *Trifolium*, *Vaccinium* and *Vicia*.

Megachile (Delomegachile) ingenua
Cresson

(Figs. 43-45)

Megachile ingenua Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 122. ♂.

Megachile tephrosiana Mitchell, 1927. Psyche 34, p. 179. ♀.

Megachile (Delomegachile) ingenua Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 188.

FEMALE — Length 13-15 mm.; entirely black, including tegulae and legs, spurs more brownish-piceous; eyes subparallel; clypeal margin about straight, the rather broad, median area narrowly shining and impunctate; mandibles very broad, 4-dentate, but inner tooth very broadly truncate (fig. 43); lateral ocelli subequally distant from eyes and margin of vertex; cheeks much broader than eyes; vertex shining, punctures quite deep and distinct, rather fine, quite close medially, well separated to almost sparse laterally, becoming minute and close on cheeks below; face below ocelli with densely crowded punctures, rather fine medially, becoming minute laterally, supra-clypeal area and clypeus with a median, shining, impunctate area, becoming very closely and deeply punctate on each side; pubescence short but rather copious and entirely pale around antennae and sides of face, somewhat thinner on cheeks below, quite dense, entirely white on thorax laterally and posteriorly, vertex with very short, erect, piceous or blackish pubescence; scutum with copious, erect but rather short, blackish pubescence across posterior half and scutellum with considerable erect, more elongate, dark pubescence; scutum and scutellum shining, punctures minute on scutum medially, rather widely separated, becoming more distinct around margins, median punctures of the scutellum rather sparse and minute, becoming quite close laterally, axillae very finely and closely punctate; pleura rather dull, punctures densely crowded, becoming minute above; propodeum smooth but very dull, with only very minute, shallow and rather vague punctures evident; all basitarsi shorter and somewhat narrower than their tibiae; tegulae somewhat shining, impunctate posteriorly but with scattered, minute and irregular punctures toward anterior margin; wings subhyaline, veins brownish-testaceous; abdominal terga 2 and 3 quite deeply grooved across base, basal margin of groove distinct, but only obscurely carinate, 4 and 5 slightly impressed toward the base but not definitely grooved, apical margins of terga narrowly depressed, with dense, whitish fasciae that are entire on 2-5, discal pubescence very short but copious and black, tergum 1 with more erect, loose, entirely white pubescence; punctures fine, slightly separated medially on all terga,

becoming, quite close at extreme sides; tergum 6 nearly straight, with abundant, erect, black pubescence visible in profile, punctures very fine and densely crowded; sternum 6 quite uniformly, densely covered with short, black, scopal hairs; scopa otherwise pale yellow, but with a few, elongate black hairs at extreme sides on sterna 3-5, and 5 with an additional row of black hairs across posterior margin, the more basal sterna densely and finely punctate, punctures becoming somewhat coarser on the more apical sterna, sternal fasciae not evident.

MALE — Length 10-12 mm.; black, including tegulae, and legs in large part, anterior tarsi yellow, and spurs yellowish-testaceous; eyes subparallel; clypeal margin nearly straight; mandibles 4-dentate, with an acute, basal, inferior process, lower margin with a small, submedian angle; apical segment of flagellum not appreciably dilated; lateral ocelli subequally distant from eyes and margin of vertex; cheeks much broader than eyes, slightly excavated below, posterior margin of this produced as a rather stout, pubescent tubercle; punctures of vertex quite deep and distinct, rather fine, close medially, becoming very slightly separated laterally, but very fine and densely crowded on cheeks below, a transverse shining line on lower part of cheeks that is margined on each side by a rather dense, fringe of short, white hairs; face below ocelli very finely and quite densely punctate, the more lateral areas and supra-clypeal area with minute and densely crowded punctures, clypeus narrowly impunctate toward base medially, becoming closely and very finely punctate on each side and toward apical margin; pubescence yellowish-white, quite copious and elongate around antennae and lower part of face, becoming snowy white on cheeks below, rather dense but shorter and thinner above, vertex with intermixed, elongate, white hairs and very short, fuscous hairs; pubescence whitish and quite copious on thorax laterally and posteriorly, scutum with intermixed dark and light hairs on posterior half; punctures of scutum quite deep and distinct, uniformly close, only slightly separated in center, scutellum rather sparsely punctate in mid-line but rather closely so on each side, punctures of axillae very fine and crowded; pleura rather dull, punctures rather fine and densely crowded, becoming even finer above; propodeum smooth but dull, with only vague, minute, and irregular punctures evident; front coxal spines short but distinct, conspicuously divergent, subtriangularly carinate, not much longer than the breadth at base, coxae with considerable dense, white pubescence anteriorly but without ferruginous bristles; midtibial spurs well developed; front basitarsi very slightly dilated toward apex but rather deeply

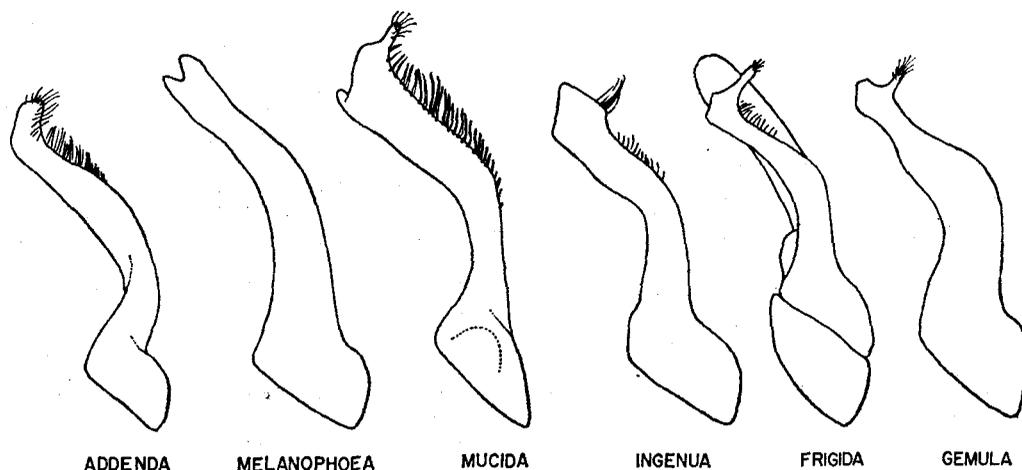


Figure 45—Lateral view of gonocoxites in males of *Megachile* (*Delomegachile*).

excavated, entirely yellow, the excavation more or less reddish, following tarsal segments short but yellow and slightly dilated, with a rather thin, posterior, whitish fringe; tegulae shining, with only exceedingly minute and rather sparse punctures except along anterior margin; wings subhyaline, veins brownish-testaceous; abdominal terga 2 and 3 rather deeply grooved across base, basal margin of each somewhat carinate, 4 and 5 somewhat depressed at base but hardly grooved, apical margins of the terga shallowly depressed, with whitish apical fasciae, these more or less interrupted in the more basal terga; tergum 1 with elongate, rather thin, entirely whitish pubescence, that on 2 also somewhat elongated and entirely white, discs of 3-5 black pubescent, this rather short but erect and quite dense; punctures of terga very fine, rather widely separated medially, becoming somewhat closer at extreme sides, tergum 6 shining, punctures exceedingly minute and vague, carina consisting of a pair of more or less triangular lateral protuberances which delimit a median, triangular emarginate area, these protuberances irregularly serrate in part, median teeth of apical margin rather small, subcarinate, somewhat nearer lateral angles than to each other, lateral teeth not evident; tergum 7 transverse, rather short, slightly and shallowly excavated, rounded apically; sterna 1-4 exposed, shining, very minutely and quite sparsely punctate especially on the more apical sterna, apical margins depressed and somewhat hyaline, but not fasciate; setose area of sternum 5 reduced, widely separated from the sclerotized basal and lateral areas by a more membranous region, finely setose (fig. 44); sternum 6 with a pair of densely setose areas that nearly meet

medially, apical lobe quite broad, short medially, lateral angles conspicuously produced; gonocoxites abruptly constricted above base, subacute apically, with a ventral, subapical protuberance (fig. 45).

DISTRIBUTION—Illinois to Pennsylvania, south to Florida, March (in Florida) to July.

FLOWER RECORDS—*Lupinus*, *Tephrosia* and *Vaccinium*.

Megachile (*Delomegachile*) *melanophoe melanophoe* Smith

(Figs. 43-45)

Megachile melanophoe Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 191. ♀ ♂.

Megachile canadensis Friese, 1903. Ztschr. System. Hym. Dipt. 3, p. 248.

Megachile melanophoe Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 336.

Megachile (*Delomegachile*) *melanophoe* Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 190.

FEMALE — Length 12-14 mm.; entirely black, including tegulae and legs, spurs brownish-testaceous; eyes subparallel; clypeal margin straight, very finely crenulate; mandibles 4-dentate, inner tooth very slightly emarginate, giving an approach to a 5-dentate condition (fig. 43); lateral ocelli very slightly nearer margin of vertex than to each other; cheeks much broader than eyes; punctures of vertex quite deep and distinct, rather fine, close medially, becoming well separated laterally, fine and close on cheeks above, densely crowded and minute below; face below ocelli

dull and densely rugose, supraclypeal area shining, punctures fine and slightly separated, clypeus with a median, shining, sparsely punctate line, densely punctate on each side; pubescence yellowish-white around antennae and lower part of face, vertex with erect, elongate, pale hairs intermixed with shorter, fuscous hairs, pubescence becoming largely fuscous on cheeks; thorax with copious, elongate, yellowish-white pubescence laterally and posteriorly, scutum and scutellum with long, erect pubescence which is pale anteriorly, but in large part fuscous across posterior half of disc and in part on scutellum; scutum shining, punctures quite deep and distinct, moderately coarse, rather sparse in center of disc, becoming close laterally; scutellum with fine and rather sparse punctures in mid-line but becoming rather closely punctate on each side, punctures of axillae very fine and crowded; pleura dull, punctures fine and very close, becoming minute and crowded above; propodeum smooth but dull, with only exceedingly vague, shallow and minute punctures evident; mid and hind basitarsi about as broad as their tibiae, but somewhat shorter; tegulae smooth but rather dull, with only exceedingly minute punctures evident anteriorly; wings subhyaline, veins brownish-piceous; abdominal terga 2 and 3 shallowly depressed across base, hardly grooved, basal margin evident but not sharply carinate, apical margins of 2-4 only very shallowly but rather broadly depressed, entirely lacking fasciae, discal pubescence of 1 and 2 long, erect, quite copious, and entirely pale, quite long, erect and entirely black on 3-6, largely subappressed on 6; median punctures of terga exceedingly minute and quite sparse, becoming closer laterally, tergum 6 densely and finely punctate throughout; sternum 6 well covered with scopal hairs, these becoming somewhat sparse toward apex which is fringed with short, relatively pale hairs; scopa largely reddish, more or less tinged with fuscous toward base, the more basal sternal plates very closely and rather finely punctate, somewhat more widely separated apically on the apical sterna, apical margins narrowly yellowish-hyaline, no sternal fasciae evident.

MALE — Length 9-12 mm.; black, including tegulae and mid and hind legs, front legs testaceous in large part; eyes subparallel; clypeal margin shallowly emarginate on each extreme side, otherwise straight and entire; mandibles 4-dentate (fig. 43), outer margin obtusely angulate medially, basal, inferior process triangular, with a broad base; apical segment of flagellum flattened and quite broadly dilated; lateral ocelli subequally distant from eyes and margin of vertex; cheeks somewhat broader than eyes, with a blunt tubercle on lower posterior angle, with a deep, narrow

excavation between this and base of mandible; vertex somewhat shining, punctures fine and close medially, becoming well separated laterally, very fine and close on cheeks above, becoming minute and densely crowded below, area below ocelli dull, rather finely rugoso-punctate, becoming very finely and densely punctate on sides of face and on supraclypeal area, clypeus somewhat shining beneath pubescence, punctures very fine and slightly separated over most of disc; pubescence yellowish-white, quite copious around antennae and over lower half of face, becoming somewhat thinner but long and erect on vertex, with a few dark hairs intermixed, very short and thin in general on cheeks, but with a transverse line of elongate, whitish hairs toward inferior margin; pubescence of thorax rather copious, elongate, yellowish-white laterally and posteriorly, scutum with elongate, erect pubescence which is somewhat thinner, pale anteriorly, to a considerable degree fuscous over posterior half, with some intermixed fuscous hairs on scutellum; scutum somewhat shining, punctures quite deep and distinct, rather fine, well separated in center of disc, but very close elsewhere, finer and uniformly close on scutellum and axillae, pleura dull, punctures very fine, shallow and quite densely crowded, propodeum somewhat smoother but dull, posterior face with close, shallow, minute and rather obscure punctures evident; front coxal spines subtriangular, acute at tip, rather short but well developed, with elongate, pale pubescence posteriorly, a dense, transverse patch of short, brownish bristles at base of each spine, coxae otherwise largely bare; mid tibial spurs short but well developed; front tarsi entirely yellowish-testaceous, basitarsus broadly dilated and very deeply excavated, apex fully as broad as the tibiae, following segments short, posterior margin with a quite dense fringe of yellowish-white hairs, intermixed with fuscous at tips; front tibiae yellowish at apex and testaceous on anterior and posterior faces, outer face blackish; front femora largely testaceous, with a piceous band from base to apex on posterior face, rather prominently whitish-fringed posteriorly; tegulae somewhat shining, rather closely and minutely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2 and 3 shallowly depressed toward base, basal margin of this distinct but not conspicuously carinate, following terga only faintly impressed at base, apical margins shallowly but rather broadly depressed, not at all fasciate, discal pubescence of terga 1 and 2 and base of 3 entirely pale, erect, quite copious, that on 4 and 5 largely blackish, erect and quite copious, also apical portion of 3 blackish in large part; punctures of terga medially very minute, well separated, becoming quite close at extreme sides; tergum 6

densely and finely punctate above, margin of carina irregularly crenulate, with a deep, rounded, median emargination, median teeth of apical margin much elongated, slightly narrowed and abruptly truncate at tip, slightly nearer the low, subangulate, lateral teeth than to each other; sternum 7 conspicuous, acutely pointed medially; sterna 1-4 exposed, shining, punctures very fine but rather close on the more basal plates, becoming minute and vague on the more apical sterna, apical margin of each narrowly but deeply and abruptly depressed, yellowish-hyaline, rather prominently fringed toward sides; setose area of sternum 5 very broad and extensive, setae short and fine (fig. 44); sternum 6 with broad, densely setose areas that nearly meet medially and are much narrowed laterally, apical lobe very broad, lateral angles produced, rounded, lateral areas of the sternum with conspicuous apical tufts of setae; gonocoxites somewhat constricted above base, slender apically, apex bilobate (fig. 45).

DISTRIBUTION—Mackenzie to Newfoundland, south to California, Colorado and Pennsylvania, June to August. The Georgia record given in the Revision (Mitchell 1935, p. 193) now seems improbable.

FLOWER RECORDS—*Agastache*, *Apocynum*, *Astragalus*, *Azalea*, *Campanula*, *Cypripedium*, *Epilobium*, *Helianthus*, *Lupinus*, *Medicago*, *Phacelia*, *Psoralea*, *Ranunculus*, *Raphanus*, *Rhodora*, *Rosa*, *Rubus*, *Rudbeckia*, *Symphoricarpos*, *Taraxacum*, *Trifolium* and *Vicia*.

***Megachile (Delomegachile) melanophoea submelanophoea* Mitchell**

Megachile (Delomegachile) melanophoea var. *submelanophoea* Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 197. ♀.

This form is very similar to typical *melanophoea*, but the scopa is entirely deep black. It may also be separated from other related forms by the entirely black pubescent cheeks, legs and pleura, while the vertex, scutum, scutellum and terga 1 and 2 are entirely pale ochraceous pubescent, without black intermixture.

DISTRIBUTION—Formerly known only from California, specimens have now been identified from Michigan and Maine, collected in June.

FLOWER RECORDS—*Dicentra* and *Lupinus*.

***Megachile (Delomegachile) mucida* Cresson**

(Figs. 43-45)

Megachile mucida Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 118. ♂. (♀ misident.)

Megachile mucida semimucida Cockerell, 1909. Ann. Mag. Nat. Hist. (8) 4, p. 26. ♀ ♂.

Megachile audax Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 161. ♂.

Megachile (Delomegachile) mucida Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 197.

FEMALE — Length 13-15 mm.; entirely black, including tegulae and legs, spurs brownish-testaceous; eyes subparallel; clypeal margin about straight; mandibles 4-dentate, 3rd tooth narrowly truncate, inner tooth narrowly rounded (fig. 43); lateral ocelli considerably nearer margin of vertex than to eyes; cheeks subequal to eyes in width; vertex somewhat shining between deep and distinct punctures, these fine and close medially, becoming somewhat more coarse and distinctly separated laterally, minute and close on cheeks; face below ocelli rather finely and densely rugoso-punctate, supra-clypeal area shining and sparsely punctate medially, becoming very closely and quite finely punctate laterally, clypeus with a narrow, median, sparsely punctate and shining line, densely, finely and quite deeply punctate on each side of this; pubescence quite copious but not very long around antennae, becoming quite short, erect and largely fuscous on supra-clypeal area and clypeus, rather short, erect and largely pale on vertex, with dark hairs intermixed, entirely fuscous on cheeks; pubescence of thorax dense, erect and quite long, entirely yellowish-white on dorsal and posterior surfaces and on upper part of pleura, black on pleura below and on venter, legs entirely black pubescent; scutum quite deeply, distinctly and densely punctate, somewhat separated only in center of disc, scutellum with a narrow, median impunctate line, finely and densely punctate on each side and axillae minutely and densely punctate; pleura somewhat shining, punctures on venter quite sparse and rather shallow, becoming minute and densely crowded above; propodeum smooth, dull, punctures of posterior face quite close, minute and obscure; mid and hind basitarsi about as broad as their tibiae but considerably shorter; tegulae very finely and rather closely punctate, somewhat shining; wings subhyaline, veins brownish-piceous; abdominal terga 2-4 shallowly depressed across base, basal margin distinct but not sharply carinate, apical margins of the terga rather broadly and shallowly depressed, completely lacking fasciae; discal pubescence of tergum 1 entirely pale, quite long, erect and copious, that on basal half of 2 similar but the narrow, apical portion with

quite dense, fuscous pubescence, discs of 3-5 covered with dense, rather short, erect, copious, fuscous pubescence; punctures minute, quite close throughout, sparse only toward base of the more basal terga; tergum 6 about straight in profile with abundant but rather short, erect, fuscous hairs, minutely and very closely punctate throughout; sternum 6 well covered with rather short, black, scopal hairs, scopa densely fuscous or black throughout, the sterna finely and densely punctate, punctures becoming slightly coarser and more widely separated on the more apical plates, sternal fasciae not evident.

MALE—Length 10-12 mm.; black, including tegulae and mid and hind legs, front legs in large part yellowish or testaceous; eyes parallel; clypeal margin very slightly outcurved medially, finely crenulate; mandibles rather obscurely 4-dentate (fig. 43), outer margin evenly rounded, basal, inferior process elongate and acute with a broad base; apical segment of flagellum rather elongate but quite broadly dilated, strongly flattened; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks somewhat broader than eyes, quite deeply excavated below lower end of eye, posterior margin of excavation with a broad, carinate tubercle; vertex finely and quite densely punctate medially, punctures becoming slightly coarser and more distinct laterally, minute and densely crowded on cheeks, area below ocelli densely and very finely rugose, and entire area below antennae with very fine, densely crowded punctures; pubescence around antennae and over lower part of face copious and erect, entirely yellowish-white, becoming somewhat thinner but long and erect on vertex and upper cheeks, pale except for short fuscous hairs evident on vertex laterally and along outer orbits, cheeks below with a patch of dense, snowy-white, appressed pubescence; pubescence of thorax largely pale, erect and copious, yellowish-white over dorsum and somewhat more whitish on vertex and propodeum; central punctures of scutum distinct and slightly separated but otherwise rather fine and densely crowded, scutellum with a median, narrow, impunctate line, densely and finely punctate on each side and on axillae; pleura uniformly, densely and very finely punctate, propodeum somewhat smoother but rather dull, with very minute, shallow and vague but quite close punctures, especially on posterior face; front coxal spines spatulate, rather narrow, narrowly rounded apically, densely white pubescent posteriorly, with a dense patch of yellowish setae at base on the coxae, a dense patch of snow-white pubescence of each coxa laterally; mid tibial spurs short but well developed; front tarsi entirely pale yellow, basitarsus much elongated and

dilated, sides parallel, very deeply excavated, apex projecting over segment 2 nearly to its tip, posterior margin of tarsi with a dense, yellowish-white fringe of rather long hairs, these tipped with brown in large part; outer face of front tibiae piceous, apex yellow, anterior and posterior faces largely testaceous; posterior face of front femora piceous toward tip, otherwise entirely testaceous, quite densely pale pubescent posteriorly; tegulae very finely and quite closely punctate, somewhat shining; wings subhyaline, veins brownish-testaceous; abdominal terga 2-4 shallowly depressed across base, apical margins broadly and quite distinctly depressed, but not at all fasciate, discal pubescence of basal tergum copious, long and erect, entirely yellowish-white, that on 2 yellowish-white across base but more or less fuscous toward apical margin, discal pubescence of 3-5 copious, rather elongate, dense and erect, entirely fuscous or black; punctures of terga very minute, well but not widely separated medially, becoming very close at extreme sides; tergum 6 quite dull, densely and minutely punctate, carina nearly entire on each side, with a rather shallow, rounded, median emargination, median teeth of apical margin carinate, very widely separated, lateral teeth hardly evident; tergum 7 triangularly pointed medially, quite broad and conspicuous; sterna 1-4 exposed, somewhat shining, minutely and rather closely punctate, apical margins quite abruptly and rather narrowly depressed and yellowish-hyaline, with sparse but rather elongate and suberect, pale hairs; setose area of sternum 5 quite extensive, setae fine, minutely plumose (fig. 44); sternum 6 with broad, densely setose areas that nearly meet medially, setae long and robust, apical lobe broad, produced medially, lateral angles acute; gonocoxites constricted above base, slightly dilated and sinuate above, apex narrowly produced, with a short, subapical, ventral lobe (fig. 45).

DISTRIBUTION—New Jersey to Georgia and Texas, April to June.

FLOWER RECORDS—*Lupinus*, *Polycodium*, *Rubus* and *Tephrosia*.

Megachile (Megachiloides) oenotherae
(Mitchell)

(Figs. 46, 47 & 55)

Megachiloides oenotherae Mitchell, 1924. *Elisha Mitchell Sci. Soc. Jour.* 40, p. 154. ♀ ♂.
Megachile (Megachiloides) oenotherae Mitchell, 1936. *Amer. Ent. Soc. Trans.* 62, p. 151.
Megachile (Megachiloides) oenotherae Sivik, 1954. *Ent. News* 65, p. 256. (biology)

FEMALE—Length 11 mm.; entirely black, including tegulae and legs, tibial spurs yellow;

eyes subparallel; clypeal margin about straight, with a very shallow, emarginate area on each extreme side; mandibles 3-dentate, a long bevelled edge between the 2nd and 3rd teeth (fig. 47); glossa extremely long, reaching nearly to tip of abdomen, and 2nd segment of labial palpi about four times length of the 1st; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks very slightly broader than eyes; vertex somewhat shining, punctures quite deep and distinct, rather fine and close between ocelli medially, becoming slightly more coarse and distant on each side, close on cheeks, rather fine above, somewhat coarser below; face with some shining spaces just below anterior ocellus, but otherwise very finely and closely punctate, supraclypeal area somewhat more coarsely and densely so, punctures quite uniformly close and deep on clypeus; pubescence of face below ocelli rather copious, white, that on cheeks white and rather thin above, becoming somewhat longer below, black between ocelli and across vertex; pubescence whitish, rather copious on thorax laterally and posteriorly, but largely black on scutum, hairs erect, quite copious, becoming pale at extreme sides and across anterior margin, scutellum with a few, black hairs interspersed through the generally pale, erect pubescence; scutum and scutellum quite closely, deeply and distinctly punctate, punctures slightly separated medially, becoming crowded between notaulices and tegulae and on scutellum laterally, axillae very finely and densely punctate; punctures of pleura rather coarse, quite close but shallow below, becoming somewhat finer above; lateral faces of propodeum rather smooth but dull, posterior face with rather close but very minute and vague punctures; all basitarsi distinctly shorter and narrower than their tibiae; tegulae minutely and closely punctate; wings subhyaline, veins piceous; abdominal terga 2-5 rather shallowly grooved or depressed across base, basal margin of these subcarinate, apical margins of terga quite deeply depressed laterally, less so medially on the more basal terga, densely white fasciate, these very narrow medially on 2 and 3, but complete on all; tergum 1 with copious, long and erect, whitish pubescence, discal pubescence of 2 pale, rather long and erect in large part, with a few black hairs laterally, that of 3-6 black, rather short but quite dense and erect; punctures very fine and close on terga 1 and 2, slightly coarser and more distinctly separated on 3-5, 6 very slightly concave in profile, with abundant, erect, black pubescence visible, a few pale, appressed hairs toward tip, punctures very fine and close throughout; sternum 6 well covered with rather short, black, scopal hairs, with a dense fringe of very short, dark hairs along apical margin; scopa otherwise very pale yellowish

or whitish; punctures of sternum 2 quite fine and close, becoming somewhat more coarse and sparse on 3-5, apical margins depressed and obscurely hyaline, sternal fasciae absent.

MALE—Length 9 mm.; black, including legs in large part, tegulae somewhat more brownish, spurs pale yellow; eyes subparallel; clypeal margin straight beneath the dense beard; mandibles 3-dentate, with a rather slender, sharply acute, basal inferior process; glossa extremely long, reaching nearly to tip of abdomen, 2nd segment of labial palpus fully four times the length of segment 1; apical segment of flagellum slender; lateral ocelli very slightly nearer margin of vertex than to eyes; cheeks subequal to eyes in width, obscurely angulate below; vertex somewhat shining, punctures deep and distinct, quite uniformly and slightly separated, becoming somewhat finer and closer on cheeks below, some shining spaces just below anterior ocellus, face otherwise very finely and closely punctate throughout; pubescence white, quite elongate and copious on face, clypeus and lower half of cheeks, elongate and erect but rather thin on vertex and cheeks above, largely pale, with scattered, somewhat shorter, black hairs intermixed; pubescence white and quite copious on thorax laterally and posteriorly, scutum with a transverse patch of fuscous pubescence over posterior half, more distinctly whitish anteriorly, scutellum with a few, fuscous hairs intermixed with the generally white, erect pubescence; punctures of scutum quite deep and distinct, close in general, slightly separated only in center, and slightly separated in mid-line of scutellum but quite finely and closely punctate on each side, punctures of axillae very fine and densely crowded; pleura rather dull, punctures shallow but close, slightly coarser below, fine and densely crowded above; lateral faces of propodeum smooth but dull, posterior face with rather close, minute and somewhat vague punctures; front basitarsus slightly dilated, nearly equaling its tibia in width, and shallowly excavated anteriorly, following segments more or less testaceous, posterior fringe dense and white but rather short; front femur quite broadly dilated medially, lower margin strongly bowed and subcarinate, entirely piceous; front coxal spines slender and elongate, subacute apically, coxae largely bare but each with a small patch of inconspicuous pale bristles at base of spine; mid tibial spurs well developed, mid tarsi with a rather thin but elongate posterior fringe, basitarsi quite narrow and short relative to the tibiae; tegulae minutely and closely punctate; wings subhyaline, veins, brownish-piceous; abdominal terga 2-5 slightly depressed across base, basal margin of depression subcarinate, apical margins of terga rather deeply

but narrowly depressed laterally, these not evident medially on the more basal terga, but complete and deeper on the more apical terga, quite densely white fasciate, especially laterally; discal pubescence of terga 1 and 2 quite copious and elongate, entirely white, tergum 3 with a few, black hairs toward apical margin but pale basally, largely black, erect and rather copious on 4 and 5; punctures of terga 1 and 2 very fine and uniformly close, becoming somewhat more distinctly separated on 3 and 4, rather irregular and substriate on 5, carina of 6 subtriangular in outline, entire medially, margin with a few irregularities on each side, the carina slightly downcurved at tip, median teeth of apical margin broadly and conspicuously carinate, subequally distant from each other and the obscure, lateral angles which are not definitely dentate; tergum 7 triangularly acute; sterna 1-4 exposed, very finely and rather closely punctate, punctures becoming sparse apically on 3 and 4, apical margins narrowly depressed and hyaline, rather thinly long pubescent; sternum 5 with rather extensive, distinctly delimited, apical, pubescence plates on each side, setose area rather broad and short, separated from basal margin by a membranous area, partially divided medially and well covered with robust, apically dilated setae (fig. 46); sternum 6 with small, well separated, setose areas, setae flexed apically, apical lobe quite expansive, broader than long, lateral angles slightly produced; gonocoxites narrowed above base, robust apically, slightly sinuate, obliquely compressed, slightly dilated and short setose apically (fig. 55).

DISTRIBUTION—New Jersey to Texas and Oklahoma, May and June.

FLOWER RECORDS—This collects pollen from *Oenothera laciniata*, but has also been collected visiting *Ceanothus meriolex* and *Pentstemon*.

***Megachile (Xeromegachile) brimleyi*
Mitchell**

(Figs. 47-49)

Megachile brimleyi Mitchell, 1926. Amer. Ent. Soc. Trans. 52, p. 114. ♂.

Megachile (Xeromegachile) brimleyi Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 344. ♀ ♂.

FEMALE—Length 12 mm.; entirely black including tegulae and legs, mid and hind spurs brownish; eyes subparallel; clypeal margin very slightly incurved, minutely denticulate; mandibles 4-dentate, a bevelled edge between the 3rd and 4th teeth (fig. 47); lateral ocelli very slightly nearer eyes than to margin of

vertex; cheeks slightly narrower than eyes; vertex somewhat shining, punctures deep and distinct, quite close and rather fine medially, becoming quite sparse on each side, rather fine and close on cheeks above, becoming somewhat coarser and more widely separated below; face

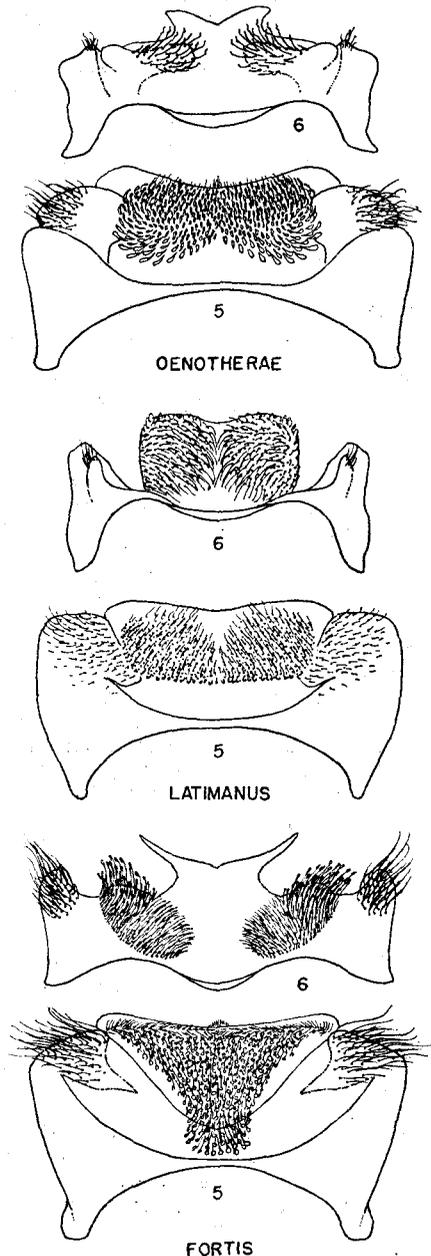


Figure 46
Sterna 5 and 6 in males of *Megachile (Megachiloides)*, *M. (Xanthorsarus)* and *M. (Phaenosarus)*.

below anterior ocellus with quite distinct and close punctures, becoming very close and fine between antennae and eyes, deep, distinct and slightly separated on supraclypeal area, upper margin of clypeus very finely and closely punctate, becoming rather irregularly and more coarsely punctate apically; pubescence largely whitish on head, rather short and dense around antennae, on sides of face and on cheeks below, rather short and thin on cheeks above and across vertex, entirely white on thorax laterally and posteriorly, very dense around tubercles beneath tegulae, and to some degree behind wing bases; scutum and scutellum with very short, erect and rather thin, fuscous pubescence, becoming more or less whitish on scutum anteriorly, and with a pair of oblique, rather short, dense lines of whitish tomentum, a small spot of tomentum back of each tegula and a line of tomentum in the scutello-mesothoracic suture; scutum rather dull, quite closely and deeply punctate throughout, punctures slightly separated in center, those on scutellum uniformly very close and somewhat finer, rather fine and densely crowded on axillae; pleura with densely crowded, rather fine punctures above, but these becoming more coarse, shallow and rather widely separated below; lateral faces of propodeum somewhat shining, with very shallow but rather close punctures evident, posterior face with scattered, very minute and obscure punctures; mid and hind basitarsi almost as broad as their tibiae, but distinctly shorter; tegulae very minutely and closely punctate; wings subhyaline, becoming slightly clouded apically, veins brownish; abdominal terga 2 and 3 shallowly grooved across base, basal margin of the grooves only subcarinate, apical margins of terga rather distinctly depressed laterally, very obscurely so, if at all, medially; terga 1-5 with dense, entire but rather narrow, whitish, apical fasciae, discal pubescence of basal tergum rather copious, long and erect, entirely whitish, that on following terga very short, inconspicuous and largely fuscous; punctures very fine and close on terga 1 and 2, becoming somewhat more distinct but still fine on 3-5, 6 about straight in profile, with a few suberect, pale hairs evident in profile, largely covered with pale tomentum in dorsal view, punctures very fine and densely crowded throughout; sternum 6 quite well covered with dark, scopal hairs, apical fringe short and dense; scopa otherwise creamy-white, with a few black hairs across apex of sternum 5, the more basal sterna very closely and finely punctate, punctures becoming somewhat more coarse and sparse apically, apical margins narrowly hyaline, no sternal fasciae evident.

MALE—Length 10-11 mm.; black, tegulae

more brownish-testaceous, front tarsi pale yellowish, mid and hind spurs brownish-testaceous; eyes very slightly convergent below; median third of clypeal margin very slightly produced; mandibles 3-dentate, inferior process sub-basal, slender and acute; apical segment of flagellum very slightly dilated; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks somewhat narrower than eyes, obscurely angulate below; vertex shining, punctures deep and distinct, rather coarse and well separated laterally, becoming slightly closer medially and between ocelli, close and fine on cheeks punctures below anterior ocellus slightly separated, rather coarse, becoming fine and densely crowded on lower portions of face and clypeus beneath dense pubescence; pubescence creamy-white, quite dense on face around and below antennae, more whitish on cheeks, thin above, somewhat more elongate below, short and thin but largely pale on vertex; thorax with rather copious, somewhat elongate, white pubescence laterally and posteriorly, scutum in large part covered with very short thin, black pubescence, becoming somewhat more elongate and whitish anteriorly, with a pair of slightly oblique lines of pale tomentum anteriorly, the scutello-mesothoracic suture white tomentose, and scutellum with a few dark hairs interspersed in the generally pale and more elongate pubescence; punctures of scutum and scutellum quite deep and distinct, slightly separated only in center of scutum, moderately coarse, somewhat finer but uniformly slightly separated on scutellum, fine and close on axillae; pleura dull, punctures rather shallow but contiguous, becoming quite densely crowded above; lateral faces of propodeum somewhat smoother but very shallowly, obscurely and closely punctate, posterior face with very minute, vague and close punctures; front coxal spines very broad at base, subtriangular and somewhat flattened, tips narrowly rounded, densely long white pubescent posteriorly and with a small patch of short, testaceous bristles at base, coxae otherwise bare and shining; front tarsi pale yellow, faintly brownish along margins and toward apex, basitarsus slightly dilated but not equalling the tibiae in width, rather shallowly excavated anteriorly, posterior fringe entirely pale, quite dense but rather short; front tibiae piceous on outer face, more or less testaceous on the other two faces; front femora piceous on posterior face, becoming brownish toward the subcarinate lower margin, anterior surface highly polished and testaceous; mid tarsi narrow, not much modified, but with a very long, white, posterior fringe; mid tibial spurs well developed; hind basitarsi quite short and slender; tegulae minutely and closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga

2-5 shallowly depressed across base, basal margins of these subcarinate, apical margins of 1-5 with complete, dense, white tomentose fasciae, these rather narrow, and margins distinctly depressed laterally on the more basal terga, more completely depressed on the more apical terga; tergum 1 with rather elongate, thin, entirely whitish pubescence, discal pubescence of 2-5 very short, suberect and largely fuscous; punctures of terga very fine and close basally, becoming somewhat more distinctly separated but still quite close on the more apical terga; tergum 6 thinly pale tomentose, punctures close but rather irregular, carina broadly rounded, with no evidence of a median emargination, median teeth of apical margin broadly carinate, somewhat nearer the small, acute lateral angles than to each other; tergum 7 largely hidden, transverse and not produced medially; sterna 1-4 exposed, punctures rather fine but well separated, especially on the more apical sterna, apical margins rather abruptly depressed, yellowish-hyaline, thinly fasciate, hairs elongate and entirely pale; sternum 5 with well defined, lateral, pubescent, apical plates, area between filled by the rather broad and expansive setose area, setae rather sparse, simple along apical margin but becoming robust, elongate and apically dilated toward base, apical margin with a median, dense tuft of fine hairs (fig. 48), sternum 6 with poorly defined but rather extensive setose areas on each side of mid-line, setae sinuate, rather sparse, apical lobe broader than long, acutely angulate laterally; gonocoxites narrowed above base, sinuate, slightly dilated apically, bearing numerous elongate hairs (fig. 49).

DISTRIBUTION—This is limited to the narrow coastal region of the southeastern states, from North Carolina to Florida, July and August.

FLOWER RECORDS—This visits *Galactia* primarily, but has been collected on *Erigeron*.

***Megachile (Xeromegachile) dakotensis*
Mitchell**

(Figs. 48 & 49)

Megachile dakotensis Mitchell, 1926. Psyche 33, p. 164. ♂ ♀.

Megachile (Xeromegachile) dakotensis Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 335.

FEMALE—Length 13 mm.; black, tegulae brownish-testaceous, spurs yellow, legs black; eyes subparallel; clypeal margin straight; mandibles 4-dentate, a rather short bevelled edge between 3rd and 4th teeth; lateral ocelli

considerably nearer eyes than to margin of vertex; cheeks slightly broader than eyes; vertex somewhat shining, punctures quite distinct, rather shallow, a narrow, median, impunctate line reaching from anterior ocellus to margin of vertex, punctures quite close on each side of this, densely crowded between ocelli, becoming rather sparse laterally, close on cheeks in large part, but somewhat separated toward posterior margin above; punctures below anterior ocellus slightly separated, quite deep and distinct, becoming densely rugoso-punctate laterally and below, beneath rather dense pubescence, quite close medially on supraclypeal area, becoming densely crowded on each side, close and fine along upper margin of clypeus, but somewhat more coarse and distinct but still rather close apically; pubescence largely pale on head and thorax, rather short and dense around antennae, on sides of face and on cheeks below, very short and fuscous in part, across vertex; pubescence quite copious and rather short on thorax practically bare, (possibly denuded in material at hand); scutum rather dull, punctures fine, well separated medially, becoming rather close laterally and posteriorly, those of scutellum, very fine and close except along mid-line, very fine and densely crowded on axillae, pleura rather dull, punctures fine and very close, becoming crowded above; lateral faces of propodeum somewhat smoother but rather dull, punctures hardly evident, posterior face somewhat velvety, punctures very close but shallow and vague, becoming inevident medially; mid and hind basitarsi about as broad as their tibiae, hind pair nearly equal to their tibiae in length; anterior tarsi much narrower than their tibiae; tegulae with exceedingly minute, hardly visible but rather close punctures; wings subhyaline basally, becoming faintly infuscated apically, veins brownish-piceous; abdominal terga 2-5 deeply and abruptly grooved across base, basal margins of grooves quite definitely carinate, apical margins of terga quite deeply depressed except on 1 and 2 medially, median areas of terga strongly convex, finely and quite closely punctate, with very short, black, erect pubescence visible laterally but inevident medially; tergum 6 about straight in profile, with no erect hairs visible, and only very short, erect, black hairs evident toward sides in dorsal view, narrowly rounded apically, apical half rather densely pale yellowish tomentose, basal half very minutely and closely punctate; sternum 6 rather well covered with short, black, scopal hairs, these becoming somewhat sparse toward apex, which is very narrowly fringed with short, black setae; scopa otherwise white, with only a few inconspicuous black hairs at extreme sides of sternum 5, the more basal

sterna closely and finely punctate, punctures becoming more widely separated on apical sterna; no sternal fasciae evident.

MALE—Length 10-11 mm.; black, tegulae more brownish-testaceous; anterior tarsi yellowish in part, spurs pale yellow; eyes subparallel; clypeal margin very slightly out-curved; mandibles 3-dentate, inferior process sub-basal, rather broadly triangular; apical segment of flagellum slender and elongate; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks very slightly broader than eyes, much narrowed below but not angulate; vertex shining, punctures deep and distinct, rather fine and quite close medially, becoming slightly more widely separated laterally, slightly separated on cheeks above toward posterior margin, much finer and densely crowded along margin of eyes, very close and fine below, quite deep and distinct, slightly separated below anterior ocellus, but otherwise very fine and densely crowded on face and clypeus; pubescence largely pale on head and thorax, with only scattered, erect, dark hairs intermixed with the generally pale yellowish hairs on vertex and scutum, face with copious, elongate creamy-white pubescence, dense and snowy-white on cheeks below, shorter and thinner above, copious and rather elongate on thorax laterally and posteriorly, yellowish across posterior half of scutum; scutum dull, very closely and finely punctate, punctures slightly separated only in center posteriorly, those of scutellum fine and close on each side of a somewhat shining median line, those on axillae very fine and close; pleura dull, punctures fine and close, becoming densely crowded above; lateral surfaces of propodeum somewhat shining, finely and shallowly but rather closely punctate, punctures of posterior face close, very minute and rather vague; front coxal spines distinct, very short not much longer than broad at base, narrowly rounded, densely long white pubescent posteriorly, coxae without definite patches of setae; front tarsi slender and unmodified, pale yellowish, more or less brownish on anterior and posterior margins, not at all excavated, with a quite dense, rather short, whitish, posterior fringe; mid tibial spurs well developed; mid tarsi quite short and slender, dark, with a much elongated, white, posterior fringe; hind basitarsi short and quite slender; tegulae very minutely and rather closely punctate; wings subhyaline, faintly clouded apically, veins brownish-piceous; abdominal terga 2-5 deeply grooved across base, basal margins of these sharply carinate, apical margins of terga deeply and quite abruptly depressed except on 1 and 2 medially, with entire, dense, whitish, apical fasciae on 2-5, basal tergum with quite copious, elongate, white pubescence which is

quite dense at extreme sides, whitish discal pubescence of following terga evident only toward base of each plate; punctures fine and close, becoming subrugose at extreme sides of terga 4 and 5, 6 white tomentose basally, punctures fine, densely crowded and irregular, or surface more or less rugose, carina entire, quite broadly and evenly rounded, median teeth of apical margin broadly carinate, slightly nearer the small, acute lateral angles than to each other; tergum 7 largely hidden, with a very small, median, acute, apical angle; sterna 1-4 exposed, quite closely and finely punctate, apical margins quite abruptly and deeply depressed, narrowly hyaline, more or less densely fringed with white hairs; lateral pubescent plates of sternum 5 rather small but well defined, setose area broad but quite short medially, setae short and rather sparse, more or less dilated apically (fig. 48); sternum 6 with well separated, sublateral setose areas, setae short and robust, apical lobe broad and very short, lateral angles acute; gonocoxites constricted above base, slightly sinuate, much dilated apically, sparsely setose toward apex, tip with a tuft of elongate hairs (fig. 49).

DISTRIBUTION: Montana to Minnesota, Nebraska and Illinois, July and August.

FLOWER RECORDS—*Amorpha*, *Cleome*, *Helianthus*, *Kuhnistera*, *Petalostemon* and *Verbena*.

Megachile (Xeromegachile) deflexa
Cresson

(Figs. 47-49)

Megachile deflexa Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 125. ♂.

Megachile megagyna Cockerell, 1909. Canad. Ent. 41, p. 394. ♀.

Megachile indianorum Cockerell, 1913. Ann. Mag. Nat. Hist. (8) 11, p. 533. ♂.

Megachile (Xeromegachile) coreopsana Mitchell, 1934. Amer. Ent. Soc. Trans. 59, p. 319. ♂.

Megachile (Xeromegachile) deflexa Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 332.

FEMALE—Length 15-17 mm.; black, tegulae more brownish, legs black, spurs yellowish; eyes subparallel; clypeal margin narrowly produced and slightly incurved medially, with a small, median denticle; mandibles 4-dentate, a bevelled edge between 3rd and 4th teeth; lateral ocelli much nearer eyes than to margin of vertex; cheeks subequal to eyes in width; vertex somewhat shining between deep, distinct, rather fine and close punctures, these becoming slightly separated laterally, punc-

tures of cheeks close and fine above, becoming somewhat coarser but still quite close below; face below ocelli quite densely rugoso-punctate, finely so between antennae and eyes, clypeus with quite coarse and deep punctures medially where they are slightly separated, but becoming fine and densely crowded on each side; pubescence whitish on face and cheeks, rather copious but short around antennae and at sides of face, somewhat elongate but rather thin on cheeks below, becoming short and thin above, very short but erect over entire vertex; pubescence whitish or cream color on thorax laterally and posteriorly, dorsum of thorax largely covered with extremely short, erect, fuscous or blackish pubescence, the scutello-mesothoracic suture with a line of pale tomentum; scutum quite deeply and distinctly punctate throughout, punctures somewhat coarser and more distinctly separated medially, becoming densely crowded laterally and posteriorly, scutellum somewhat more finely and very densely punctate throughout, punctures of axillae slightly more coarse, deep and distinct; pleura somewhat shining, punctures rather shallow but quite distinct, to some slight degree separated but becoming densely crowded above; lateral faces of propodeum quite smooth but rather dull, not distinctly punctate, posterior face with rather close, minute and indistinct punctures; mid and hind basitarsi about equal to their tibiae in breadth, hind pair equalling their tibiae in length also; front tarsi relatively slender; tegulae minutely and closely punctate; wings subhyaline, becoming rather deeply infuscated apically, veins brownish-testaceous; abdominal terga 2-4 rather deeply grooved across base, basal margin of grooves distinct but hardly carinate, terga 1-5 with complete, dense, yellowish, apical fasciae, apical margins rather sharply depressed laterally but only obscurely so medially on the more basal terga; tergum 1 with rather elongate, thin, yellowish pubescence medially, with a dense, yellowish patch of tomentum at each extreme side, discal pubescence of following terga very short, erect and fuscous; tergal punctures uniformly fine and quite close, becoming slightly coarser and more distinctly separated laterally on the more apical terga, 6 about straight, with very short, suberect, dark hairs visible in profile, broadly rounded apically in dorsal view, surface very densely and finely punctate, punctures obscured toward apex by rather dense, appressed, pale yellowish tomentum; sternum 6 well covered with dark scopal hairs, becoming rather thin toward the apical fringe of very short dark bristles; scopa yellowish-white, the more basal sterna very closely and finely punctate, punctures becoming more coarse, deep and distinct on the more apical sterna, apical margins

narrowly depressed and hyaline; sternal fasciae not evident.

MALE—Length 15 mm.; black, tegulae more brownish-testaceous, legs black, spurs yellow; eyes very slightly convergent below; apical margin of clypeus with a rather narrow, median, slightly incurved area, with a minute, median tubercle; mandibles 3-dentate or sometimes obscurely 4-dentate (fig. 47), with a rather narrow and acute, sub-basal, inferior process; apical segment of flagellum slender and elongate; lateral ocelli much nearer eyes than to margin of vertex; cheeks subequal to eyes in width, not angulate below, but this area obscured by dense, elongate pubescence; vertex shining, punctures deep and distinct, close except at extreme sides where they are well separated, becoming close and fine on cheeks; face below anterior ocellus rather coarsely rugoso-punctate, becoming very finely so laterally and below, beneath dense pubescence; pubescence very dense, yellowish-white around antennae and over face below, snowy white, dense and elongate on cheeks below, becoming quite short and thin above, vertex with very short, erect but rather thin, fuscous pubescence; thorax rather densely white pubescent laterally and posteriorly, but short and fuscous on scutum, with some pale, erect hairs anteriorly and a pair of very obscure lines of tomentum, the scutello-mesothoracic suture narrowly pale tomentose; pubescence of scutellum and axillae relatively pale and elongate; pleura dull, punctures quite densely crowded below, relatively distinct but still close above; lateral faces of propodeum rather smooth but dull, punctures obscure, posterior face somewhat more shining, punctures rather close but minute and rather vague; punctures of scutum rather fine and close, densely crowded in large part, those of scutellum fine and crowded, axillae with rather coarse and distinctly separated punctures; front coxal spines short, not much longer than they are broad at base, narrowly rounded apically, densely long white pubescent posteriorly, front coxae with considerable white pubescence but without patches of ferruginous bristles; mid tibial spurs well developed; front tarsi slender and simple, not at all dilated nor grooved, but with a rather dense, posterior fringe of rather short, snowy-white hairs; mid basitarsi rather short and narrow, with a quite conspicuous posterior fringe of elongate, white hairs; mid tibial spurs well developed; hind basitarsi short and slender, fringed anteriorly; tegulae minutely but quite closely and distinctly punctate; wings subhyaline, faintly infuscated apically, veins more brownish; abdominal terga 2-5 rather deeply grooved across base, basal margins of grooves subcarinate on the more basal terga, but becom-

ing quite sharply carinate on 4-5; terga 1-5 with complete, narrow, dense, apical, yellowish fasciae, apical margins rather deeply depressed laterally, but only obscurely so medially on the more basal terga; tergum 1 with elongate, pale yellowish pubescence, this becoming very dense at each extreme side, discal pubescence of the following terga largely dark and very short, but with some pale hairs across base of 2 and 3; punctures rather uniformly fine and close, becoming somewhat more irregular, distinct and more distant on tergum 5, 6 somewhat shining, punctures rather shallow but distinct and close, carina subtriangular, with a more or less rounded apex, sides relatively straight, with no median emargination, median teeth of apical margin carinate, slightly nearer the short but acute lateral teeth than to each other; tergum 7 almost entirely hidden, not produced medially; sterna 1-4 exposed, punctures quite deep and distinct, well separated and rather coarse except on sternum 1; lateral pubescence plates of sternum 5 poorly defined, setose area broad and expansive, setae rather sparse and minute (fig. 48); sternum 6 with well separated, lateral setose areas, the setae sparse and short, apical lobe very broad, lateral angles acute; gonocoxites narrowed above base, slightly dilated and sinuate above, compressed at tips (fig. 49).

DISTRIBUTION—North Carolina, along the coast to Florida, west to Texas, and north to Nebraska, April (in Florida) to September.

FLOWER RECORDS—*Bidens*, *Clethra*, *Erigeron*, *Phaseolus* and *Rhus*.

Megachile (Xeromegachile) integra
Cresson

(Figs. 47-49)

Megachile integra Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 121. ♂.

Megachile strophostylis Robertson, 1904. Canad. Ent. 36, p. 277. ♀.

Megachile strophostylis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile (Xeromegachile) integra Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 341.

FEMALE—Length 11-13 mm.; black, including tegulae and legs, spurs more yellowish; eyes very slightly convergent below; clypeal margin nearly straight but minutely denticulate; mandibles 4-dentate, a bevelled edge between 3rd and 4th teeth (fig. 47); lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width; vertex somewhat shining, punctures

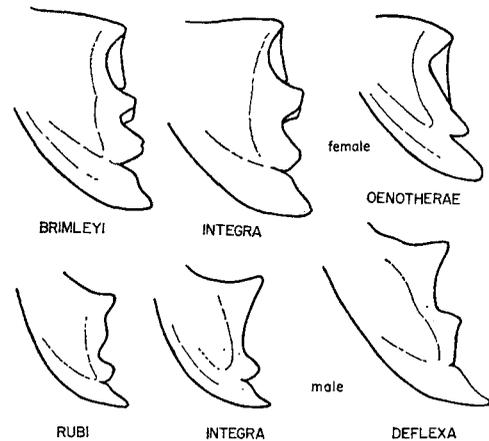


Figure 47—Mandibles in species of *Megachile (Xeromegachile)* and *M. (Megachiloides)*.

deep and distinct, quite close but with some shining spaces along mid-line between lateral ocelli, and just above eyes, fine and rather close on cheeks above, becoming somewhat coarser and rather sparse below; face rather coarsely rugoso-punctate below anterior ocellus, but becoming very finely so between antennae and eyes, supraclypeal area with rather irregular but quite deep and distinct punctures, upper margin of clypeus very finely and densely punctate, punctures becoming rather irregular but more widely spaced toward apical margin; pubescence of face and cheeks whitish, rather copious but short around antennae and on face laterally, somewhat elongate on cheeks below but becoming short and thinner above, short, erect, and largely fuscous across vertex and between ocelli; pubescence white or yellowish-white on thorax laterally and posteriorly, very short and erect but copious, fuscous or black on scutum, the anterior margin more or less white, with a pair of oblique, rather distinct lines of pale tomentum, the scutello-mesothoracic suture narrowly white tomentose; scutellum and axillae with largely erect but short, black hairs; punctures of scutum quite deep, distinct, not very coarse but uniformly close throughout, those of scutellum considerably finer and densely crowded except in mid-line, fine and very close on axillae; pleura somewhat shining, rather coarsely punctate below, punctures slightly separated, becoming finer and considerably closer above; lateral faces of propodeum shining, with numerous, very shallow, obscure and close punctures, posterior face more velvety, punctures minute and vague but rather uniformly close; mid and hind basitarsi shorter, but about as broad as their tibiae; front tarsi relatively slender,

with a rather sparse, posterior fringe of yellowish-white hairs, posterior fringe of mid tarsi relatively short and indistinct; tegulae very minutely and closely punctate; wings subhyaline basally, becoming faintly infuscated apically, veins brownish-piceous; abdominal terga 2-4 shallowly depressed or grooved across base, margins of grooves distinct but not carinate, groove obliterated medially on 4; apical margins of terga 1-5 densely white fasciate, the fasciae rather thin medially, apical margins rather deeply depressed laterally but only obscurely so medially on all; tergum 1 with rather loose but elongate, yellowish-white pubescence, becoming very dense at each extreme side, disc of 2 with considerable short but erect whitish pubescence toward base, narrowly fuscous toward apical margin, 3-5 covered with very short, erect, fuscous pubescence; punctures of terga quite uniformly fine and close, becoming somewhat more deep and distinct on the more apical terga, 6 straight in profile, with just a few suberect hairs visible toward base, broadly rounded in dorsal view, almost completely covered with dense, appressed, greyish-white tomentum; sternum 6 rather uniformly covered with short, dark, scopal hairs, with a rather dense, apical fringe of very short, dark hairs; scopa creamy-white, punctures of the more basal sterna very fine and close, becoming somewhat coarser and more distinct on the more apical sterna, apical margins narrowly hyaline; sternal fasciae not present.

MALE—Length 11-12 mm.; black, tegulae testaceous-hyaline, legs in part yellowish or ferruginous; eyes very slightly convergent below; clypeal margin with a very shallow, median, emarginate area with a minute, median tubercle; mandibles 3-dentate (fig. 47), inferior process almost median in position, broad and only obscurely angulate at tip; apical segment of flagellum quite broadly dilated; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width, not sharply angulate below; vertex somewhat shining, punctures deep and distinct, rather fine and close, becoming very fine and very close on cheeks; face below level of anterior ocellus quite densely and very finely rugoso-punctate beneath dense pubescence; pubescence of face yellowish, decumbent dorsally above margin of clypeus, with a dense, transverse brush of elongate, yellowish hairs across upper margin of clypeus, hairs below more decumbent, that on cheeks short, entirely white, a thin, transverse fringe of whitish hairs near lower margin, that on vertex yellowish, very short, erect and rather thin; thorax with rather dense but short, yellowish-white pubescence laterally and posteriorly, largely yellowish on scutum and

scutellum, that on scutum very short, erect, rather thin, with a pair of narrow, anterior, oblique, lines of whitish tomentum, and scutello-mesothoracic suture with dense, pale tomentum, that on scutellum rather elongate; scutum, scutellum and axillae very finely and closely but quite distinctly punctate throughout; punctures of pleura distinct but fine and very close below, becoming somewhat more distinct just below tegulae; lateral faces of propodeum somewhat shining, obscurely but closely punctate, posterior face more velvety, with very close but minute and vague punctures; front coxal spines very broad at base, abruptly narrowed, apex triangularly acute, densely long white pubescent posteriorly, the coxae entirely bare anteriorly but with a patch of short reddish bristles at base of each spine; mid tibial spurs short but distinct; front tarsi pale yellow, quite broadly dilated, becoming about as broad at apex as the tibiae, rather narrowly excavated anteriorly, with a rather broad, dense, whitish, posterior fringe which is fuscous beneath; front tibiae almost entirely ferruginous, front femora ferruginous except for the somewhat more yellowish, ventral carinate margin; mid and hind femora black, their tibiae more ferruginous, mid basitarsi quite short, narrower than their tibiae, with a very much elongated, quite dense, posterior fringe of pale yellowish hairs, hind basitarsi very short and quite narrow, more or less testaceous; tegulae very minutely and closely punctate; wings subhyaline, becoming faintly clouded apically, veins brownish-piceous; abdominal terga 2-5 somewhat depressed toward base, basal margins subcarinate, these terga with narrow, entire, pale yellowish, apical fasciae which are quite dense laterally, completely so on the more apical terga, margins somewhat depressed laterally on the more basal terga but completely and abruptly depressed on 4 and 5; basal tergum with quite dense, copious, elongate, yellowish pubescence which becomes quite dense at extreme sides, 2 quite largely covered with dense, much shorter, pale yellowish pubescence, 3-5 with very short and rather dense, erect, fuscous or blackish pubescence; tergal punctures rather uniformly very fine and close, becoming somewhat more distinct on tergum 5, 6 very finely and densely punctate, carina broadly and quite regularly rounded or subtriangular, not at all emarginate, median apical teeth broadly carinate, considerably nearer the obscure, lateral angles than to each other; tergum 7 very short, transverse, largely hidden, not at all produced medially; sterna 1-4 exposed, shining, very finely and quite closely punctate, apical margins depressed and narrowly yellowish-hyaline; lateral pubescent plates of sternum 5 rather small, setose area rather expansive,

setae uniformly fine, becoming broadly dilated apically around basal margin, apical margin with a median, dense, bicornate, carinate tuft of hairs (fig. 48); sternum 6 with transverse, well separated setose areas, the setae robust and flexed, apical lobe short, not very broad, but lateral angles produced to slender, tapering points; gonocoxites narrowed above base, dilated, obliquely compressed, slightly sinuate, setose dorsally near apex (fig. 49).

DISTRIBUTION—New Jersey to Kansas, south to Texas and Florida, March (in the south) to September.

FLOWER RECORDS—*Erigeron*, *Galactia*, *Glycina*, *Koellia*, *Phaseolus* and *Strophostyles*.

***Megachile (Xeromegachile) integrella*
Mitchell**

(Figs. 48 & 49)

Megachile integrella Mitchell, 1926. Amer. Ent. Soc. Trans. 52, p. 116. ♀.

Megachile (Xeromegachile) integrella Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 339.

FEMALE — Length 10-12 mm.; black, tegulae more testaceous, legs black, spurs yellow; eyes very slightly convergent below; clypeal margin nearly straight; mandibles 4-dentate, a bevelled edge between 3rd and 4th teeth; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width; vertex somewhat shining, punctures quite deep and distinct, rather fine and close medially, becoming slightly more widely separated but still close laterally, close and rather irregular on cheeks; punctures just below anterior ocellus very slightly separated, face otherwise densely and finely rugose, punctures of supraclypeal area distinct but fine and very close, densely crowded across upper margin of clypeus, becoming somewhat more coarse and distinct yet close toward apical margin; pubescence short and white around antennae, on face laterally and on cheeks below, very fine, short and thin elsewhere, vertex with some short, inconspicuous, erect, blackish hairs back of eyes and between ocelli; thorax with short, whitish pubescence laterally and posteriorly, scutum covered in large part with very thin, erect, blackish hairs, these becoming somewhat whitish toward anterior margin, scutellum and axillae with some erect, blackish hairs; scutum rather dull, punctures shallow and somewhat separated medially, becoming fine and very close laterally, slightly separated on scutellum medially, becoming close laterally, very minute and densely crowded on axillae; pleura dull, punctures very close and rather fine, becoming crowded above; lateral faces of

propodeum rather smooth but dull, somewhat tessellate, posterior face more velvety, with very close, exceedingly minute and vague punctures; mid and hind basitarsi about as broad as their tibiae, but distinctly shorter; tegulae very minutely and rather closely punctate; wings subhyaline, veins more brownish; abdominal terga 2-5 quite deeply grooved or depressed across base, basal margins of these distinct but hardly carinate, apical margins with entire, whitish fasciae that are very thin medially but dense laterally; margins of terga quite deeply depressed laterally, completely so on 3-5; basal tergum with rather copious, erect, thin, whitish pubescence which becomes very dense at extreme sides, discal pubescence of 2 rather pale but becoming more or less blackish at extreme sides, discal pubescence of 3-5 very short but erect, entirely black, quite distinct at least laterally in dorsal view; tergal punctures minute, somewhat separated at least medially, becoming very close laterally; tergum 6 straight in profile, with a few, suberect, blackish hairs evident, rather broadly rounded, largely covered with rather thin, pale tomentum, punctures very fine and close beneath the tomentum; sternum 6 quite uniformly covered with short, brownish scopal hairs, these becoming somewhat more sparse toward the short, but dense apical fringe; scopa white, possibly with a few black hairs apically on sternum 5; the more basal sterna with very fine, and close punctures, these becoming somewhat more coarse and distinct on the more apical sterna; sternal fasciae not evident.

MALE — Length 10-11 mm.; black, tegulae more brownish-testaceous, front legs yellow and testaceous in part, mid and hind legs black, spurs pale yellow; eyes very slightly convergent below; clypeal margin nearly straight beneath the dense beard; mandibles 3-dentate, inferior process nearly median in position, triangularly acute; apical segment of flagellum slender and elongate; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes, quite strongly narrowed below, without a definite, inferior angle; vertex shining, punctures quite deep and distinct, rather close between ocelli, becoming slightly separated toward margin laterally, close but rather coarse on cheeks above, becoming fine and densely crowded below; punctures below ocelli densely crowded and rather coarse, becoming very fine and densely crowded laterally and below; pubescence whitish, rather dense and copious around antennae and over lower part of face, that on cheeks snowy white, rather elongate and dense below, becoming thin and short above, vertex with rather sparse, elongate, pale hairs and shorter, erect, fuscous hairs, these extending slightly on to upper part of cheeks; thorax with rather short, copi-

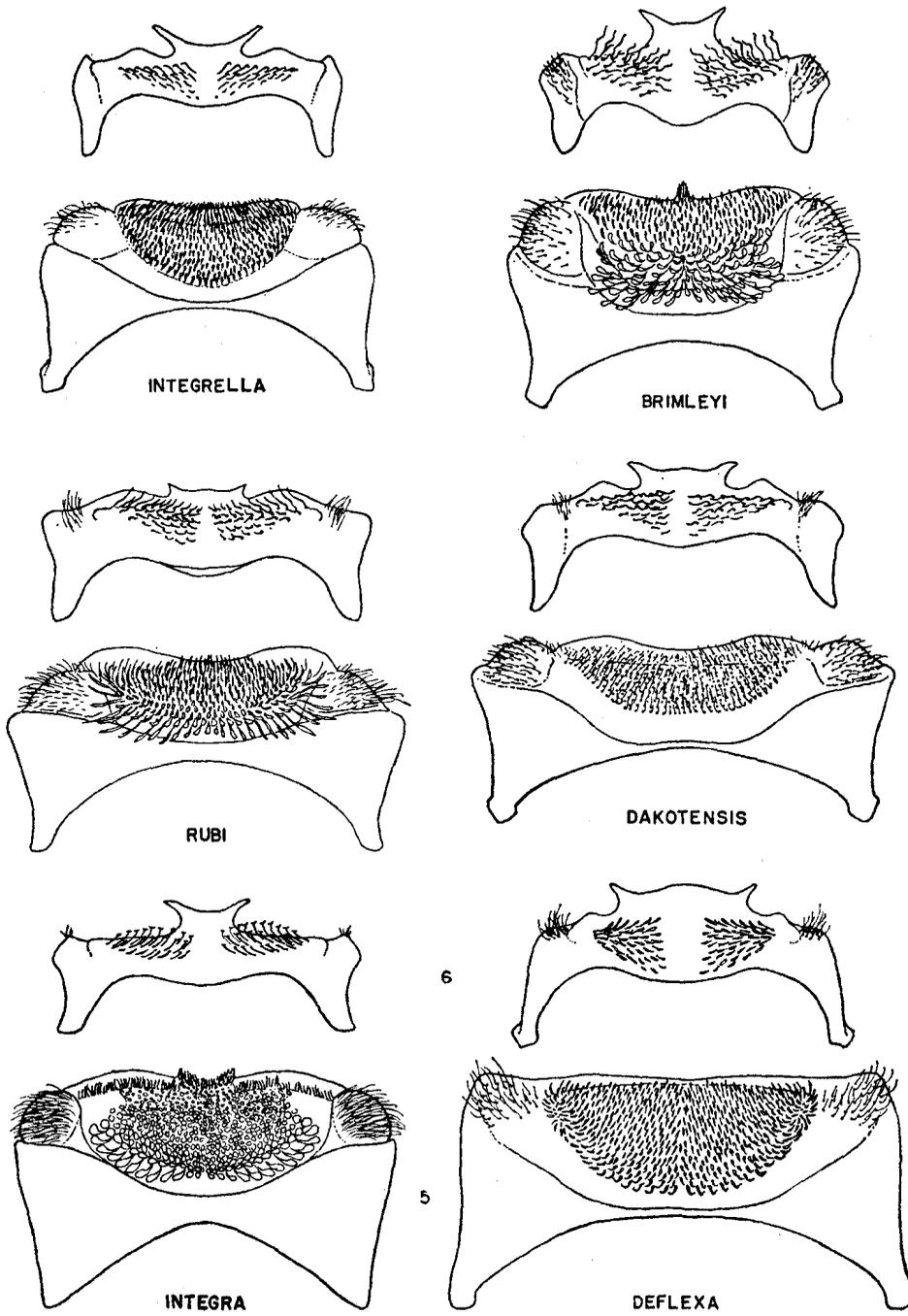


Figure 48
Sterna 5 and 6 in males of *Megachile* (*Xeromegachile*).

ous, white pubescence laterally and posteriorly, that on propodeum dorsally more elongate, scutum and scutellum with rather thin but erect, fuscous pubescence, this becoming whitish anteriorly on scutum, scutellum with whitish hairs posteriorly; scutum rather dull, punctures quite deep and distinct, rather coarse, well separated medially, becoming somewhat finer and densely crowded laterally, scutellum somewhat shining between rather evenly spaced, close punctures, and axillae densely and finely punctate; pleura closely and rather coarsely punctate beneath the pubescence, punctures becoming somewhat finer and densely crowded above; lateral faces of propodeum smooth and somewhat shining, with numerous, rather indistinct, very vague punctures, posterior face more velvety, with numerous, very close but minute and obscure punctures; front coxal spines very short but distinct, subtriangular, base nearly as broad as the length, narrowly rounded at tip, anterior surface of coxae quite closely and finely punctate, without a patch of bristles below the spine; front tarsi narrow and simple, pale yellow, with slightly brownish anterior and posterior margins, basitarsi not at all excavated, much narrower than the tibiae, posterior fringe rather thin, whitish, of moderately long hairs; outer face of front tibiae piceous, the other two faces more testaceous; posterior face of front femora piceous except for the more yellowish, lower, carinate rim, anterior face yellowish-testaceous; mid tibial spur well developed; mid tarsi slender and rather short, but with a posterior fringe of very long, whitish hairs; hind basitarsi quite slender; tegulae minutely and closely punctate; wings subhyaline basally, becoming slightly infuscated apically, veins brownish-piceous; abdominal terga 2-5 rather deeply depressed across base, basal margin of depressions only obscurely carinate, apical margins of terga depressed, completely so on 3-5, but widely interrupted on 2, with white apical fasciae, widely interrupted on 2 but entire on 3-5; tergum 1 with rather copious, elongate, white pubescence that becomes quite dense at extreme sides, discal pubescence of 2 and 3 short, quite sparse medially, becoming rather dense toward lateral margins, largely fuscous but white in part on 2; punctures close and rather fine and terga 1 and 2, slightly coarser on 3 and 4, minute and rather sparse on 5 toward base but becoming quite close and coarse toward apical rim, this tergum with considerable pale tomentum toward base; tergum 6 densely and narrowly tomentose across base, finely and closely punctate, carina irregularly rounded, margin rather finely serrate but not emarginate, lateral teeth of apical margin strongly carinate, very much nearer the obscure, lateral angles than to each other; tergum 7 transverse, with a very low, median,

apical angle; sterna 1-4 exposed, quite deeply and rather closely and regularly punctate, apical margins rather broadly depressed and hyaline, apical pubescence rather elongate, each sternum being subfasciate; lateral pubescent plates of sternum 5 rather indistinct, setose area rather restricted, separated from sclerotized portions of plate by a membranous zone, setae quite sparse, minute and simple (fig. 48); sternum 6 with rather elongate, transverse, setose areas that are distinctly separated medially, setae robust, sinuate and spatulate, apical lobe short and rather broad, angles forming elongate, acute lobes; gonocoxites constricted above base, dilated and sinuate apically, with a ventral, subapical, oblique, carinate ridge which is minutely pubescent (fig. 49).

DISTRIBUTION — Coastal North Carolina to Florida, May and June.

FLOWER RECORDS — *Hypericum* and *Oxydendrum*.

Megachile (Xeromegachile) rubi
Mitchell

(Figs. 47-49)

- Megachile rubi* Mitchell, 1924. Elisha Mitchell
Sci. Sc. Jour. 40, p. 159. ♀
Megachile neglecta Mitchell, 1924. Elisha Mitchell
Sci. Soc. Jour. 40, p. 160. ♂
Megachile (Xeromegachile) rubi Mitchell, 1937.
Amer. Ent. Soc. Trans. 62, p. 362.
Megachile (Xeromegachile) rubi Sivik, 1954.
Ent. News 65, p. 255. (biology)

FEMALE — Length 11-12 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes subparallel; clypeal margin straight and entire; mandibles 4-dentate, a short bevelled edge between 3rd and 4th teeth; lateral ocelli subequally distant from eyes and margin of vertex; cheeks somewhat broader than eyes; vertex shining, punctures deep and distinct, rather fine and close between ocelli, slightly coarser and more distinctly separated laterally, rather fine and close on cheeks; face rather coarsely rugoso-punctate just below ocelli, but becoming minutely and closely punctate laterally, supraclypeal area quite coarsely, deeply and closely punctate throughout, clypeus with fine, densely crowded punctures across upper margin, these becoming somewhat coarser and more distinct but still close apically; pubescence white, rather copious and elongate around antennae and on sides of face, rather short on cheeks above, becoming more elongate below, erect and fuscous between ocelli and across vertex; thorax with rather copious, elongate, whitish pubescence laterally and posteriorly, scutum largely covered with erect,

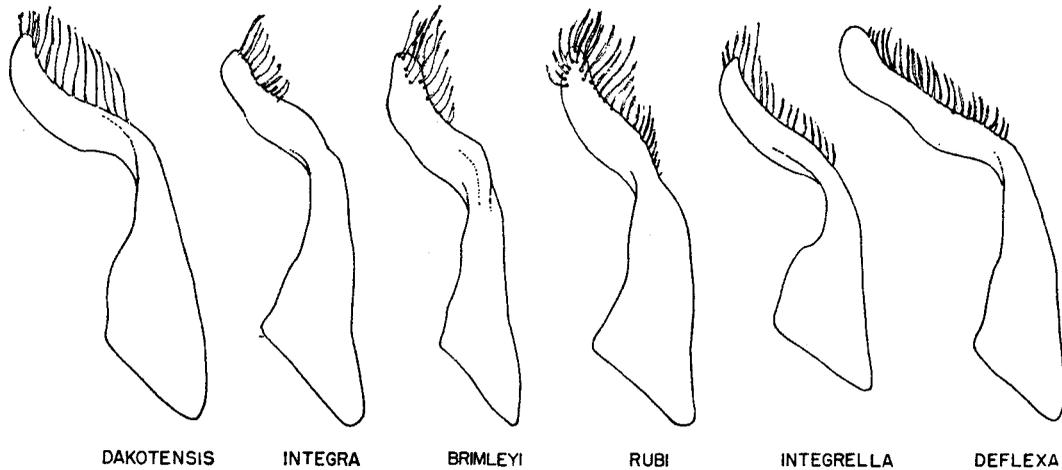


Figure 49—Lateral view of gonocoxites in males of *Megachile* (*Xeromegachile*).

black hairs, becoming whitish along anterior margin, scutellum with a few rather short, inconspicuous, black hairs interspersed among the more elongate, white hairs; scutum somewhat shining, punctures deep and distinct, quite coarse, somewhat separated medially but becoming densely crowded laterally, scutellum with a rather sparsely punctate and shining median line, punctures deep, distinct and close on each side, those on axillae very fine and densely crowded; pleura dull and rather coarsely punctate below, becoming finer and densely crowded above; lateral faces of propodeum smooth but rather dull, posterior face more velvety, with close but exceedingly minute and vague punctures; mid and hind basitarsi slightly shorter but about as broad as their tibiae, front basitarsi considerably narrower; tegulae shining, punctures very fine but slightly separated; wings subhyaline, veins brownish-piceous; abdominal terga 2-4 shallowly grooved across base, basal margin of grooves distinct but not carinate, apical margins of terga depressed laterally but not medially; terga 2-5 with entire, whitish, apical fasciae, these very narrow on 2 and 3, basal tergum with rather copious, elongate, whitish pubescence, discal pubescence of following terga shorter but copious, entirely fuscous except across base of 2; punctures of terga very fine and slightly separated medially, becoming somewhat closer laterally on the more basal terga, somewhat deeper and more distinct, rather widely separated but not sparse on 3-5; sternum 6 very slightly convex in profile, almost straight, with no erect hairs visible, but with erect dark hairs visible toward base in dorsal view, rather densely covered with pale appressed tomentum apically, this part evenly sloping on each side

of an obscure, median ridge; sternum 6 rather well covered with short, black scopal hairs, with a short, apical fringe of very short, fuscous hairs; scopa white, with some black hairs on sternum 5 laterally, the more basal sterna very finely and densely punctate, becoming somewhat more sparsely and coarsely so on the more apical sterna, apical margins narrowly hyaline; sternal fasciae not evident.

MALE — Length 10-11 mm.; black, tegulae somewhat more brownish-testaceous, front tarsi yellow, mid and hind legs black, spurs pale yellow; eyes very slightly convergent below; clypeal margin straight and entire beneath dense pubescence; mandibles 3-dentate (fig. 47), inferior process somewhat removed from base, rather slender and acute; apical segment of flagellum flattened and considerably dilated; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width, narrowed below, obscurely angulate just below base of mandible; vertex shining, punctures deep and distinct, rather close and fine between ocelli but rather widely separated laterally, close and rather coarse on cheeks above, becoming very fine and densely crowded below; face below ocelli with a few scattered, distinct punctures, becoming densely rugose laterally, very finely so below; pubescence yellowish-white, copious and elongate around antennae and over lower part of face, rather thin and whitish on cheeks above, becoming more elongate below, vertex with elongate and erect, whitish hairs, with a few short, black hairs evident on each side; thorax with rather copious, elongate, whitish pubescence laterally and posteriorly and over anterior half of scutum, posterior half of scutum with a rather

conspicuous patch of elongate, fuscous hairs, scutellum and axillae with entirely whitish hairs; scutum somewhat shining between coarse and very close punctures medially, becoming dull, with densely crowded punctures elsewhere, punctures slightly separated on scutellum medially but becoming close and rather coarse laterally, very fine and densely crowded on axillae, pleura rather dull, punctures very close throughout; lateral faces of propodeum smooth but rather dull, posterior face somewhat velvety, with exceedingly minute, close and rather vague punctures; front tarsi and apex of front tibiae yellow, the basitarsus somewhat excavated anteriorly, but slightly narrower than the tibiae, posterior fringe white, quite dense and rather elongate; front tibia fuscous on outer face except at base, the other two faces more reddish-testaceous; posterior face of front femora piceous, the carinate lower rim yellow, upper and anterior faces more testaceous; front coxal spines well developed but rather short and narrow, narrowly rounded at apex, anterior surface of coxae somewhat shining and minutely punctate, but with an obscure patch of very short, pale bristles at base of spine; mid tibial spur well developed, mid basitarsi short and rather slender, with a posterior fringe of very much elongated, white hairs; hind basitarsi quite short and narrow; tegulae very minutely and rather closely punctate; wings subhyaline, faintly clouded apically, veins brownish to piceous; abdominal terga 2 and 3 rather deeply depressed across base, basal margins distinct but not carinate, 4 and 5 very slightly depressed, but basal margin quite distinct, apical margins of the more basal terga slightly depressed laterally, depressed

across entire width on 4 and 5, terga densely white fasciate apically, rather thinly so medially on 2 and 3, basal tergum with copious, elongate, whitish pubescence, 2 with shorter, largely white pubescence, 3-5 with erect but rather short blackish pubescence, 5 with some pale tomentum across the base; punctures minute and obscure on basal tergum, fine but quite distinct and slightly separated on the following terga, 6 pale tomentose toward base, punctures fine, rather close medially but becoming somewhat more sparse laterally, carina subtriangular in outline, sometimes obscurely crenulate on each side, but entire medially, the tip narrowly rounded or subacute, median teeth of apical margin broadly carinate, considerably nearer the obscure, lateral angles than to each other; sternum 7 produced medially to an acute, spine-like process; sterna 1-4 exposed, very finely punctate, punctures rather sparse toward apical margin of each plate, closer basally, apical margins narrowly yellowish-hyaline, thinly long pubescent; lateral pubescent plates of sternum 5 rather poorly defined, setose area broad but not entirely filling median length of plate, setae fine, uniformly distributed, but those along basal margin long and dilated apically (fig. 48); sternum 6 with quite extensive setose areas, only slightly separated medially, setae sinuate, apical lobe broad and very short, lateral angles acute; gonocoxites narrowed above base, apical half dilated and slightly sinuate (fig. 49).

DISTRIBUTION — North Carolina to Florida, March to June.

FLOWER RECORDS — *Crataegus*, *Cuscuta*, *Ilex*, *Rubus* and *Senecio*.

Table 5—Distribution of species of *Megachile* (*Megachile*, *Litomegachile*, *Eutricharaea*, *Delomegachile*, *Megachiloides* and *Xeromegachile*) by states.

Megachile (Litomegachile)	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
brevis	X			X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X
b. pseudobrevis																					X	X			X	X	
mendica	X	X	X	X		X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X
texana		X	X	X	X	X		X	X	X		X	X	X					X	X	X	X		X	X	X	X
(Megachile)																											
centuncularis	X	X	X	X		X	X	X	X	X		X	X	X	X			X	X								
inermis	X	X	X	X			X	X				X		X								X				X	
montivaga	X	X	X	X		X		X	X	X		X	X	X	X			X				X					
navalis	X																										
relativa	X	X	X	X		X	X	X				X	X	X	X						X	X				X	
(Eutricharaea)																											
apicalis													X					X									
concinna										X				X						X	X	X			X	X	X
rotundata			X					X	X									X	X								
(Delomegachile)																											
addenda		X	X				X	X	X		X	X	X					X			X				X	X	
frigida	X	X	X	X		X	X					X	X														
f. appalachensis												X										X				X	
gemula	X	X	X	X		X	X	X	X	X		X	X	X			X		X	X	X	X			X		
g. fulvogemula																						X					
ingenua								X	X					X								X			X	X	
melanophoea	X	X	X	X		X	X					X	X												X		
m. submelanophoe	X						X																				
mucida																					X	X			X		
(Megachiloides)																											
oenotherae												X										X			X		
(Xeromegachile)																											
brimleyi																						X			X	X	
dakotensis								X																			
deflexa																						X			X	X	
integra								X	X			X	X		X				X		X	X			X	X	
integrella																					X				X		
rubi																					X			X	X		

Megachile (Phaenosarus) fortis

Cresson

(Figs. 46, 50 & 51)

Megachile fortis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 262. ♂.*Megachile emoryi* Cockerell, 1904. Entomologist 37, p. 7. ♀.*Megachile fortis* var. *vestali* Cockerell, 1913. Ann. Mag. Nat. Hist. (8) 11, p. 530. ♂.*Megachile (Phaenosarus) fortis* Mitchell, 1936. Amer. Ent. Soc. Trans. 62, p. 143.

FEMALE—Length 16-18 mm.; entirely black, including tegulae and legs, spurs brownish-testaceous; eyes parallel, clypeal margin straight, with a few minute irregularities; mandibles 5-dentate as shown, (fig. 51); lateral ocelli considerably nearer eyes than to margin of vertex; cheeks subequal to eyes in width; vertex and cheeks very finely and closely punctate throughout, and face below ocelli rather finely and closely punctate, the supra-clypeal area more densely rugose, clypeus finely and densely punctate along upper margin, but punctures becoming more coarse, deep and distinct and at least slightly separated toward apical margin; pubescence of head and thorax entirely pale, rather short and quite dense, pale yellowish around antennae and sides of face, more whitish on cheeks below, becoming thin and more yellowish above, that on vertex rather short but erect, quite copious, largely pale yellow; pleura and posterior face of propodeum with quite dense, rather short, pale yellowish pubescence, that on dorsum of thorax somewhat brighter yellow, rather short but copious, partially decumbent on scutum; thorax very dull, uniformly very densely and finely rugosopunctate, propodeum somewhat more shining laterally, posterior face dull, with minute, shallow, close and vague punctures; basitarsi only slightly shorter than their respective tibiae, mid and hind pair nearly as broad as their tibiae, tegulae somewhat shining, but with exceedingly minute and very close punctures; wings subhyaline, very faintly clouded apically, veins piceous; abdominal terga 2 and 3 quite deeply grooved across base, basal margin of groove quite distinctly carinate, 4 shallowly depressed across base but hardly grooved, apical margins of all terga somewhat depressed, yellowish-hyaline, densely fringed with short, yellowish pubescence forming conspicuous, transverse and entire fasciae; discal pubescence of tergum 1 copious, elongate pale yellow, that on 2 somewhat shorter, and very short and less conspicuous on 3-5; punctures very fine and quite densely crowded, uniform on the more basal terga, becoming slightly coarser toward apical margin of 5, this hardly at all depressed across base and without a definite, basal, carina-like margin; tergum 6

nearly straight in profile, with only a very few, short, erect hairs toward the base visible, punctures across base in dorsal view very fine, densely crowded but rather distinct, becoming indistinct apically, apical half covered with yellowish, appressed hairs which obscure the surface; sternum 6 rather uniformly covered with pale, rather short, scopal hairs, apical margin with a rather prominent, thickened margin, beyond which there is a dense fringe of very short, yellowish hairs, scopa otherwise pale yellow; sternal plates closely punctate, sternal fasciae not evident.

MALE—Length 14-15 mm.; black, tegulae somewhat more brownish-piceous, mid and hind legs black, anterior tarsi yellow, and front tibiae and femora in part pale in color; eyes parallel; clypeal margin nearly straight beneath a dense beard; mandibles 3-dentate (fig. 51), inferior process extremely broad, terminating below at an acute angle near base, but separated from apical part by a very broadly rounded emarginate area, lower margin less oblique; apical segment of flagellum very broadly dilated; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks very slightly broader than eyes, obscurely angulate and slightly excavated, below, this area fringed with dense, yellowish, rather short hairs; vertex and cheeks quite uniformly, finely and densely punctate, lower portions of face in large part very finely and closely punctate beneath dense pubescence which completely hides surface; pubescence of face and vertex yellowish, dense below level of antennae, rather elongate on vertex medially, becoming shorter, more inconspicuous laterally, very thin and short on cheeks, becoming somewhat paler and more dense along inferior margin; pubescence of thorax rather dense, not very elongate, pale yellowish on pleura and propodeum, somewhat deeper yellow and rather short and erect but not hiding surface on dorsum of thorax; scutum and scutellum dull, with very fine, densely crowded punctures, those on pleura minute and densely crowded; lateral faces of propodeum somewhat more shining, obscurely punctate, posterior face somewhat less shining, with close but rather vague and indistinct punctures; anterior coxal spines robust, rather acutely pointed apically, broad at base, with a large transverse patch of suberect, ferruginous bristles at base, coxae otherwise largely bare; front tarsi pale yellow, rather broadly dilated, about equal to the tibiae, but anterior margin only very obscurely excavated, posterior fringe dense, about equal in length to breadth of the segments, whitish toward apical segments, more brownish-testaceous at base; outer face of front tibiae piceous, with tip yellowish, other two faces more

ferruginous, and posterior face of front femora piceous, with lower margin carinate and testaceous, other faces largely testaceous, densely fringed posteriorly with yellowish hairs which are elongate toward base; mid tibial spurs well developed; basitarsi slightly narrower, considerably shorter than their tibiae, with a much elongated, yellowish, posterior fringe, hind femora somewhat swollen, hind basitarsi about half the length of their tibiae; tegulae very minutely and closely punctate, anterior part quite densely pubescent; terga 2 and 3 quite deeply depressed at base, 4 and 5 more shallowly so, basal margin of depressions distinct, more or less carinate, apical margins of terga uniformly, rather deeply depressed, very deeply so on 4 and 5, the discs overhanging the depressed rims, with dense, entire, yellowish, apical fasciae on all, basal tergum with copious, elongate, yellowish pubescence, apical fringe rather obscure, discal pubescence of the following terga erect, conspicuous, entirely pale, but not obscuring the fasciae; tergum 5 more or less bare apically, punctures very fine and close throughout, minute on the more basal terga, becoming somewhat more irregular and substriate on 5 apically, 6 rather densely tomentose, very closely and finely punctate beneath the pubescence, with a slight median ridge, and slightly depressed on each side, the carina slightly downcurved and truncate, with no median emargination, median apical teeth broadly carinate, much nearer the very small lateral angles than to each other; tergum 7 obscurely angulate medially; sterna 1-4 exposed, very finely, uniformly and closely punctate, apical margins depressed, yellowish-hyaline, quite densely fasciate, the fasciate fringes much broader laterally, sternum 4 not conspicuously fringed but with a quite distinct, median, carinate and acute tubercle; sternum 5 with lateral, apical pubescent plates distinct from the lateral and basal sclerotized areas and the median setose area, this broad apically, narrowed basally, separated from basal margin of plate by a membranous area, setae robust, abruptly dilated at tips (fig. 46); sternum 6 with broad, more or less oblique setose areas that are well separated medially, lateral portions of plate long pubescent, apical lobe short, but lateral angles produced into long, slender projections; gonocoxites robust, narrowed above base, slightly sinuate, flexed ventrally near apex which is dilated, compressed, bearing long conspicuous setae (fig. 50).

DISTRIBUTION—South Dakota to New Mexico, east to Texas and Illinois, July and August. The occurrence of *fortis* in Illinois was shown by the collection of two specimens on August 20, 1957, a male at Bishop-

ville, Mason Co., and a female at Mason State Forest, on *Helianthus* (Mitchell).

FLOWER RECORDS — *Dicrophyllum*, *Helianthus*, *Silphium*, *Solidago* and *Vernonia*.

***Megachile (Xanthosarus) latimanus*
Say**

(Figs. 42, 46, 50 & 51)

- Megachile latimanus* Say, 1823. West. Quart. Rptr. 2, p. 81. ♂.
Megachile femorata Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 188. ♂.
Megachile acuta Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 192. ♀.
Megachile vidua Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 192. ♀.
Xanthosarus latimanus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Xanthosarus) latimanus Mitchell, 1936. Amer. Ent. Soc. Trans. 62, p. 130.
Megachile (Xanthosarus) latimanus Krombein, 1958. Hymenoptera of America North of Mexico. Synoptic Catalog. U.S.D.A. Agri. Monog. No. 2. First Suppl., p. 245. (synonymy)

FEMALE—Length 13-14 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes parallel; clypeal margin straight, minutely and rather sparsely denticulate; mandibles 5-dentate (fig. 51); lateral ocelli slightly nearer margin of vertex than to eyes; cheeks slightly broader than eyes; punctures of vertex deep and distinct, rather fine, close medially, becoming very slightly separated laterally, minute, close and obscure on cheeks; face below ocelli densely rugoso-punctate, becoming somewhat smoother or very minutely rugose laterally beneath the pubescence, supra-clypeal area shining, with scattered, rather fine but deep and distinct punctures, clypeus with rather deep, distinct and fine, closely crowded punctures throughout; pubescence around antennae and on face below pale yellowish, quite copious but not very long, somewhat longer and thinner, entirely yellowish on cheeks below, becoming shorter above, entirely yellowish, quite dense and copious on thorax laterally and posteriorly, vertex and scutum with considerable, somewhat shorter but erect and conspicuous, black pubescence; scutum and scutellum very finely, closely and quite deeply punctate throughout; pleura rather dull beneath the pubescence, very finely and densely punctate, propodeum somewhat more shining and smooth, posterior face with minute, rather close, vague punctures; mid and hind basitarsi nearly as broad as their tibiae, hind basitarsi nearly equal to their tibiae in length;

tegulae rather dull, minutely and very closely punctate; wings subhyaline, faintly clouded apically, veins brownish-testaceous; abdominal terga 2-4 shallowly depressed across base, basal margin of depressions distinct but hardly carinate, apical margins of terga rather narrowly depressed, yellowish fasciate; discal pubescence of terga 1 and 2 long, erect and quite copious, entirely pale yellowish, short and yellowish toward base, black apically on 3 and 4, and black over most of 5, punctures of terga very minute but rather close, becoming very close at extreme sides; tergum 6 very slightly concave in profile, with only a few inconspicuous, suberect hairs visible, the more apical pubescence yellowish, subappressed and rather dense, punctures very fine and densely crowded throughout; sternum 6 rather well covered with yellowish scopal hairs, but these becoming somewhat sparse apically, with a dense fringe of short hairs apically; scopa otherwise orange in color, the more basal sterna very finely and densely punctate, punctures becoming slightly more widely separated and coarse on the more apical sterna, apical margins very narrowly yellowish-hyaline, sternal fasciae entirely absent.

MALE—Length 12-13 mm.; black, tegulae brownish-testaceous, mid and hind legs black, front legs in large part yellowish or testaceous; eyes very slightly convergent below; clypeal margin very slightly incurved on each side; mandibles 3-dentate, outer margin curved as seen from above (fig. 51), inferior basal process quite narrow and elongate, apex obliquely acute, densely pubescent on inner surface; apical segment of flagellum elongate and slightly dilated, rather strongly flattened; lateral ocelli subequally distant from eyes and margin of vertex; breadth of cheeks nearly twice that of eyes, with a concave, shelf-like tubercle at inferior margin that receives tip of the basal, mandibular projection when closed; vertex very finely and closely punctate medially, punctures becoming somewhat more coarse and distinctly separated laterally, very fine and dense on cheeks; surface below ocelli finely and densely rugose, subantennal areas and clypeus very finely and densely punctate; pubescence pale yellowish, copious and elongate around antennae and lower half of face, thinner and erect on vertex, short and thin on cheeks which have a pair of lines of short white hairs along lower margin; pubescence entirely pale on thorax, more whitish on venter and on pleura below, yellow on propodeum and on pleura above, that on scutum and scutellum dense, elongate and bright yellow; scutum dull, punctures indistinct, very fine and densely crowded through, those on scutellum very minute, close but relatively dis-

ting, pleura somewhat shining beneath the pubescence, punctures very fine, shallow and close throughout, propodeum shining laterally, posterior face rather dull, with minute, indistinct, fine and close punctures; front coxal spines robust, rather slender, subacute apically, anterior face of coxa entirely bare, without patches of setae; front tarsi yellow, basitarsus quite broadly dilated at base, slightly narrowed apically, quite deeply excavated anteriorly, tarsal fringe pale yellow, very dense and elongate; front tibiae largely ferruginous, becoming yellow at tip; posterior face of femur piceous apically, but this segment otherwise largely testaceous, densely fringed posteriorly, outer hairs pale yellowish, inner hairs more orange; mid and hind femora much swollen, mid basitarsus with a much thickened, quadrate process, covering most of lower surface, hind basitarsus about half as long as broad, anterior margin evenly curved; tegulae minutely and very closely punctate; wings subhyaline basally, becoming faintly clouded apically, veins brownish-testaceous; abdominal terga 2-5 rather shallowly depressed across base, basal margin of groove distinct but hardly carinate, apical margins of terga rather abruptly depressed, at least laterally and on the more apical terga medially, margins yellowish-hyaline, fringed with pale hairs that form rather loose, indefinite fasciae; discal pubescence of all terga rather long, erect, entirely pale yellow; punctures of terga very minute and quite close, becoming somewhat more distinct on the more apical terga, 6 very finely and densely punctate, carina definite but rather low, irregularly serrate across median area, emargination very shallow or absent, median teeth of apical margin prominent and acute, considerably nearer the small, barely visible, lateral teeth than to each other; tergum 7 prominent, transverse, rather broadly triangular, apex obtusely angulate; sterna 1-4 exposed, finely and closely punctate, apical margins rather deeply depressed, yellowish-hyaline, more or less fringed with rather elongate, pale yellowish hairs; setose area of sternum 5 broad but quite short, separated from base of plate by a wide membraneous area, setae slender and simple (fig. 46); sternum 6 with expansive, setose areas on each side of mid-line, that project apically much beyond the lateral areas, setae elongate and hair-like, apical lobe short but very broad, lateral angles produced and narrowly rounded; gonocoxites robust, constricted above base, sinuate above, setose dorsally toward the apex, this bilobed, dorsal lobe broad and flat, ventral lobe slender, and curved (figs. 42 & 50).

DISTRIBUTION—Alberta to Nova Scotia, south to Kansas and Georgia, May to October. In the southeast it is limited to

the higher elevations of the Appalachians.

FLOWER RECORDS—*Agastache*, *Althea*, *Amorpha*, *Asclepias*, *Aster*, *Baptisia*, *Campanula*, *Carduus*, *Cephalanthus*, *Chamaemeron*, *Chrysopsis*, *Cirsium*, *Cleome*, *Convolvulus*, *Eupatorium*, *Gaillardia*, *Grindelia*, *Helianthus*, *Hieraceum*, *Kuhnistera*, *Liatris*, *Medicago*, *Melilotus*, *Mentzelia*, *Monarda*, *Pentstemon*, *Petalostemum*, *Phytostegia*, *Potentilla*, *Psoralea*, *Rudbeckia*, *Sanctus*, *Solidago*, *Stachys*, *Taraxacum*, *Teucrium*, *Traumeria*, *Trifolium*, *Verbena* and *Vicia*. The following additional genera are recorded by Robertson (1929): *Abutilon*, *Arabis*, *Bidens*, *Blephilia*, *Boltonia*, *Cassia*, *Coreopsis*, *Gerardia*, *Helenium*, *Hydrophyllum*, *Lactuca*, *Lepachys*, *Lespedeza*, *Polymonium*, *Pycnanthemum*, *Rosa*, *Ruellia*, *Strophostyles*, *Verbesina* and *Vernonia*.

***Megachile (Xanthosarus) perihirta*
Cockerell**

Megachile perihirta Cockerell, 1898. Ann. Mag. Nat. Hist. (7) 1, p. 126. ♂.

Megachile latimanus grindeliarum Cockerell, 1904. Ent. News 15, p. 33. ♀.

Megachile (Xanthosarus) perihirta Mitchell, 1936. Amer. Ent. Soc. Trans. 62, p. 136.

This western species is very closely related to *latimanus*, and the females of the two are so much alike as to be practically indistinguishable. The males, however, are easy to recognize, the mid basitarsal protuberance being markedly different from that of *latimanus*. It is much smaller and is narrow and keel-shaped, contrasting with the broad, blunt and robust protuberance in *latimanus*.

Any records of this species east of the Mississippi based on determinations of the female should be viewed with suspicion, and only if males are available should such records be regarded as authentic.

DISTRIBUTION—This species ranges from British Columbia to Mexico, east to Nebraska and Texas, May to October. One collection record in Michigan (1 ♂, Manistigue, Schoolcraft Co., July 1, 1922, S. Moore) indicates its rare occurrence east of the Mississippi.

FLOWER RECORDS—*Aster*, *Cirsium*, *Cleome*, *Epilobium*, *Eriogonum*, *Helianthus*, *Melilotus* and *Trifolium*.

***Megachile (Argyropile) parallela*
parallela Smith**

(Figs. 50-52 & 55)

Megachile parallela Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 191. ♂.

Megachile sexdentata Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 125. ♂.

Megachile parallela Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 337.

Megachile 6-dentata Robertson, 1929. Flowers and Insects Lancaster, Pa., Science Press. (flower records)

Megachile (Argyropile) parallela Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 48.

Megachile (Argyropile) parallela Fisher, 1951. Kans. Ent. Soc. Jour. 24, p. 49. (biology)

FEMALE — Length 13-14 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes very slightly convergent below; clypeal margin straight, with a rather narrow, slightly produced, median area which is shining and impunctate, and bears a very small but distinct, median tubercle; mandibles broad apically, 4-dentate, a long, bevelled edge between the 3rd and 4th teeth and a much shorter one between the 2nd and 3rd (fig. 51); lateral ocelli considerably nearer eyes than to margin of vertex; cheeks subequal to eyes in width; punctures deep and distinct but quite fine and close on vertex and cheeks, face below ocelli rather finely and densely punctate beneath dense pubescence, but punctures of supraclypeal area and clypeus, deep, distinct, quite close, with shining interspaces evident; pubescence white, rather short but dense below level of anterior ocellus, becoming thin on clypeus, dense and white on cheeks, becoming somewhat elongate below, and white and quite dense on thorax laterally and posteriorly, becoming somewhat yellowish just below wing bases, and entirely pale yellow or white on scutellum; vertex, and scutum black pubescent medially and posteriorly; scutum dull, punctures very fine and quite close, almost crowded laterally, but slightly separated in median area, surface tessellate; scutellum and axillae very densely and finely punctate; pleura finely and closely punctate, somewhat more coarsely so below, becoming fine and densely crowded above; propodeum smooth but rather dull, posterior face with rather close, minute and rather vague punctures; front tarsi slender; mid basitarsus quite broad apically, the anterior, apical margin narrowly produced, segments 2 and 3 very narrow at base, dilated apically, with the anterior, apical angle slender and produced; hind basitarsus very broad, about equal to its tibia, and nearly equalling it in length; tegulae somewhat shining but very minutely and closely punctate throughout;

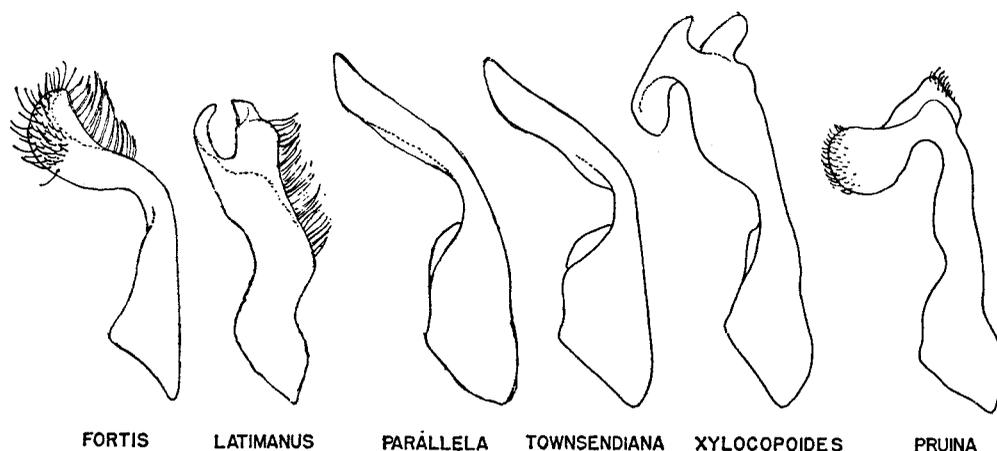


Figure 50—Lateral view of gonocoxites in males of several subgenera of *Megachile*.

wings subhyaline, faintly clouded apically, veins brownish-piceous; abdominal terga 2 and 3 quite distinctly and narrowly grooved across base, basal margin of groove distinct but not carinate; tergum 4 faintly impressed toward base, more conspicuously so on each side, but basal margin not distinct, apical margins of terga 1-5 narrowly depressed, densely pale fasciate, very narrowly so medially on the more basal terga, tergum 1 with copious, elongate, entirely pale yellowish or whitish pubescence, discal pubescence of 2 very short and dense, black laterally, becoming somewhat more elongate and pale at center, that of 3-5 entirely black, very short, and quite dense; punctures of terga fine and very close throughout, becoming densely crowded laterally on the more basal terga, somewhat deeper and more distinct apically, tergum 6 nearly straight in profile, with only a few short, suberect hairs evident, the apical, somewhat narrowed half densely pale tomentose, surface very finely and densely punctate; sternum 6 narrowly rounded at tip, with short, black, scopal hairs that become rather sparse apically, the apex with a bare, slightly upturned lip projecting slightly beyond the dense fringe of short, dark hairs; scopa white, punctures of sterna beneath the scopa slightly separated and rather fine on the more basal plates, becoming somewhat coarser apically; no sternal fasciae evident.

MALE — Length 12-13 mm.; black, tegulae somewhat more brownish, legs entirely dark; eyes very slightly convergent below; apical margin of clypeus beneath beard with a rather narrow, slightly produced area which bears a rather pronounced, median tubercle, quite similar to the female; mandibles obscurely 4-

dentate (fig. 51), inferior process very narrow, quite elongate, sub-basal; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes; punctures quite deep and distinct, but very fine and quite close on vertex and on cheeks anteriorly, becoming somewhat more widely separated along posterior margin; face below ocelli very finely and closely punctate beneath the pubescence; pubescence of head and thorax largely pale, copious and dense below ocelli and on clypeus, creamy white or snowy white, often somewhat more yellowish and less dense on vertex and cheeks, becoming more elongate and white on cheeks below, rather dense and whitish on thorax laterally and posteriorly, the scutum and scutellum with shorter and somewhat thinner, erect but quite copious, yellowish or white hairs; scutum dull, very densely tessellate, punctures minute and obscure; scutellum more definitely punctate, punctures minute and densely crowded; pleura with fine, close punctures below becoming densely crowded above; lateral faces of propodeum somewhat shining, minutely punctate, posterior face with somewhat closer and more definite but very minute punctures; front coxal spines rather small, slender, acute, densely long pubescent posteriorly, and to a considerable degree obscured by pubescence on anterior face of coxae; basitarsi of all legs quite slender and simple, anterior tarsi elongate and slender, with a rather short but dense, posterior, white fringe; mid tibial spurs rather short but well developed; tegulae minutely and very closely punctate; wings subhyaline, faintly clouded apically, veins brownish-testaceous; terga 2-5 depressed across base, basal margins distinct but not definitely carinate, apical margins of terga rather deeply depressed at least lateral-

ly, more deeply and completely on the more apical terga, densely pale fasciate, discal pubescence of terga 1 and 2 copious, long and erect, entirely yellowish or whitish, very short but erect and thin on 3-5, 4 and 5 with transverse, basal, tomentose fasciae, quite broad on 5; punctures minute and densely crowded on terga 1 and 2, becoming somewhat more distinct and coarse but still close on the following terga, slightly separated only toward apical margin of 5; tergum 6 densely tomentose across base, obscuring the surface, but evidently very minutely and closely punctate, carina rounded, margins faintly crenulate, with a rather deep semicircular, median emargination, slightly impressed medially just before the emargination, median teeth of apical margin erect, conspicuous, rather narrowly carinate, tips subtruncate, much closer to the more acute, lateral teeth than to each other; tergum 7 narrowly produced medially, tip very slightly incised; sterna 1-4 exposed, shining, very finely and closely punctate except on the more apical plates, apical margins rather narrowly yellowish-hyaline, fringed with long, pale hairs forming a rather thin apical fringe; setose area of sternum 5 indefinite, sparsely covered with fine setae (fig. 52); sternum 6 with lateral, slightly separated, sparsely setose areas, the setae flexed and dilated apically, apical lobe broad, truncate, not at all angulate; gonocoxites narrowed above base, slender, slightly sinuate and not setose (figs. 50 & 55).

DISTRIBUTION — British Columbia to Mexico, east to North Dakota, Indiana, North Carolina and Florida, June to September.

FLOWER RECORDS — *Ceanothus*, *Encelia*, *Gaillardia*, *Gilia*, *Helianthus*, *Heterotheca*, *Hypericum*, *Medicago*, *Melilotus*, *Phaseolus* and *Verbena*. Robertson (1929) records this species (as *sexdentata*) also on *Boltonia*, *Cephalanthus*, *Cirsium*, *Coreopsis*, *Heliopsis*, *Lepachys*, *Petalostemum*, *Rudbeckia*, *Silphium* and *Verbesina*.

The occurrence of one or more additional forms of *parallela* in the West makes the subspecific designation of this typical form desirable.

***Megachile (Argyropile) townsendiana*
Cockerell
(Figs. 50-52)**

Megachile townsendiana Cockerell, 1898. Ann. Mag. Nat. Hist. (7) 1, p. 129. ♂.

Megachile bishoppi Cockerell, 1915. Ann. Mag. Nat. Hist. (8) 15, p. 535. ♂.

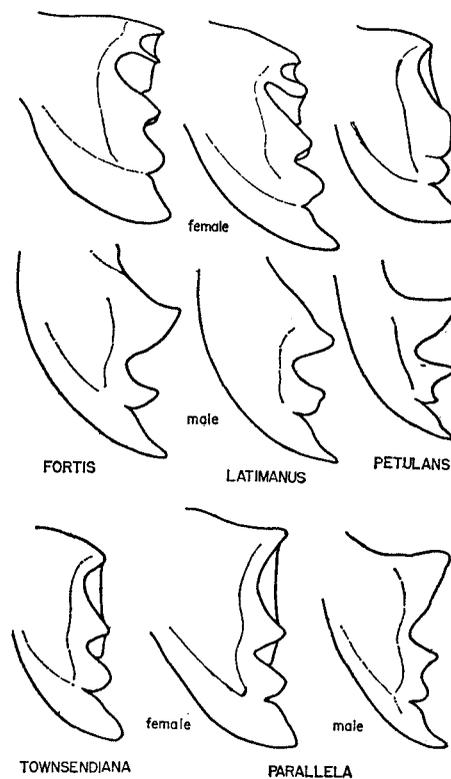


Figure 51
Mandibles in species of *Megachile* (*Argyropile*), *M. (Phaenosarus)*, *M. (Xanthosarus)* and *M. (Leptorachis)*.

Megachile (Argyropile) townsendiana Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 54.

FEMALE — Length 12 mm.; black including legs, tegulae yellowish-testaceous, spurs yellow; eyes subparallel; clypeal margin nearly straight, the narrow, median area very slightly produced, very narrowly shining and impunctate, with a minute, median tubercle; mandibles quite broad apically, 4-dentate, a long bevelled edge between 3rd and 4th teeth and a very short one between 2nd and 3rd (fig. 51); lateral ocelli slightly nearer margin of vertex than to eyes; cheeks slightly narrower than eyes; punctures of vertex and cheeks above deep and distinct, rather fine and close, becoming more shallow and obscure on cheeks below; face below ocelli quite densely rugose beneath dense pubescence, supra-clypeal area more distinctly but densely punctate; clypeus shining between rather coarse and very close punctures, these becoming somewhat finer toward apical margins; pubescence of face white, rather short but copious and dense around antennae and on sides of face, some-

what thinner on cheeks above but becoming more elongate and dense below, short, thin and somewhat more yellowish or dark on vertex; pubescence of thorax dense and white but rather short laterally and posteriorly, more elongate around wing bases, quite conspicuous across anterior margin of scutum, very short and inconspicuous, hardly evident, over posterior half, a pair of oblique, whitish, tomentose lines anteriorly, and scutello-mesothoracic suture densely white tomentose; scutum densely, tessellate, punctures rather shallow but distinct, slightly separated medially, but close laterally, scutellum somewhat more coarsely, and distinctly but very closely punctate, axillae minutely and densely punctate; punctures of pleura rather coarse and deep, close in large part, propodeum somewhat obscured by dense pubescence, posterior face with rather vague, fine and close punctures; front tarsi slender and simple; mid basitarsi broad apically, subequal to its tibia, the anterior, apical angle narrowly produced, segments 2 and 3 very slender at base, broadened apically, and anterior angle markedly produced; hind basitarsi very broad, about equal to their tibiae but somewhat shorter; tegulae minutely and very closely punctate; wings subhyaline, veins piceous; terga 2-4 narrowly grooved across base, basal margins of the grooves distinct but not carinate, apical margins of 1-5 with complete, dense, pale, apical fasciae, tergum 1 with abundant, erect, whitish pubescence, very copious at sides, discal pubescence of the following terga very short and inconspicuous, hardly visible, apparently pale in large part; punctures very fine and close on the more basal terga, becoming somewhat more distinctly but not widely separated on 4 and 5; tergum 6 quite broadly rounded apically, very slightly concave in profile, with no erect pubescence at all visible, largely covered with very fine, appressed tomentum which does not quite hide surface, very minutely and closely punctate, erect hairs evident only at extreme sides; sternum 6 rather well covered with short scopal hairs, with a sub-apical, dense fringe beyond which a bare marginal lip is somewhat flexed upward; scopa entirely white; sternal plates very closely and quite deeply punctate; no sternal fasciae in evidence.

MALE — Length 10 mm.; black, tegulae testaceous-hyaline, legs largely dark, spurs yellow; eyes slightly convergent below; clypeal margin beneath beard very slightly produced medially, this area very slightly incurved, with a minute, median denticle; mandibles obscurely 4-dentate, with a sub-basal, narrowly acute, inferior process; apical segment of flagellum quite narrow and elongate; lateral ocelli slightly nearer eyes than to margin of vertex;

cheeks subequal to eyes in width; punctures of vertex quite deep and distinct, rather fine and close, becoming somewhat more minute and inconspicuous on cheeks; face below ocelli very finely and closely punctate or subrugose beneath dense pubescence; head and thorax with entirely white pubescence, quite copious and elongate around antennae and over lower part of face and on cheeks below, becoming very thin on cheeks above and across vertex, quite copious on thorax laterally and posteriorly, thin and elongate on thorax dorsally; scutum dull and very densely tessellate, punctures minute, close and shallow, hardly evident, scutellum more distinctly but very finely and closely punctate; pleura dull beneath the pubescence, with very fine and close punctures throughout; lateral faces of propodeum somewhat shining, posterior face with minute and rather close and shallow punctures; front coxal spines quite slender and elongate, acute apically, densely pubescent posteriorly, and to a considerable degree obscured by the coxal pubescence; mid tibial spurs slender and well developed; anterior tarsi entirely simple and slender, much elongated, with a very short, posterior, white fringe, front tibiae more or less testaceous, the femora reddish-testaceous on upper and anterior faces, more fuscous posteriorly except along lower margin, rather densely fringed with white pubescence posteriorly; tegulae smooth, punctures hardly evident; wings subhyaline or faintly infuscated, veins brownish-piceous; terga 2-5 shallowly depressed across base, basal margin of the depressions distinct but hardly carinate, apical margins of terga narrowly depressed, more deeply so on the more apical terga, white fasciate, completely so on 3 and 4, fasciate only at sides on the more basal plates; tergum 1 with elongate and rather copious, pale pubescence, discal pubescence of the following terga very thin, sparse and inconspicuous, hardly evident, apparently largely pale, punctures fine and rather close basally, becoming somewhat more widely separated on 3-5; tergum 6 very densely pale tomentose across base, narrowly produced medially, this area representing the carina slightly downcurved apically, with a narrow, median emargination, median teeth of apical margin acute, well developed, considerably nearer the well developed and acute lateral teeth than to each other; tergum 7 partially exposed, rather broad, apical margin subacute; sterna 1-4 exposed rather deeply and closely punctate, apical margins abruptly depressed and yellowish-hyaline, pubescence rather elongate but thin and pale; setose area of sternum 5 poorly defined, setae very sparse, dilated apically (fig. 52); setose areas of sternum 6 rather widely separated, well defined,

setae robust, flattened and dilated apically, apical lobe poorly defined; gonocoxites narrowed above base, compressed apically, considerably shorter than penis valves (fig. 50).

DISTRIBUTION — Lower California to Arizona, Colorado and Texas, eastward to Florida, Georgia and North Carolina, May to October.

FLOWER RECORDS — *Actinella*, *Chrysopsis*, *Helianthus* and *Melanthera*.

Megachile (Leptorachis) petulans
Cresson

(Figs. 51, 52 & 55)

Megachile petulans Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 127. ♂.

Megachile mexicana Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 127. ♀ ♂.

Megachile petulans Robertson, 1929 Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile (Leptorachis) petulans Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 59.

FEMALE—Length 11-12 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes very slightly convergent below; clypeal margin about straight, with a very slight, median, raised tubercle which does not protrude beyond the margin; mandibles broad apically, obscurely 4-dentate, median teeth low and very broadly truncate, a bevelled edge between the median and inner teeth (fig. 51); lateral ocelli considerably nearer margin of vertex than to eyes; cheeks distinctly narrower than eyes, subcarinate posteriorly; punctures of vertex quite deep and distinct, rather coarse, close medially, becoming well separated or almost sparse toward eyes, very minute, close and hardly distinguishable on cheeks above, becoming somewhat more irregular and more widely spaced below; face below ocelli densely rugoso-punctate, very finely so at sides, supra-clypeal area and clypeus with a median, impunctate, polished space, becoming closely and rather finely punctate on each side; pubescence whitish, rather short but copious around antennae, sides of face and on cheeks below, intermixed with fuscous between antennae, largely black around ocelli and across vertex; pubescence of thorax rather short, but dense, entirely whitish laterally and posteriorly, scutum and scutellum with short, thin, erect, blackish pubescence, becoming pale anteriorly on scutum, the scutello-mesothoracic suture with some rather obscure, pale tomentum; punctures of scutum fine and densely crowded in large part, slightly separated in center posteriorly, median punctures of scutellum quite distinct but somewhat finer, becoming

very fine and densely crowded laterally and on axillae; pleura dull, with fine and close punctures, somewhat coarser below but becoming fine and densely crowded above; propodeum somewhat shining, very minutely and

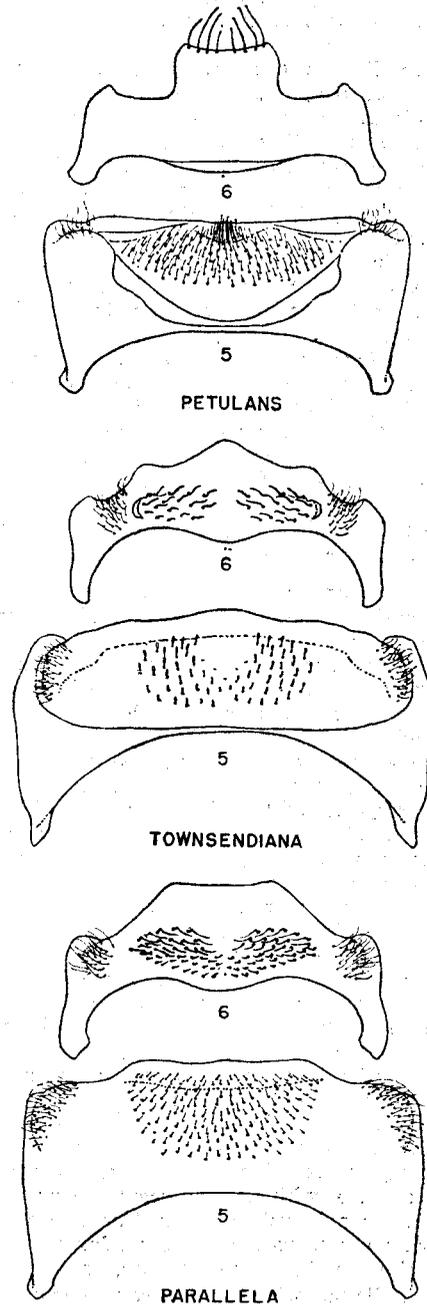


Figure 52
Sterna 5 and 6 in males of *Megachile (Argyro-*
pila) and *M. (Leptorachis)*.

obscurely punctate, punctures somewhat closer on posterior face; mid and hind basitarsi about as broad and nearly as long as their tibiae; mid tibial spur rather short but distinct; tegulae shining, with only exceedingly minute, barely visible punctures; wings sub-hyaline, veins brownish-piceous; terga 2-5 slightly depressed toward base, basal margin of the depression distinct but hardly carinate, apical margins of terga hardly depressed but very narrowly and completely whitish fasciate, tergum 1 with rather copious, erect, whitish pubescence which is quite dense at sides, discal pubescence of 2-5 very short but rather dense, entirely black; punctures of terga very fine and close throughout; tergum 6 nearly straight in profile, with abundant, erect, black hairs visible, with some very fine, appressed, pale tomentum partially obscuring surface, punctures very fine and densely crowded throughout; sternum 6 with scopal hairs across basal half but bare apically, apical margin protruding slightly but very inconspicuously beyond the dense, subapical fringe of short, dark hairs; scopa yellowish-white throughout, sternal plates very finely and densely punctate on the more basal sterna, somewhat coarser apically, apical margins yellowish-hyaline; sternal fasciae not evident.

MALE—Length 9-10 mm.; black, legs dark in general but the more apical tarsal segments becoming brownish-testaceous, spurs pale yellow, tegulae brownish-testaceous; eyes rather strongly convergent below; clypeal margin slightly produced medially, this area very shallowly incurved beneath dense pubescence; mandibles 3-dentate (fig. 51), with a rather slender and acute, basal, inferior process; apical segment of flagellum slender and elongate; lateral ocelli considerably nearer margin of vertex than to eyes; cheeks considerably narrower than eyes, subcarinate posteriorly; punctures of vertex deep and distinct, rather fine and close medially, becoming somewhat more widely separated and slightly coarser laterally, cheeks minutely and closely punctate; surface of face beneath dense pubescence below ocelli very densely and finely rugose, clypeus more distinctly, but rather closely and rather finely punctate; pubescence of face copious and elongate, pale yellow, that on vertex largely fuscous, long and erect but thinner, short and more whitish on cheeks, becoming quite elongate below; venter of thorax more whitish pubescent, pleura and propodeum pale yellowish, scutum and scutellum with erect, rather elongate, fuscous hairs intermixed with some shorter, pale hairs, the scutello-mesothoracic suture rather densely pale tomentose; scutum rather coarsely punctate, punctures slightly separated in center, becoming very close laterally and posteriorly,

those on scutellum somewhat finer, very close throughout, densely crowded on axillae; pleura closely punctate throughout, punctures somewhat more distinct and coarse below, becoming densely crowded above, propodeum somewhat shining but minutely and quite closely punctate, posterior face with more sparse, minute punctures; front coxal spines well developed, rather narrow and narrowly rounded at tip, somewhat spatulate, densely pubescent posteriorly, and coxae with thin, sparse, elongate pubescence anteriorly, without any red bristles; anterior tarsi entirely slender and simple, the more apical segments testaceous, posterior fringe very short and inconspicuous; mid tibial spur very short but distinct; tegulae minutely and quite closely punctate; wings subhyaline, veins more brownish-testaceous; abdominal terga 2-4 rather deeply depressed across base, basal margin of depression quite definitely carinate, apical margins of terga somewhat depressed laterally, that on 4 depressed across entire plate, quite deeply so laterally; punctures very fine and close on the more basal terga, becoming more coarse and distinct apically, 2 and 3 very thinly white fasciate medially, becoming dense laterally, 1 and 2 with rather copious, elongate, whitish pubescence, discal pubescence of following terga becoming blackish toward apical rims, pale at base, 4 with a rather narrow but distinct, transverse, basal fascia, apical fascia broadly interrupted medially; tergum 5 with a faint, median ridge, broadly pale tomentose over most of disc, apical margin very abruptly and deeply depressed but not fasciate, disc with some erect, black hairs apically; tergum 6 densely whitish tomentose throughout, entirely hiding surface, punctures very fine and densely crowded beneath, carina rather low, somewhat produced on each side of a rounded, median, emargination, median apical teeth very low, hardly recognizable, lateral teeth very low but quite distinct; tergum 7 very short, largely hidden; sterna 1-4 exposed, quite closely and deeply punctate, apical margins yellowish-hyaline, those of 2 and 3 very abruptly and deeply depressed, margin of disc before the rim considerably elevated, conspicuously fringed with elongate, pale hairs, hyaline rim of 4 not depressed, very broad, shallowly emarginate medially; setose area of sternum 5 very broad, rather short, setae fine, unmodified (fig. 52); sternum 6 without setose areas, being largely bare, apical lobe broad and short, subtruncate, lateral angles rounded; gonocoxities obliquely compressed medially, abruptly flexed laterally toward apex, with an inner subapical protuberance, setose on inner side apically (fig. 55).

DISTRIBUTION — North Dakota to Mexico, east to New Jersey and Florida,

May to September except in Florida where it is in flight through most of the year.

FLOWER RECORDS — *Apocynum*, *Asclepias*, *Aster*, *Bidens*, *Chamaecrista*, *Flaveria*, *Galactia*, *Helenium*, *Helianthus*, *Hydrolea*, *Hypericum*, *Hyptis*, *Ilex*, *Koellia*, *Lespedeza*, *Liatris*, *Melilotus*, *Phaseolus*, *Polygonum*, *Rhodendron*, *Rhus*, *Rubus*, *Solidago*, *Tephrosia*, *Trifolium*, *Vernonia* and *Vicia*. Robertson (1929) records this species also on *Achillea*, *Blephilia*, *Brauneria*, *Campanula*, *Cassia*, *Cephalanthus*, *Cicuta*, *Coreopsis*, *Desmodium*, *Eryngium*, *Lobelia*, *Ludvigia*, *Lycopus*, *Lythrum*, *Nepeta*, *Pastinaca*, *Psoralea*, *Rudbeckia*, *Silphium*, *Strophostyles*, *Verbena* and *Verbesina*.

Megachile (Acentron) albitarsis

Cresson

(Figs. 53-55)

- Megachile albitarsis* Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 263. ♂.
Megachile optiva Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 268. ♀.
Megachile newelli Cockerell, 1908. Ann. Mag. Nat. Hist. (8) 1, p. 262. ♀.
Megachile kallstraemiae Cockerell, 1908. Ann. Mag. Nat. Hist. (8) 1, p. 264. ♀.
Megachile (Acentron) albitarsis Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 75.
Megachile (Acentron) albitarsis Michener, 1947. Amer. Midland Nat. 38, p. 450. (flower records)

FEMALE—Length 12-13 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes subparallel; clypeal margin medially with three small but distinct tubercles; mandibles broad apically, obscurely 4-dentate, the two median teeth broadly truncate, a bevelled edge between these and the inner tooth (fig. 53); lateral ocelli slightly nearer margin of vertex than to eyes; cheeks subequal to eyes in width; punctures of vertex deep and distinct but rather fine, slightly more sparse and coarse medially and between lateral ocelli, somewhat finer and much closer on each side, more shallow and obscure on cheeks, becoming quite sparse below; face below ocelli quite densely rugose, clypeus and supraclypeal area with some evident but narrow, shining spaces medially, punctures becoming close on each side; pubescence white, rather short but quite copious below ocelli, around antennae, on cheeks and on clypeus laterally, becoming rather elongate on cheeks below, thin and short above, clypeus with more elongate and erect but thin yellowish pubescence, that between ocelli and across vertex short and black; pubescence of thorax entirely pale laterally and

posteriorly, rather short but quite dense on pleura, with dense white tufts back of tubercles and just behind wing bases, scutum and scutellum with short, erect, generally black pubescence, becoming somewhat whitish on scutum anteriorly, with a pair of narrow, slightly oblique, tomentose lines, a dense tomentose spot behind each tegulae, and a line of tomentum in the scutello-mesothoracic suture; scutum, scutellum and axillae finely and densely punctate throughout, with no shining spaces evident, punctures of pleura close, somewhat coarser below, becoming somewhat finer and densely crowded above; propodeum somewhat shining laterally, with vague obscure punctures, posterior face with rather numerous, irregular, minute punctures; hind basitarsi fully as broad and nearly as long as their tibiae; mid basitarsi fully as broad as the tibiae but definitely shorter, the apical, anterior angle somewhat produced, following segments narrow at base, broadly dilated apically, with the anterior angle somewhat prolonged; tegulae minutely and quite closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2 and 3 quite deeply grooved across base, basal margin of the grooves distinct but not carinate, 4 and 5 shallowly depressed toward base but without a definite, basal margin, apical margins of terga rather narrowly depressed, more deeply so on the more apical terga, with quite dense, entire, pale tomentose fasciae; tergum 1 with quite copious, long and erect, whitish pubescence, becoming dense at extreme sides, discs of 2-5 with very short but definitely black pubescence; tergal punctures fine and close throughout; tergum 6 straight in profile, with no erect pubescence evident, but with erect black hairs toward base visible in dorsal view, surface otherwise finely greyish tomentose,

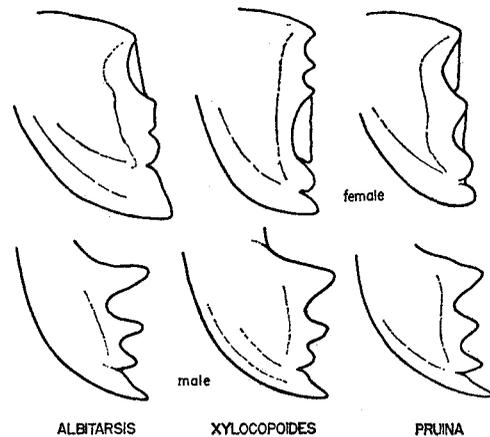


Figure 53
 Mandibles in species of *Megachile (Acentron)*.
M. (Pseudocentron), and *M. (Melanosarus)*.

punctures extremely minute and densely crowded except at extreme sides toward base; sternum 6 with a row of elongate hairs across the base, but bare from this to the subapical fringe of very short, brownish hairs, a narrow, rounded lip projecting slightly beyond this fringe; scopa white, the sterna closely and rather deeply punctate, close on the more basal sterna, becoming somewhat more widely spaced apically, apical margins of the plates narrowly hyaline; no sternal fasciae evident.

MALE—Length 11-12 mm.; black, tarsi bright yellow, tibiae more testaceous, and tegulae yellowish-hyaline; eyes slightly convergent below; clypeal margin medially with three small but distinct tubercles beneath dense pubescence; mandibles distinctly 4-dentate (fig. 53); inferior process sub-basal, robust, lower margin oblique to an acute, apical angle; apical segment of flagellum flattened and quite broadly dilated; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks subequal to eyes in width, shallowly excavated below, lower margin of the excavation produced to a robust, blunt tubercle, surface of the excavation shining and impunctate, with a dense, transverse line of long whitish pubescence just above; punctures of vertex deep and distinct, but fine and uniformly close, becoming minute and densely crowded on cheeks just back of eyes, but the more posterior punctures becoming shallow, somewhat more coarse and sparse, uniformly minute and densely crowded just above the transverse, pubescent band; face below ocelli beneath the dense pubescence quite uniformly, densely and finely rugoso-punctate; pubescence entirely pale on head and thorax, yellowish, very dense and decumbent on supraclypeal area and just below ocelli, more erect at sides of face and on clypeus, rather short, thin, and much more sparse on vertex, becoming thin and whitish on cheeks and snowy-white beneath; pubescence white on thorax beneath, becoming more yellowish on pleura above, and on propodeum posteriorly, thin, erect and yellowish on scutum and scutellum, scutum with a pair of oblique, anterior spots of yellowish tomentum, a quite dense yellowish tuft back of tegulae, and a band of yellowish tomentum in the scutello-mesothoracic suture; scutum and scutellum densely, finely, rugoso-punctate throughout, punctures of pleura very close and fine above, becoming shallow and vague on the shining and bare venter; propodeum somewhat shining but rather dull, posterior face with numerous, minute and rather vague punctures; anterior basitarsi broadly expanded, especially apically, pale yellow, anterior margin quite deeply excavated, following segments much shorter, posterior fringe pale yellow, the hairs much shorter

than total width of the segments, tipped with fuscous beneath, segment 2 with a distinct, fuscous, integumental spot beneath; front tibiae and femora largely testaceous to yellowish; front coxal spines broadly spatulate at base, acuminate apically, surface of the coxa bare and polished, without red bristles; mid basitarsus broadly dilated but rather short, posterior margin semicircular, rather densely covered with yellowish-white hairs, following segments quite short and slender; mid tibiae testaceous, lower margin produced and slightly angulate apically, tibial spur absent; each mid coxa with a short but sharply acute spine; hind basitarsus somewhat narrower and definitely shorter than the tibia, pale yellow, following segments very short and narrow; tegulae minutely and closely punctate; wings subhyaline, veins brownish-testaceous; abdominal terga 2-5 quite strongly depressed across base, basal margin of the depression distinct, obscurely carinate, apical margins of the terga narrowly depressed, more deeply so on the more apical terga, with entire, dense, pale fasciae on 2-4, 4 and 5 pale tomentose across base, broadly so on 5; tergum 1 with copious, erect, yellowish pubescence, discal pubescence of the following terga very short but quite copious, entirely yellowish, 5 with scattered, erect, yellowish hairs, fasciate apically only at extreme sides, the margin very deeply and abruptly depressed; tergum 6 very short dorsally, surface densely whitish-tomentose, obscuring the surface except at extreme base, punctures fine and irregular, mostly quite close, carina very low and inconspicuous, with a barely evident, shallow, median emargination, median and lateral teeth of apical margin very poorly developed; tergum 7 transverse, very short, largely hidden, not at all acute medially; sterna 1-4 exposed, punctures fine, quite close on 2 and 3, very minute and sparse medially on 4, becoming coarser but still rather sparse laterally, apical margins quite deeply depressed, yellowish-hyaline, subfasciate laterally; setose area of sternum 5 broadly rounded, densely covered with fine setae, with a median, apical tuft of 6-8 parallel, robust, spine-like setae (fig. 54); setose areas of sternum 6 triangular, oblique, widely separated, setae short, robust, modified, apical lobe short and narrow, not angulate; gonocoxities slender above base, dilated just before apex, tips elongate and narrow, with a small protuberance on inner side of apex, this area short setose (fig. 55).

DISTRIBUTION—Michigan and Indiana to North Carolina and Florida, west through Texas to Mexico, March to November in the more southern regions, May to September elsewhere.

FLOWER RECORDS—*Asclepias*, *Bidens*, *Cassia*, *Cephalanthus*, *Chrysopsis*, *Coreopsis*, *Eryngium*, *Flaveria*, *Gaillardia*, *Galactia*, *Helenium*, *Ilex*, *Liatris*, *Melilotus*, *Phaseolus*, *Pycnanthemum*, *Rhus*, *Rudbeckia*, *Solidago*, *Stokesia* and *Verbena*. Michener (1947) records this species on *Aster*, *Cyrilla*, *Helianthus* and *Ipomoea*.

***Megachile (Pseudocentron) pruina*
pruina Smith**

(Figs. 50 & 53-55)

Megachile pruina Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 190. ♀.

Megachile pinguis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 126. ♂.

Megachile floridana Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 125. ♂.

Megachile pruina Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 337.

Megachile shermani Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 163. ♂.

Megachile pruina var. *bermudensis* Mitchell, 1929. Psyche 36, p. 92. ♀.

Megachile (Pseudocentron) pruina Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 65.

FEMALE—Length 12-13 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes very slightly convergent below; clypeal margin straight; mandibles quite broad apically, 4-dentate, with bevelled edges between 2nd, 3rd and 4th teeth (fig. 53); lateral ocelli very slightly near margin of vertex than to eyes; cheeks subequal to eyes in width; vertex somewhat shining, punctures quite deep and distinct, rather coarse along margin, and between and behind ocelli, becoming somewhat finer and more sparse between eyes and ocelli, close on cheeks, becoming almost rugose below; face below anterior ocellus rather coarsely rugoso-punctate, becoming very finely and densely so laterally beneath dense pubescence, supraclypeal area with some shining spaces medially, but densely punctate laterally and above, clypeus with a somewhat more lightly punctured median line, closely and densely punctate on each side; pubescence white, quite dense and elongate around antennae and along inner orbits, rather sparse, suberect and largely pale on clypeus, a few black hairs intermixed with the white between antennae, largely black on vertex, rather short and pale on cheeks above, becoming somewhat more elongate below; thorax white pubescent laterally and posteriorly, scutum and scutellum with rather short but erect, rather conspicuous, black pubescence, scutum narrowly pale pubescent anteriorly, and scutello-meso-thoracic suture with a very narrow line of pale tomentum; scutum and scutellum some-

what shining, punctures rather deep and distinct, fine over most of scutum, slightly separated over the broad, median area, slightly more coarse and sparse medially on scutellum, but becoming much closer laterally, axillae with fine and close punctures; pleura rather

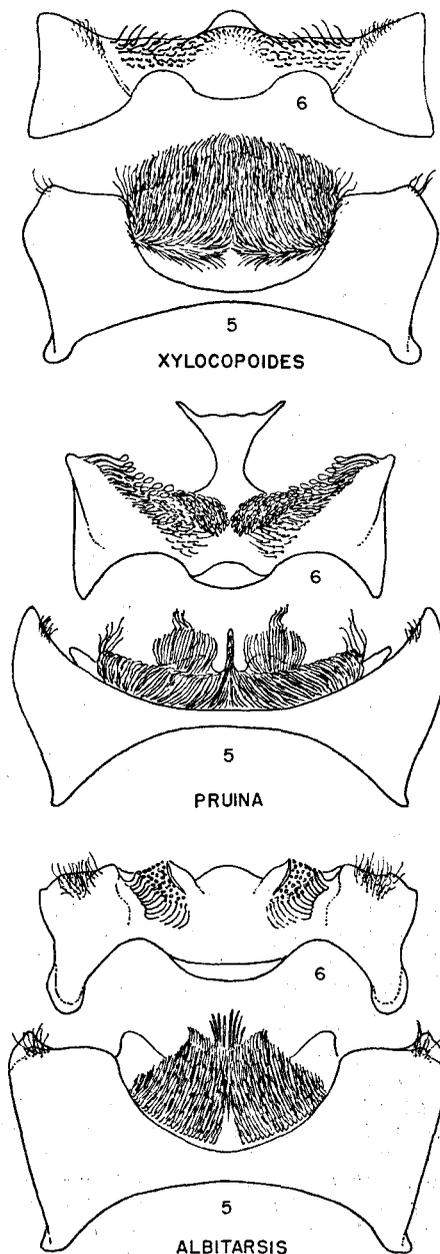


Figure 54
Sterna 5 and 6 in males of *Megachile (Acen-*
tron), *M. (Pseudocentron)*, and *M.*
(Melanosarus).

dull, punctures rather coarse and contiguous below, becoming finer and densely crowded above; propodeum rather smooth, only obscurely and shallowly punctate laterally, posterior face with rather close, shallow and minute punctures; basitarsi slightly narrower and considerably shorter than their respective tibiae, mid basitarsus with conspicuous, fuscous pubescence on outer face; tegulae minutely and closely punctate; wings subhyaline, becoming somewhat clouded apically, veins brownish-piceous; abdominal terga 2 and 3 with transverse, complete but rather shallow, sub-basal grooves, basal margins of these grooves distinct but hardly carinate, terga 4 and 5 shallowly depressed toward base, but basal margin indistinct; apical margins of terga narrowly depressed only toward sides, narrowly but quite densely white fasciate; basal tergum with rather copious, elongate, entirely pale pubescence, discal pubescence of following terga more or less erect, short, completely black; punctures of terga rather fine and close, uniformly minute and close on tergum 2, becoming slightly coarser and somewhat more definitely separated apically, tergum 6 straight in profile, with a few sub-erect, black hairs evident, these becoming erect and more conspicuous at sides in dorsal view, surface largely covered with appressed, pale tomentum which obscures surface, the minute and densely crowded punctures evident only toward sides; sternum 6 largely bare except for a basal fringe of scopal hairs, apical margin slightly produced beyond the subapical fringe of short, dark setae; scopa otherwise white, with a few black hairs at extreme sides of sterna 4 and 5, and across base of 6; sternal plates quite closely, rather finely punctate, apical margins narrowly yellowish-hyaline, sternal fasciae not present.

MALE—Length 11-12 mm.; black, the front legs and mid and hind tarsi in considerable part yellow, tegulae black with brownish and yellowish blotches, tibial spurs yellow; eyes very slightly convergent below; median portion of clypeal margin very slightly produced; mandibles 4-dentate, with a rather dense tuft of short, whitish hairs on outer side as seen from above (fig. 53), inferior process basal in position, subacute apically, lower margin of mandible with a submedian, distinct, apically directed angle; apical segment of flagellum slender and elongate; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, lower margin slightly excavated and angulate, rather finely but copiously pale pubescent; vertex shining, punctures quite deep and distinct, rather close and coarse medially, becoming somewhat more fine and sparse laterally, rather close but shallow and obscure on cheeks, becoming very

fine and densely crowded below; surface below ocelli and on clypeus rather finely rugoso-punctate; pubescence yellowish-white, copious and rather dense on face around and below antennae, thin and whitish on cheeks medially, more yellowish or fuscous, thin and erect on vertex; pubescence rather thin but somewhat copious and elongate on thorax laterally and posteriorly, scutum with largely erect, short, fuscous hairs, these more or less whitish anteriorly, scutellum with a few, erect, fuscous hairs in the generally pale pubescence, the scutellum-mesothoracic suture very obscurely pale tomentose, and a small, white tuft just back of each tegula; scutum and scutellum rather uniformly, closely, deeply and rather finely punctate, punctures somewhat more distinct medially, slightly finer on scutellum medially, but becoming slightly coarser on axillae; pleura rather dull beneath the pubescence, punctures rather coarse but very close, propodeum somewhat more shining, punctures shallow and vague but rather numerous, posterior face somewhat more shining, punctures numerous but minute and rather obscure; front coxal spines long and erect, narrowly spatulate, with rounded tips, coxal surfaces rather smooth and bare anterior to the spine, without red bristles, becoming rather densely white pubescent laterally; front tarsi entirely yellow, basitarsus somewhat excavated anteriorly, gradually dilated to the broad tip, base slightly narrower than its tibia, following segments successively shorter and narrower, posterior fringe rather broad, white tipped with brownish beneath; front tibia piceous except for the narrow, yellowish apex, inner and anterior surfaces more testaceous; apical portion of posterior face of front femora piceous with a broadly impunctate, bright yellow, ventral rim, carinate dorsally, upper surface otherwise bright yellow or testaceous, anterior surface largely testaceous; lower apical angle of mid tibia prolonged to form a spur-like projection, spur entirely lacking; mid and hind tarsi yellow anteriorly, posterior margin narrowly fuscous, mid tarsi with a thin posterior fringe of elongate, pale hairs, hind tarsi with an anterior fringe of elongate hairs; tegulae minutely but very closely and distinctly punctate; wings rather lightly infuscated, veins brownish to piceous; abdominal terga 2-5 shallowly depressed across base, basal margins of these depressions quite distinct, more or less carinate, apical margins of the terga conspicuously depressed laterally; basal tergum with rather copious, erect, elongate, entirely pale pubescence, 2-4 with short, black, erect, discal pubescence, that on 5 blackish toward base but becoming pale toward apical margin; punctures fine and quite close on the more basal terga, becoming somewhat more distinct and more widely separated on 3 and

4, rather coarse and irregular on 5; tergum 6 vertical, surface above carina very finely and densely rugose, with scattered, fine and irregular nodules, the carina rather low but distinct, with a rather narrow, rounded, median emargination, median teeth of apical margin evident only as low carinae which are considerably nearer the very small but acute lateral teeth than to each other; tergum 7 transverse, largely hidden, very slightly angulate medially; sterna 1-4 exposed, punctures very fine and rather close on the more basal segments, becoming somewhat more sparse apically, apical margins rather broadly depressed, abruptly hyaline except on 4; setose area of sternum 5 restricted in area, its apical margin with an abrupt emargination in which is located an elongate, tapering, acute median lobe, a rather elongate, wing-like lobe on each side, setae very fine, those along apical margin elongate, especially on each side where they are curved and abruptly flexed apically (fig. 54); setose area of sternum 6 more restricted in area, forming a somewhat oblique, transverse line, slightly separated medially, the more lateral setae robust, very long and directed medially, apical lobe elongate, very narrow basally, broadened apically, lateral angles narrowly produced and acute; gonocoxites of genital armature gradually narrowed from base to near the tip, bilobate apically, dorsal lobe flexed inwardly, its oblique, apical margin shallowly excavated, ventral lobe extremely robust, more or less rounded, with its ventral surface deeply excavated (figs. 50 and 55).

DISTRIBUTION—North Carolina to Florida and Texas, March to October in Florida, June to September elsewhere.

FLOWER RECORDS—*Asclepias*, *Crotalaria*, *Cuscuta*, *Gaillardia*, *Helianthus*, *Ocimum*, *Rhus* and *Strophostyles*. Graenicher (1930?) records it on *Croton*, *Dalbergia*, *Galactia*, *Melanthera* and *Vernonia*.

The subspecific designation is used here for this typical form of *pruina* because of the occurrence of another form, *nigropinguis* Mitchell in Texas.

***Megachile (Melanosarus) bahamensis*
Mitchell**

Megachile bahamensis Mitchell, 1927. *Psyche* 34, p. 47. ♀.

Megachile (Melanosarus) floridensis Mitchell, 1934. *Amer. Ent. Soc. Trans.* 59, p. 349. ♂ ♀.

Megachile (Melanosarus) floridensis Mitchell, 1937. *Amer. Ent. Soc. Trans.* 63, p. 80.

Megachile (Melanosarus) bahamensis Krombein, 1953. *Amer. Mus. Novitates* 1633, p. 21. (synonymy)

FEMALE—Length 13 mm.; entirely black, including tegulae and legs, mid and hind spurs brownish; eyes slightly convergent below; clypeal margin nearly straight; mandibles 5-dentate, a long bevelled edge between 2nd and 3rd teeth; lateral ocelli subequally distant from eyes and margin of vertex; cheeks slightly narrower than eyes; vertex shining, with scattered, very sparse, shallow and rather coarse punctures, and a few exceedingly minute, hardly visible punctures between, area between and behind lateral ocelli nearly to margin of vertex impunctate, and area between eyes and ocelli with only exceedingly minute punctures; cheeks above with rather coarse and close punctures, becoming almost rugose below; face below anterior ocellus somewhat shining, punctures rather variable and well separated but quite deep and distinct, becoming more finely rugoso-punctate laterally; supraclypeal area shining, with only a few, scattered, rather coarse punctures, clypeus shining, punctures rather coarse but slightly separated medially, becoming rather close at extreme sides; pubescence over entire head and thorax deep fuscous to black, rather dense around antennae, on sides of face and a transverse brush above anterior ocellus, quite dense and elongate on cheeks below, becoming shorter above; pubescence quite dense on thorax laterally and posteriorly, the scutum and scutellum very sparsely short pubescent; scutum and scutellum shining, punctures fine, quite sparse over the broad median area of scutum, more narrowly so on scutellum, punctures becoming rather close laterally, fine and slightly separated on axillae, those on scutellum of two rather distinct sizes; pleura dull, quite closely and rather finely punctate, lateral faces of propodeum dull, rather shallowly rugoso-punctate, posterior face very finely and closely punctate; all basitarsi subequal in breadth to their tibiae and only slightly shorter; tegulae with minute rather close and barely visible punctures; front wings quite deeply infuscated or brownish, veins brownish-piceous; basal depressions of abdominal terga barely evident, basal margin of 2 and 3 subcarinate, very finely and quite sparsely punctate medially, apical margins depressed only at extreme sides, and area just anterior to these depressions very sparsely punctate and shining, punctures rather close and deep in the depressed margin; basal tergum with rather elongate, copious, fuscous pubescence, discal pubescence of following terga very sparse, suberect, short and entirely fuscous or black; tergum 6 about straight in profile with no erect hairs visible, but with a few erect, black hairs laterally in dorsal view, punctures exceedingly minute and densely crowded throughout, more or less obscured by very short, quite dense, brownish tomen-

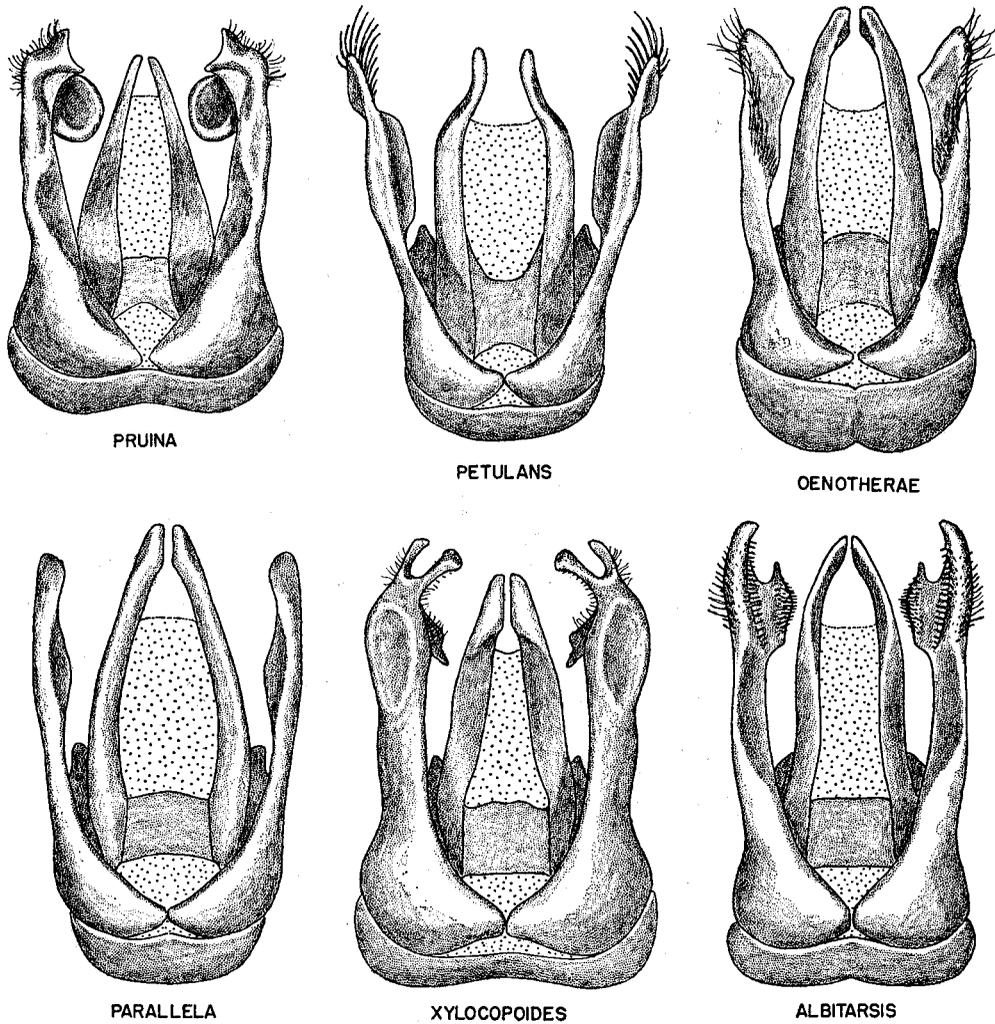


Figure 55—Genital armature in males of 6 subgenera of *Megachile*.

tum; sternum 6 with a sub-basal row of black scopal hairs, otherwise largely bare, with a short, bare, apical rim protruding slightly beyond the transverse subapical fringe of short, dark hairs; scopa entirely black, punctures very close on sterna, becoming somewhat more distinct to sternum 5, apical margins very narrowly yellowish-hyaline, and no sternal fasciae evident.

MALE—Length 11-12 mm.; black, tegulae more brownish-piceous, all tarsi yellowish, front femora and tibiae yellowish or ferruginous in part; eyes slightly convergent below; clypeal margin about straight; mandibles 4-dentate, acute tip of the ventral process submedian in position; apical segment of flagellum somewhat flattened and slightly

dilated; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly wider than eyes, much narrowed below, with a shallow, somewhat elongated excavation beneath lower end of eye, which is pale yellowish tomentose, a dense white fringe just above; vertex shining in part, but punctures back of lateral ocelli deep, distinct and very close, with an impunctate area between ocelli, punctures becoming slightly separated on each side of vertex, close and rather fine on cheeks above, becoming minute and densely crowded on cheeks below, lower half of face with fine, densely crowded punctures beneath dense pubescence; pubescence yellowish-white, rather elongate and very copious on lower part of face, short and inconspicuous on cheeks, but with a somewhat dense, posterior fringe; vertex

with short, erect, and rather thin, fuscous pubescence; thorax with rather pale pubescence beneath, becoming more or less fuscous laterally, pale yellowish on propodeum posteriorly, erect, black, short and rather copious on scutum and scutellum, scutum with some pale pubescence anteriorly, and scutello-meso-thoracic suture with some fine, pale tomentum; punctures rather deep, distinct, fine and close on scutum, crowded except in center, scutellum with a narrow, median, sparsely punctate line, closely punctured on each side, axillae with fine, slightly separated punctures above; pleura dull, punctures very close, rather coarse below, becoming fine and densely crowded above; lateral faces of propodeum somewhat smoother and only obscurely sculptured, punctures of posterior face very fine and shallow but quite close; front coxal spines rather broad at base, spatulate and narrowly triangular, with narrowly rounded tips, a few very short, pale setae on coxae at base of spine, the coxae quite densely, creamy pubescent on each side; mid tibial spurs absent; front tarsi pale yellow, very broadly expanded or dilated, segments 1 and 2 subequal in length along posterior margin, but 1 very broadly expanded apically, deeply excavated,, overlying anterior margin of 2, this somewhat less broadly expanded apically, posterior fringe rather short but dense, pale yellowish to white, tipped with fuscous beneath; front tibiae piceous to ferruginous on outer face, the other two faces testaceous, apical portion of posterior face of front femora piceous, otherwise yellowish-testaceous, base slightly produced posteriorly; mid tarsi slender and elongate; hind basitarsi relatively short, clothed with dense, yellowish pubescence beneath, this forming rather definite, anterior and posterior fringes; tegulae very minutely and closely punctate; front wings pale fuliginous or brownish, hind wings subhyaline, veins brownish-piceous; terga 2-4 rather deeply, transversely depressed across base, basal margin of depressions only inconspicuously carinate, apical margins of terga 2 and 3 quite abruptly and deeply depressed laterally, this obliterated medially, but abrupt, deep and complete on 4 and 5, fasciae not evident; basal tergum with elongate, rather copious, yellowish pubescence, becoming somewhat intermixed with fuscous at extreme sides, discs of following terga with short but dense and erect, blackish pubescence, punctures fine and close on the more basal terga, becoming somewhat more distinct on 3 and 4, uniformly close and rather fine on 5, 2 with a small, impunctate area on each side adjacent to apical groove; tergum 6 vertical, very finely and densely rugoso-punctate, with a quite deep, median excavation, the carina low, with a rounded, median, apical emargination, the two result-

ing lobes rather narrowly rounded, apical teeth not evident; tergum 7 largely covered, very narrowly truncate apically; sterna 1-4 exposed, rather closely and deeply punctate toward apical margins of each plate, becoming impunctate basally, apical margins of 2 and 3 very narrowly depressed, yellowish-hyaline, margin of 4 somewhat more broadly depressed and hyaline, more or less membranous, these sterna with loose, apical fringes of elongate, pale hairs; setose area of sternum 5 rather broadly produced apically, separated from basal part of plate by a broad, membranous area, but this considerably narrowed toward base, setae very fine and dense; setose area of 6 rather extensive, not appreciably separated medially, the more lateral and apical setae quite elongate, apical lobe rather narrowly produced and rounded, not at all angulate; gonostyli robust, rather abruptly narrowed just above base, conspicuously trilobate at apex. (as in *xylocopoides*, fig. 55)

DISTRIBUTION—Southern Florida and the Bahamas, March to October.

FLOWER RECORD—*Flaveria*.

Megachile (Melanosarus) xylocopoides
Smith

(Figs. 50 & 53-55)

Megachile xylocopoides Smith, 1853. Cat. Hym.

Brit. Mus. 1, p. 189. ♀ ♂.

Megachile xylocopoides Graenicher, 1930. Ent.

Soc. Amer. Ann. 23, p. 162. (flower records)

Megachile (Melanosarus) xylocopoides Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 80.

FEMALE—Length 14-15 mm.; entirely black, including tegulae and legs, mid and hind spurs brownish-testaceous; eyes very slightly convergent below; clypeal margin broadly and very slightly incurved; mandibles 5-dentate, a long bevelled edge between 2nd and 3rd teeth (fig. 53); lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes; vertex shining, rather irregularly and sparsely punctate, punctures becoming somewhat coarser toward margin, but with an impunctate area between ocelli, and punctures very minute, sparse and obscure between ocelli and eyes; cheeks becoming quite coarsely and closely punctate posteriorly and below, very finely and closely punctate toward eyes; face below anterior ocellus quite distinctly and deeply punctate, punctures well separated, becoming somewhat finer and densely crowded laterally and along inner margins to clypeus, supraclypeal area shining, with only a few, scattered, rather coarse and deep punctures, clypeus also shining, punctures quite close, deep and irregular, becoming somewhat finer toward the slightly

elevated and impunctate apical margin; pubescence of entire head and thorax black to deep fuscous, rather short, quite dense around antennae, on cheeks below, and quite copious on thorax laterally and posteriorly; scutum and scutellum somewhat shining, punctures rather fine but quite deep and distinct, sparse over most of scutum, becoming rather close anteriorly, and between notaulices and tegulae; scutellum broadly angulate, punctures sparse medially, but becoming quite close laterally, somewhat finer and closer on axillae; pleura densely and rather finely punctate; lateral faces of propodeum finely rugoso-punctate, posterior face smoother and more shining, with fine, obscure, shallow and quite irregular punctures; basitarsi of all legs nearly as broad and only slightly shorter than their respective tibiae; tegulae shining, very minutely and closely punctate; front wings deep fuliginous, hind wings somewhat less so, veins brownish-piceous; abdominal terga only slightly depressed basally, basal margins of the depressions evident only on 2 and 3, apical margins of the terga deeply depressed laterally, fasciae absent; discal pubescence very short and obscure, suberect, entirely fuscous, somewhat more copious and elongate on basal tergum laterally; punctures of terga fine but distinct, rather uniformly close across basal tergum, becoming more sparse on the more apical terga, depressed margins more deeply, closely and finely punctate; tergum 6 nearly straight in profile, with no erect hairs visible, quite densely covered with fuscous, appressed tomentum, the close and fine punctures visible only at extreme sides of base; sternum 6 bare over apical half, with a bare apical lip projecting slightly beyond the dense, subapical fringe of short, fuscous hairs; scopa entirely black, punctures of sterna rather fine and close, becoming slightly coarser to sternum 5, apical margins of plates very narrowly hyaline, sternal fasciae entirely absent.

MALE—Length 10-13 mm.; black, including tegulae and mid and hind legs in large part, front legs largely yellowish; eyes slightly convergent below; clypeal margin very slightly and broadly produced beneath the dense beard; mandibles 4-dentate (fig. 53), with a broad, sub-basal, triangular, inferior process; apical segment of flagellum somewhat flattened and dilated; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width, strongly narrowed and slightly grooved below base of mandible, posterior margin of this area carinate, a dense fringe of snow-white and rather elongate hairs just above the disc toward posterior margin; vertex shining, punctures quite deep and distinct, not very sparse, well separated in large part, but with an impunctate area between

ocelli, and largely impunctate between ocelli and eyes; cheeks quite coarsely and deeply punctate above, becoming very densely and finely tessellate below; face below ocelli beneath dense pubescence very finely and closely rugoso-punctate; pubescence of face creamy-white, dense, copious and quite elongate, rather thin and blackish on vertex, short, thin and whitish on cheeks; pleura largely fuscous pubescent; scutum with erect but rather short and thin, black pubescence, becoming rather narrowly whitish anteriorly, scutellum and posterior face of propodeum with quite elongate, erect, whitish pubescence; punctures of scutum and scutellum quite deep and distinct, rather coarse, somewhat separated medially, becoming close laterally, crowded between notaulices and tegulae, slightly separated on axillae; pleura rather finely and densely rugose; lateral faces of propodeum very finely but rather closely punctate, posterior face somewhat more shining, with minute, close, rather shallow and vague punctures; front coxal spines elongate but rather narrow, subacute apically, each coxa with a small, inconspicuous patch of rather pale setae anterior to the spine, otherwise quite closely and deeply punctate, with a dense patch of pale pubescence laterally; mid tibial spurs absent; front tarsi pale yellow, very broadly dilated, segments 1 and 2 subequal in length on posterior margin, but basitarsus broadly expanded apically, very deeply excavated, overlying segment 2 nearly to its apex, this segment more narrowly produced anteriorly, posterior fringe rather short, hairs tipped with fuscous beneath; front tibia piceous on outer face, yellowish on the other faces, front femora piceous toward apex on posterior face, lower margin conspicuously carinate, otherwise pale yellowish, with a conspicuous, yellowish-white posterior fringe, lower basal margin angulate; mid tarsi slender and very much elongated, rather dark, with brownish-fuscous pubescence and a short, posterior fringe; hind basitarsus rather short, piceous, densely brownish pubescent beneath, forming rather conspicuous anterior and posterior fringes; tegulae very minutely and closely punctate; front wings quite deeply infuscated, hind wings more nearly subhyaline, veins brownish-piceous; abdominal terga 2-5 rather deeply depressed across base, basal margins of the grooves more or less distinctly carinate, apical margins rather deeply depressed laterally on 2 and 3, depression entire on 4 and 5, very deep and abrupt laterally; punctures minute and rather close on basal tergum, minute and well separated on 2 laterally, somewhat closer medially, somewhat deeper and more distinct on 3-5, well separated on 3 becoming closer on 4 and very close on 5; tergum 1 with erect, pale pubescence medially, becoming somewhat

more fuscous laterally; discal pubescence of following terga short, erect and fuscous, apical fasciae entirely absent; tergum 6 completely vertical, very densely and finely rugoso-punctate, quite deeply depressed in center, the carina low but distinct, broadly and shallowly emarginate, the two resulting angles rather narrowly rounded, apical margin without visible teeth; tergum 7 largely hidden, very broadly and obtusely angulate; sterna 1-4 exposed, punctures rather close and fine in general, becoming rather minute and sparse toward margins of 2 and 3, rims very narrowly yellowish-hyaline on 2 and 3, somewhat broader on 4; setose area of sternum 5 rather broadly out-curved apically, separated from basal margin of the plate by a rather broad, membranous area, setae very fine and dense (fig. 54); setose areas of sternum 6 not completely separated medially, setae rather elongate and more sparse, apical lobe narrowly produced and rounded; gonocoxites robust, rather abruptly narrowed above base, apex conspicuously trilobate (figs. 50 & 55).

DISTRIBUTION—Louisiana and Florida, north to Maryland, March to November.

FLOWER RECORDS—*Bidens*, *Borrichia*, *Cephalanthus*, *Elephantopus*, *Gaillardia*, *Helianthemum*, *Helianthus*, *Ilex*, *Itea*, *Mikania*, *Oxypolis*, *Phaseolus*, *Polygonum*, *Rhus*, *Rubus*, *Rudbeckia*, *Senecio*, *Solidago*, *Trifolium*, and *Vernonia*. Graenicher (1930) records *xylocopoides* on *Poinsettia* and *Citrus*.

***Megachile (Sayapis) frugalis frugalis*
Cresson**

(Figs. 56-58 & 62)

Megachile frugalis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 266. ♂.

Megachile (Sayapis) frugalis Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 183.

FEMALE—Length 12-13 mm.; abdomen elongate and parallel-sided; black, tegulae somewhat more testaceous, legs black and spurs testaceous; eyes subparallel; clypeal margin nearly straight, very narrowly polished and impunctate, this area slightly elevated and sinuate; mandibles 4-dentate, a short bevelled edge between 2nd and 3rd teeth (fig. 56); lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width; vertex shining, punctures deep and distinct, quite close medially, becoming slightly separated laterally, rather coarse and well separated on cheeks but becoming fine and close along margins of eyes; face rugoso-punctate in large part, punctures slightly separated only below anterior ocellus, median line

and apical margin of supraclypeal area shining and sparsely punctate, clypeus very finely and densely punctate throughout; pubescence white on cheeks, somewhat elongate below, and white between antennae and eyes; clypeus with erect, conspicuous, fuscous pubescence; vertex with somewhat shorter, erect, dark hairs, and area between antennae with a mixture of light and dark hairs; thorax rather thinly whitish pubescent laterally and posteriorly, scutum with very short, erect, fuscous pubescence, becoming pale anteriorly, and scutellum with erect, elongate, fuscous hairs; punctures of scutum quite deep and distinct, slightly separated medially, becoming densely crowded laterally, scutellum rather uniformly, closely but distinctly punctate, median punctures somewhat finer, and axillae with fine, densely crowded punctures; punctures of pleura close but distinct, somewhat shining; lateral faces of propodeum shining, but with exceedingly minute, scattered, vague punctures, posterior face more tessellate, punctures fading out toward median line; basitarsi slender and elongate, definitely shorter than their tibiae; tegulae with only very minute, obscure punctures toward inner margin; wings lightly infuscated basally, becoming rather deeply so apically and in marginal cell, veins brownish to piceous; abdominal terga 2-4 quite deeply grooved across base, apical margins distinctly and rather deeply depressed, basal margin of grooves distinct but not carinate, depressed apical margins occupied by entire, white fasciae; tergum 1 with rather copious, pale pubescence, apical fascia rather poorly developed, discal pubescence of 2-4 very short and inconspicuous, apparently entirely pale, 5 with some pale pubescence basally, but with scattered, erect and rather elongate, black hairs toward apical margins; punctures of terga quite deep and distinct, slightly separated, becoming somewhat coarser on 4 and quite coarse and close on 5; tergum 6 rather strongly upturned apically, surface very densely and rather finely punctate, with numerous, rather long, erect, black hairs, without pale tomentum; sternum 6 well covered with rather short, black, scopal hairs, scopa otherwise pale yellow; the more basal sterna very closely, deeply and distinctly punctate, punctures becoming much more coarse and more distinctly separated on the more apical sterna, apical margins rather narrowly but deeply depressed and hyaline, no sternal fasciae evident.

MALE—Length 10-11 mm.; black, tegulae, and mid and hind spurs testaceous, legs otherwise black; eyes subparallel; clypeal margin nearly straight, with a very shallow, median, incurved area; mandibles 3-dentate (fig. 56), inferior process subbasal, triangularly acute;

apical segment of flagellum slender and elongate; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, somewhat narrowed below, with a slender, acute process just beneath base of mandible; vertex smooth but rather dull, punctures distinct but rather fine and shallow, slightly separated medially, becoming more widely so laterally, quite sparse between ocelli and eyes, fine and close on cheeks above, becoming somewhat coarser and more widely separated below; face rather coarsely rugosopunctate, above, becoming finely so laterally and below, clypeus with quite deep and distinct but very fine and close punctures; cheeks white pubescent, elongate below, shorter above; face with elongate, more or less erect, white pubescence, with a row of conspicuous, erect, black hairs across upper margin of clypeus, with fuscous hairs between ocelli, intermixed with white on vertex; thorax rather short, white pubescent laterally and posteriorly, dorsum also largely pale pubescent, but with rather short, intermixed dark hairs on scutum, scutellum with quite elongate and erect dark hairs; scutum rather dull, punctures quite shallow but distinct, rather uniformly, slightly separated, becoming quite close between notaulices and tegulae, uniformly slightly separated on scutellum, somewhat closer on axillae; pleura rather dull beneath the pubescence, punctures quite close and rather coarse; lateral faces of propodeum somewhat shining beneath the pubescence, obscurely punctate, posterior face dull and tessellate, punctures hardly evident; front coxal spines slender and elongate, rather densely long, white pubescent posteriorly, coxae punctate anteriorly, without distinct patches of bristles at base of spines; mid tibial spurs well developed; front tarsi slender and unmodified, entirely dark, but with a rather distinct, short, posterior, white fringe; mid and hind tarsi slender and simple; tegulae minutely and closely punctate toward inner margin; wings subhyaline basally, becoming somewhat infuscated apically, veins brownish; abdominal terga 2-5 quite deeply depressed across base, basal margins distinct, more or less carinate, apical margins of terga narrowly depressed, rather conspicuously white fasciate; basal tergum with rather copious, elongate, white pubescence, becoming dense at extreme sides, discal pubescence of 2-4 entirely pale, becoming very short on 4, 5 with some pale hairs basally, and rather elongate, erect, dark hairs toward apical margin; punctures of terga rather deep and distinct, quite close but not crowded, rather evenly distributed, becoming somewhat more irregular on 5; tergum 6 vertical, very closely and irregularly punctate but to some degree shining, with a rather deep, median, subapical pit, carina rather low, with a quite deep, semicircular

median emargination, irregularly crenulate on each side, median teeth of apical margin evident only as very broad, low carinae which are very close to the acute, quite distinct, lateral angles; tergum 7 somewhat exposed, transverse, with a median, acute but very short process; sterna 1-4 exposed, shining, punctures quite deep and distinct, rather coarse, close toward base but more sparse apically on each plate, apical margins rather broadly and deeply depressed, yellowish-hyaline, with apical fringes of thin, white pubescence; apical margin of sternum 5 with a pair of oblique processes, intervening margin slightly incurved, setae very fine and sparse (fig. 57); setose areas of sternum 6 bilobate on each side, slightly separated medially, basal lobes short, apical lobes more extensive and triangular, apical marginal lobe extensive, broadly truncate; gonocoxites slender, slightly sinuate, and compressed (figs. 58 & 62).

DISTRIBUTION — Pennsylvania and New Jersey to Florida, west to California and Mexico, April to July.

FLOWER RECORDS—*Croton*, *Erigeron*, *Eriogonum*, *Lotus*, *Opuntia* and *Tephrosia*.

Another form, *pseudofrugalis* Mitchell, occurring in the Southwest, necessitates the use of the subspecific designation for this typical form.

Megachile (Sayapis) inimica inimica
Cresson

(Figs. 56, 58 & 61)

Megachile inimica Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 267. ♀.

Megachile inimica Graenicher, 1930. Ent. Soc. Amer. Ann. 23, p. 162. (flower records)

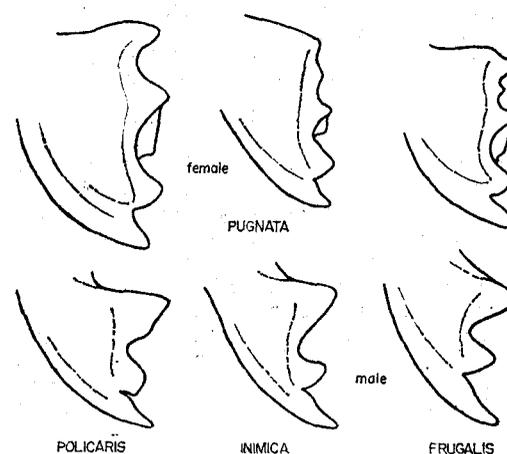


Figure 56

Mandibles in species of *Megachile (Sayapis)*.

Megachile (Sayapis) inimica Mitchell, 1937.
Amer. Ent. Soc. Trans. 63, p. 189.

FEMALE—Length 13-16 mm.; abdomen elongate and parallel-sided; black, tegulae yellowish-hyaline, legs ferruginous, spurs yellow; eyes parallel; apical margin of clypeus slightly rounded medially with a more obtuse angle on each side; mandibles 4-dentate, a quite conspicuous bevelled edge between 2nd and 3rd teeth; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks very slightly broader than eyes below, somewhat narrower above; vertex somewhat shining, punctures quite deep and distinct, slightly separated, of two rather distinct sizes, cheeks quite closely punctate somewhat more coarsely so below, becoming very fine and quite close along margin of eyes, especially above; face below ocelli quite densely rugoso-punctate, becoming more distinctly but closely punctate laterally, supra-clypeal area considerably swollen, punctures quite coarse and densely crowded, those on clypeus very close but distinct and quite coarse; pubescence white but rather short on face laterally, between antennae and on cheeks, becoming somewhat more elongate on cheeks below where there are intermixed, yellow hairs; clypeus with erect, rather conspicuous, yellowish pubescence; vertex rather sparsely beset with erect, more fuscous hairs; thorax rather thinly white pubescent laterally and posteriorly, with snow-white tufts of tomentum around tubercles; scutum with very short and obscure, erect, dark hairs, those on scutellum rather sparse and elongate; scutum densely and rather finely punctate in large part, punctures slightly separated only in center; scutellum quite flat, punctures close but irregular, rather fine and densely crowded on axillae; pleura dull, punctures rather coarse but densely crowded throughout, lateral faces of propodeum somewhat smoother but rather dull, posterior face more velvety, punctures very vague and obscure, hardly evident; front and mid basitarsi distinctly narrower and shorter than their tibiae, hind basitarsi nearly as broad and fully as long as their tibiae; tegulae shining, punctures hardly evident; wings rather deeply infuscated, veins brownish-piceous; abdominal terga 2-4 with very deep and entire, sub-basal grooves, basal margins of grooves distinct but not carinate, apical margins of terga 2-5 quite abruptly and deeply depressed, rather thinly white fasciate, the fasciae more dense and conspicuous laterally; tergum 1 with rather thin and elongate pale pubescence, discal pubescence of 2-4 very short and inconspicuous but quite copious, largely dark, that on 5 and 6 more elongate and conspicuous; punctures of terga fine but deep and distinct, close on the more basal terga, becoming somewhat more widely separated on 4

and 5 apically; apical rounded apex of tergum 6 rather sharply upturned, surface very densely and rather finely rugoso-punctate, with no pale tomentum evident; sternum 6 rather uniformly covered with very short, blackish, scopal hairs, the tip very slightly incurved or emarginate, without a definite apical fringe; scopa otherwise yellowish-white, the more basal sterna with very fine and close punctures, these becoming more coarse and distinct on the more apical sterna, apical margins rather deeply depressed and yellowish-hyaline; no sternal fasciae evident.

MALE—Length 11-14 mm.; black, tegulae yellowish-testaceous, legs ferruginous, but front tarsi and spurs yellowish; eyes subparallel; clypeal margin beneath beard nearly straight, but with a very shallow, median, incurved area; mandibles 3-dentate (fig. 56), inferior process sub-basal, rather short, subacute, lower margin and tip very densely short, pale pubescent; apical segment of flagellum slender and elongate; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks subequal to eyes in width, narrowed and very densely pubescent below, with a conspicuous, flattened protuberance just beneath base of mandible, which is densely pubescent on its lower surface; vertex somewhat shining, punctures deep and distinct, but rather fine and uniformly close, fine and close on cheeks above, becoming obscure or sub-rugose below, a narrow, transverse, impunctate line near lower margin, clothed on upper side by a narrow fringe of white hairs, with very dense and abundant, long white pubescence below; entire face and clypeus below ocelli very finely and densely rugose beneath dense pubescence; face with copious, yellowish-white, more or less erect pubescence, that on cheeks white, rather thin above, dense and elongate below, short and more or less fuscous across vertex; thorax with rather short and dense, white pubescence laterally and posteriorly, scutum with rather short, erect, fuscous pubescence, becoming whitish anteriorly, scutellum with a few dark hairs interspersed in the generally elongate, erect, whitish pubescence; dorsum of thorax rather dull, punctures finely and densely crowded throughout; pleura dull beneath the pubescence, punctures densely crowded throughout, lateral faces of propodeum somewhat smoother, with numerous, shallow and rather obscure punctures, posterior face becoming somewhat more velvety, punctures more shallow and obscure; front coxal spines slender and elongate, surface of coxae quite flat, with a small patch of robust, ferruginous bristles anterior to each spine; front tarsi yellow, basitarsus dilated and deeply excavated anteriorly, somewhat broader than their tibiae, the resulting anterior scale produced

over segment 2 but not attaining its tip, anterior and posterior margins of the segment somewhat brownish, posterior creamy-white fringe rather short but dense, more or less yellowish beneath; combined length of segments 2 and 3 about equal to basitarsus, each with a rather obscure, posterior, integumental dark spot; mid and hind basitarsi slender and elongate, much shorter than their tibiae; mid tibial spurs well developed; tegulae shining, punctures exceedingly minute but rather close; wings subhyaline basally, becoming faintly infuscated apically, veins brownish testaceous; abdominal terga 2-5 quite deeply grooved or depressed across base, basal margin of these grooves quite sharply carinate, apical margins of terga rather narrowly but abruptly depressed, with entire, dense, pale, apical fasciae; pubescence of basal tergum rather copious and elongate, entirely whitish, discal pubescence of following terga very short but quite dense, fuscous to black, some pale pubescence across base of 2, and 5 with suberect, and more elongate, fuscous hairs; punctures of terga very fine but quite deep and distinct, uniformly close on 2-4, becoming somewhat more irregular and obscure on 5; tergum 6 nearly vertical, very finely and densely rugoso-punctate, carina rather low but abrupt, broadly rounded and very shallowly emarginate medially, no pale tomentum evident, but with scattered, erect, fuscous hairs, median teeth of apical margin evident only as very low, transverse carinae which are much nearer each other than to the obscure lateral angles; tergum 7 barely evident, slightly acute medially; sterna 1-4 exposed, quite deeply and distinctly punctate, punctures rather coarse toward base of each plate, becoming more sparse apically, apical margins rather deeply depressed, yellowish-hyaline, not conspicuously fringed; setose area of sternum 5 covering most of apical half of plate, the setae sparse and simple, more robust toward base; setose areas of sternum 6 rather widely separated, obscurely bilobate, basal lobes elongate and acute laterally, with simple, long and robust setae, the apical lobes produced laterally, fringed with 2 or 3 rows of robust, flexed and dilated setae, apical marginal lobe of plate broad, truncate apically; (fig. 61) gonocoxites constricted above base, slightly dilated and obliquely compressed apically (fig. 58).

DISTRIBUTION—Florida to Texas, and south to Guatemala, February to April.

FLOWER RECORDS — *Achyranthes*, *Avicennia*, *Borrchia*, *Coccoloba*, *Laciniaria*, *Ocimum*, *Salvia*, *Vitex* and *Ximensia*. Graenicher records this species on *Bidens* and *Crotalaria*.

Megachile (Sayapis) inimica sayi Cresson

- Megachile sayi* Cresson, 1878. Amer. Ent. Soc. Trans. 4, p. 119. ♂ ♀.
Megachile heterodonta Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 6, p. 18. ♀.
Megachile sayi paludicola Cockerell, 1911. U. S. Natl. Mus. Proc. 40, p. 254. ♀.
Megachile sayi var. *sancta* Cockerell, 1912. Ann. Mag. Nat. Hist. (8) 10, p. 487. ♂.
Sayapis sayi Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Sayapis) inimica var. *sayi* Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 192.

This is the more northern form of this species which differs from the typical form chiefly in the black legs in both sexes. The pubescence, including the fasciae, is usually white in *sayi*, while in typical *inimica* there is a considerable tendency to yellowish color of pubescence. No differences of structure or sculpture that seem to be of any consequence have been found.

DISTRIBUTION—Pennsylvania to Florida, west to California and Mexico, July to September, and in Florida, to November.

FLOWER RECORDS—*Chrysopsis*, *Cleome*, *Coreopsis*, *Gilia*, *Helenium*, *Helianthus*, *Heliopsis*, *Melilotus*, *Strophostyles*, *Verbena* and *Vernonia*. Robertson (1929) records this subspecies on the following: *Arctium*, *Aster*, *Bidens*, *Blephilia*, *Brauneria*, *Cephalanthus*, *Lepachys*, *Liatris*, *Lythrum*, *Petalostemum*, *Pycnanthemum*, *Rudbeckia*, *Silphium* and *Teucrium*.

Megachile (Sayapis) pollicaris Say (Figs. 56-58)

- Megachile pollicaris* Say, 1831. Descr. New Spp. No. Amer. Ins., p. 17. ♀.
Megachile pollicaris Say, 1837. Boston Jour. Nat. Hist. 1, p. 406. ♂. (emend.)
Megachile grandis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 268. ♀.
Megachile pollicaris var. *perezima* Cockerell, 1900. Ann. Mag. Nat. Hist. (7), 6, p. 12. ♂.
Megachile vallorum Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 6, p. 18. ♀.
Sayapis pollicaris Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Sayapis) pollicaris Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 197.

FEMALE—Length 14-15 mm.; abdomen elongate and parallel-sided; black, including

tegulae and legs, mid and hind spurs more testaceous: eyes subparallel; clypeal margin

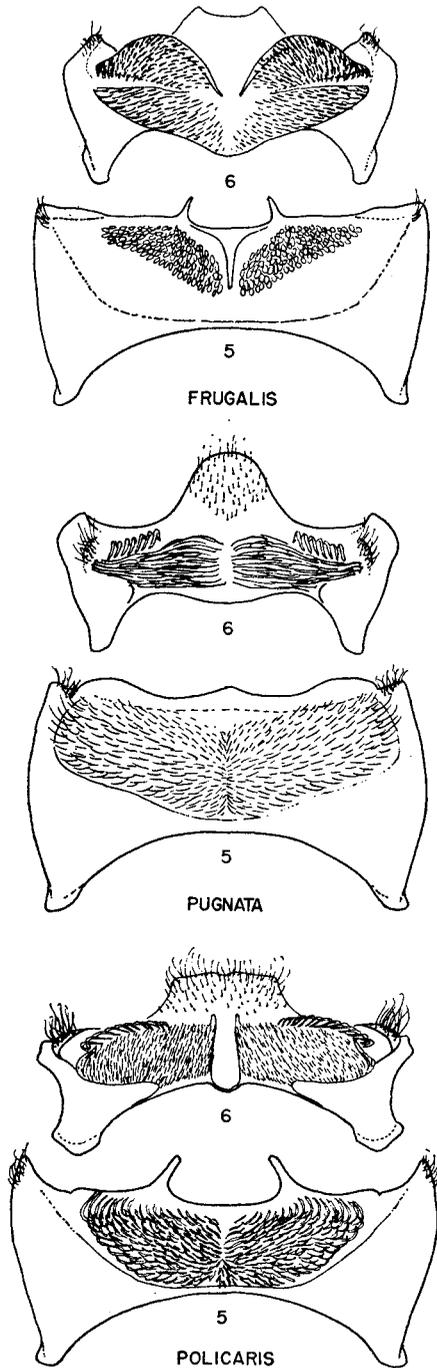


Figure 57

Sterna 5 and 6 in males of *Megachile* (*Sayapis*).

with a rather low but quite distinct tubercle on each side, the rather broad intervening space very slightly outcurved, narrowly shining and impunctate; mandibles 4-dentate, with a very low, bevelled edge between 2nd and 3rd teeth (fig. 56); lateral ocelli somewhat nearer eyes than to margin of vertex; cheeks subequal to eyes in width; vertex somewhat shining, punctures quite deep and distinct but rather fine, close in large part, being slightly separated laterally, very close and fine on cheeks above, becoming somewhat coarser but more shallow and vague below; face below ocelli finely and densely punctate, supraclypeal area rather finely rugose, becoming very narrowly shining, with a few distinct punctures toward clypeus which is uniformly very finely and closely punctate, punctures becoming somewhat coarser at extreme sides; pubescence white but rather short on face and cheeks above, becoming somewhat more elongate on cheeks below, quite dense between antennae and on face laterally, vertex with shorter, more erect, fuscous hairs; thorax with rather short, white pubescence laterally and posteriorly, quite dense around tubercles and back of wing bases, very short and largely pale on scutum, becoming more fuscous over posterior half of disc, scutellum with scattered, brownish hairs, interspersed in the generally light, erect and elongate pubescence; scutum dull, punctures very fine, densely crowded in large part, slightly separated only in center, those of scutellum somewhat more sparse but shallow and close, rather obscure, axillae very finely and densely punctate; pleura dull, punctures close but rather shallow, lateral faces of propodeum smoother but rather dull, posterior face dull, with very close, minute and obscure punctures; hind basitarsus nearly as long and broad as their tibiae, front and mid basitarsi distinctly shorter than their tibiae; tegulae very minutely and closely punctate; wings subhyaline, faintly clouded apically, veins brownish-piceous; abdominal terga 2-4 with rather deep, sub-basal, transverse, grooves, basal margins of the grooves distinct but not carinate, apical margins of terga quite narrowly but abruptly depressed, with dense, entire, whitish fasciae; basal tergum with copious, elongate and entirely pale pubescence, discal pubescence of following terga short and black, but erect and quite conspicuous; punctures of terga quite deep, distinct, very fine and close, becoming slightly more distinct on the more apical terga; tergum 6 quite abruptly upturned apically, very densely rugoso-punctate, well covered with short but erect black hairs; sternum 6 well covered with very short, black, scopal hairs, evenly rounded apically, the very short and obscure marginal fringe slightly interrupted medially; scopa otherwise largely yellowish, becoming more or less black

across apical half of sternum 5; the more basal sterna with fine and close punctures, these becoming more coarse and sparse to sternum 5, apical margins quite distinctly depressed and yellowish-hyaline; sternal fasciae not evident.

MALE—Length 12-13 mm.; black, tegulae more yellowish-hyaline, front legs largely yellowish, middle pair more ferruginous, hind pair black, spurs yellow; eyes very slightly convergent below; clypeal margin very shallowly incurved across median third; mandibles 3-dentate (fig. 56), submedian inferior process broadly, triangularly acute, with a slight angle between its tip and the apical tooth; apical segment of flagellum slightly dilated; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, much narrowed below, with a shallow excavation below lower end of eye which is bare, polished and impunctate, a narrow, transverse, impunctate line reaching from this to hind margin, this with a more dorsal fringe of very short, white hairs, and a ventral fringe of elongate, snowy-white hairs; vertex somewhat shining, punctures rather fine, well separated but deep and distinct, becoming somewhat more shallow and obscure on cheeks; punctures of face very fine and densely crowded; face quite densely covered with rather elongate, creamy-white pubescence which largely obscures surface, that on cheeks white, rather short and thin above, that on vertex thin, pale and rather short, but with a few very short, dark hairs on each side; pubescence of thorax rather short but dense and white laterally and posteriorly, very thin and largely pale on scutum and scutellum, with only a very few, very inconspicuous dark hairs at most; scutum dull, densely tessellate between very fine and close punctures, those on scutellum somewhat more distinct and more widely separated, axillae very finely and closely punctate; pleura dull, punctures rather coarse but very close, becoming crowded above, interspaces more or less tessellate, lateral faces of propodeum smoother but rather dull, posterior face with minute, vague, rather close punctures evident; anterior coxae bright yellow, the spines very slender and elongate, slightly diverging apically, with a few white hairs posteriorly, coxae largely bare but with a single, very robust, ferruginous bristle near anterior border, which is directed toward the spine, some dense, white pubescence at each extreme side; front trochanters and femora largely yellow, quite conspicuously fringed posteriorly, with dense, elongate, white pubescence; front tibiae yellow in large part, but somewhat more ferruginous on outer surface toward base; front basitarsus enormously expanded and very deeply excavated, the result-

ing scale slightly narrowed apically where it becomes somewhat more testaceous, tip of the scale reaching fully to tip of both 2nd and 3rd segments, 2nd very narrowly produced apically, its hind margin very narrow, hind margin of 3rd very much longer than 2nd, nearly as long as 1st, posterior fringe dense but rather short, largely whitish, more or less tipped with fuscous beneath; mid basitarsus very broadly flattened and expanded apically, broader than their tibiae but not quite equal in length, mid tibial spurs well developed, hind tarsi slender and simple; tegulae minutely and very closely punctate; wings subhyaline, faintly clouded apically, veins brownish-testaceous; abdominal terga 2-5 more or less deeply grooved or depressed across base, basal margin of grooves somewhat carinate, apical margins of terga quite deeply depressed and yellowish-hyaline, with entire, whitish, apical fasciae; basal tergum with rather copious, elongate, erect, pale pubescence, becoming quite dense at extreme sides, discal pubescence of 2 rather pale and elongate, 3 and 4 with very short, erect but rather dense, fuscous pubescence medially, this becoming less evident laterally, 5 with quite abundant, erect and somewhat more elongate, black pubescence; tergum 6 vertical, very densely and finely rugoso-punctate, punctures becoming somewhat more definite toward carina which is rather low, irregularly crenulate, with a somewhat obscure and indistinct, median emargination, median teeth of apical margin evident only as very low carinae which are about as near each other as to the obscure lateral angles; tergum 7 very low and inconspicuous, not produced medially; sterna 1-4 exposed, shining, quite deeply and distinctly punctate, punctures rather fine and close toward base of each plate, more sparse apically, apical margins quite abruptly depressed and yellowish-hyaline; apical margin of sternum 5 with a pair of oblique, slender processes, margin between slightly incurved, setose area occupying much of plate, the setae fine and simple, those toward basal margin more robust (fig. 57); sternum 6 densely long pubescent on each extreme side apically, setose areas slightly separated, bilobate laterally, the lobes superimposed in part, the setae fine toward base, the more apical setae long, flexed and bulbous at base, apical lobe very broad and truncate; gonocoxites narrowed above base, obliquely compressed, slightly dilated apically, the tips somewhat bulbous and finely setose (fig. 58).

DISTRIBUTION—Georgia and Florida, west to California and Mexico, March to August.

FLOWER RECORDS—*Amorpha*, *Brauneria*, *Erigeron*, *Helianthus*, *Saliva*, *Senecio*

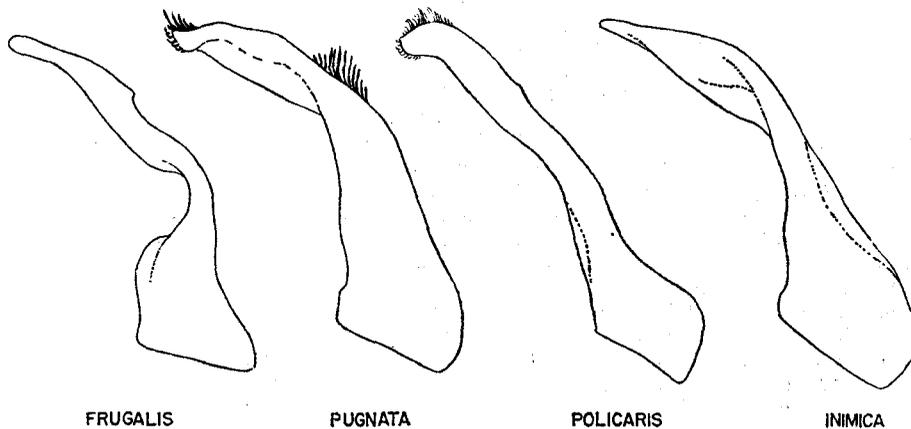


Figure 58—Lateral view of gonocoxites in males of *Megachile* (*Sayapis*).

and *Verbena*. Robertson (1929) records it on *Coreopsis*, *Oenothera*, *Silphium* and *Verbena*.

***Megachile* (*Sayapis*) *pugnata pugnata*
Say**

(Figs. 56-58)

- Megachile pugnatus* Say, 1837. Boston Jour. Nat. Hist. 1, p. 408. ♂ ♀.
Megachile scrobiculata Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 191. ♂.
Megachile bucephala Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 193. ♀.
Megachile disparilis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 264. ♂.
Megachile lucrosa Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 267. ♀.
Gnathocera cephalica Provancher, 1882. Nat. Canad. 13, p. 233. ♀.
Megachile temporalis Friese, 1903. Ztschr. System, Hym. Dipt. 3, p. 247. ♀. (♂ misdet.)
Megachile scrobiculata Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 337.
Sayapis pugnata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (*Sayapis*) *pugnata* Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 201.

FEMALE—Length 12-18 mm.; abdomen elongate and parallel-sided; entirely black, including tegulae and legs; eyes slightly divergent below; clypeus extremely short and very much thickened apically, the outer face little if any longer medially than the thickened edge, margin with a rather broad, median, truncate protuberance and a pair of more lateral tubercles; mandibles very much broadened apically, obscurely 5-dentate, 4th tooth very low, a small bevelled edge between 2nd and 3rd (fig. 56);

lateral ocelli very much nearer eyes than to margin of vertex; width of cheeks nearly twice that of eyes, with a conspicuous, flattened, subtriangular process opposite lower end of eye; vertex rather dull, punctures very fine and close, becoming relatively coarse and more separated on cheeks above, closer and irregular below, but lower surface broadly shining and impunctate; face below ocelli densely rugoso-punctate, conspicuously protuberant between antennae, punctures of supraclypeal area quite coarse and distinct but very close, clypeus with very fine, densely crowded punctures medially, these becoming coarse and more distinct laterally; pubescence white on face and cheeks, short but rather dense between antennae and eyes, more yellowish on clypeus and on lower surface of cheeks, very short and sparse on cheeks above, vertex with quite conspicuous, erect, black pubescence which does not hide surface; thorax with rather short, quite dense, white pubescence laterally and posteriorly, scutum with largely blackish, erect pubescence, this becoming pale across anterior margin, scutellum with somewhat more elongate, black hairs, with a few paler hairs toward posterior margin; scutum finely and closely punctate, punctures slightly separated only in center, those of scutellum and axillae uniformly very fine and close; pleura dull beneath the pubescence, very closely punctate, more coarsely so below and finer above; lateral faces of propodeum somewhat smoother but dull and quite densely pubescent, posterior face rather dull, punctures close but exceedingly minute and vague; all basitarsi somewhat shorter and narrower than their tibiae; tegulae with exceedingly minute and rather close punctures; wings subhyaline basally, becoming somewhat infuscated apically, veins brownish to piceous; abdominal terga

2-5 more or less deeply grooved across base, basal margin of grooves subcarinate, apical margin of terga rather deeply depressed, with dense, entire, whitish fasciae; pubescence of tergum 1 whitish, rather copious and elongate, becoming dense at extreme sides, with some shorter, more apical, fuscous hairs; discal pubescence of following terga very short, erect and quite dense, entirely black; punctures of terga very fine and close throughout; apical margin of tergum 6 rather abruptly upturned, rather narrowly rounded, surface very densely and finely punctate, pubescence suberect and entirely black; sternum 6 subtriangular, with narrow apex, the apex slightly emarginate, surface uniformly covered with short, blackish scopal hairs; scopa otherwise pale yellow, the more basal sterna finely and closely punctate, punctures becoming more coarse and sparse on the more apical sterna, apical margins somewhat depressed, distinctly yellowish-hyaline; sternal fasciae not evident.

MALE—Length 11-13 mm.; black, tegulae brownish-testaceous, front tarsi, and mid and hind spurs yellow; eyes subparallel; clypeal margin beneath beard nearly straight, with very shallow, median and sublateral emarginate areas; mandibles quite slender, obscurely 3-dentate, inferior process submedian, triangularly acute and densely pubescent; apical segment of flagellum very slightly dilated; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, with a shining, impunctate, concave area below, lower margin of this produced to form a conspicuous and rather slender process just below base of mandible; vertex and cheeks rather dull, punctures very fine and densely crowded, face dull, densely and finely rugoso-punctate beneath dense pubescence; face with copious, erect, yellowish-white pubescence that largely obscures surface, cheeks white pubescent, this rather short above, becoming dense and elongate below, vertex with erect and elongate yellowish hairs intermixed with shorter and more fuscous hairs; thorax with rather short, dense, white pubescence laterally and posteriorly, scutum with quite copious, erect and elongate fuscous hairs, becoming whitish anteriorly, scutellum with largely whitish pubescence; punctures of scutum fine and close, slightly separated only in center, densely crowded otherwise, those of scutellum and axillae uniformly fine and close; pleura dull, punctures rather shallow but very close, becoming densely crowded above; lateral faces of propodeum somewhat smoother, punctures shallow, very fine and close, posterior face rather dull, punctures quite close but exceedingly minute; front coxal spines very slender and elongate, anterior surface of coxae bare and somewhat shining, with a patch of 4 or 5

elongate, reddish bristles just before base of spines; mid tibial spurs well developed; front tarsi bright yellow, basitarsus enormously expanded anteriorly and apically, very deeply excavated, inner basal margin of excavation with a short fringe of fuscous hairs, otherwise hairs entirely pale yellowish, the basitarsal scale reaching fully to the tip of segment 2, the more posterior part of 2 much shorter than that of 1 and 3, posterior fringe pale yellow, quite dense and elongate, more or less brownish beneath; outer surface of front tibiae and posterior surface of front femora piceous, other surfaces more or less yellowish or testaceous; mid and hind basitarsi slender and simple, largely dark, the more apical tarsal segments becoming more testaceous or brownish; tegulae shining, punctures exceedingly minute but rather close; wings subhyaline, veins brownish; abdominal terga 2-5 rather shallowly depressed across base, basal margin of these distinct but not conspicuously carinate, apical margin of terga narrowly depressed on the more basal segments, becoming quite broad, more or less yellowish-hyaline and narrowly white fasciate on 4, these fasciae quite dense and conspicuous on 4 and 5; terga 1 and 2 with copious, elongate, pale pubescence, but 2 also with some shorter, more apical, fuscous pubescence, discal pubescence of 3 and 4 short, erect, quite copious and entirely black, that on 5 largely black, but more erect and elongate; punctures of terga very fine and close throughout; dorsal surface of tergum 6 vertical, very densely and finely rugoso-punctate, carina rather short but distinct, with a small, more or less rounded, median emargination, median teeth of apical margin very low, carinate, much closer to lateral angles than to each other, but these lateral angles not at all spinose; tergum 7 rather robust, obscurely angulate medially, but not produced; sterna 1-4 exposed, rather dull but very minutely and regularly punctate, punctures quite close but not crowded, apical margin depressed and yellowish-hyaline, that of 4 very slightly incurved across median area; setose area of sternum 5 broad and extensive, the setae curved and simple, apical margin slightly angulate medially (fig. 57); setose areas of sternum 6 slightly separated, bilobate, the more basal lobes with large, closely set setae, the more apical pair with an apical fringe of 4 or 5 large, curved setae, apical marginal lobe extensive, somewhat narrowed and rounded apically; gonocoxites much narrowed above base, gradually dilated and obliquely compressed to the rounded tips, finely setose on inner surface (fig. 58).

DISTRIBUTION—The Pacific Coast to Quebec and the New England states, south to Texas and Georgia, June to September.

FLOWER RECORDS—*Arctium*, *Aster*, *Brauneria*, *Carduus*, *Chrysanthemum*, *Eri-geron*, *Helianthus*, *Melilotus*, *Rudbeckia*, *Taraxacum*, *Trifolium*, *Verbena* and *Vernonia*. Robertson (1929) records *pugnata* on the following: *Asclepias*, *Blephilia*, *Cicuta*, *Cirsium*, *Coreopsis*, *Dianthera*, *Lepachys*, *Nepeta*, *Silphium* and *Verbesina*.

The subspecific designation of this typical form of *pugnata* is made necessary by the occurrence of another form, *pomonae* Cockerell, in the Southwest.

Megachile (Archimegachile) lanata
(Fabricius)

(Figs. 59, 61 & 62)

Apis lanata Fabricius, 1775. Systema Ent., p. 385.

Apis purpurea Christ, 1791. Naturgesch. Insekt. Bienen, Wespen u. Ameisengeschl., p. 168, pl. 13, fig. 7.

Megachile lanata Horne, 1870. Zool. Soc. London Trans. 7, pp. 176-177, p. 19, figs. 11, 11a, 11b, (biology).

Megachile Martindalei Fox, 1891. Amer. Ent. Soc. Trans. 18, p. 344. ♀ ♂.

Megachile (Archimegachile) lanata Krombein, 1958. Hym. Amer. n.Mex., U.S.D.A. Agr. Monogr. 2, First Suppl., p. 246.

FEMALE—Length 16 mm.; black, including legs, tegulae yellow; eyes parallel; clypeus somewhat swollen medially; apical margin broadly and very slightly incurved; mandibles quite broad apically, 4-dentate, inner teeth very low, with no bevelled edges evident (fig. 59); space between lateral ocelli and eyes about half that between ocelli and margin of vertex; cheeks slightly narrower than eyes; punctures of vertex quite deep and distinct but close and rather fine, becoming minute and close on cheeks above, somewhat more coarse and sparse below; punctures fine and densely crowded on face beneath dense pubescence, supra-clypeal area very finely but somewhat more distinctly punctate, clypeus with a narrow, median, impunctate line, quite deeply and somewhat more coarsely and closely punctate on each side; pubescence of head and thorax bright yellow to rather deep fulvous, very dense at sides of face and around and above antennae, with a dense tuft above anterior ocellus, vertex and cheeks quite short pubescent, becoming somewhat longer on cheeks below, short and dense over most of thorax, becoming somewhat paler below and almost whitish on propodeum; scutum and scutellum very finely, distinctly and closely punctate beneath dense pubescence, punctures on pleura slightly coarser, uniform and close, propodeum somewhat smoother, punctures ex-

ceedingly minute, very close on posterior face; all basitarsi very slender and very much shorter than their tibiae; tegulae shining, with minute and rather close punctures; wings lightly infuscated, veins piceous; abdominal terga 2-4 slightly depressed across base, basal margin of this impression distinct but hardly carinate, apical margin of terga depressed, densely and completely fasciate, discs of 1 and 2 densely covered with fulvous pubescence that obscures the surface, that on the following terga much thinner and shorter, largely pale on 3 and 4, but 4 with numerous, suberect, black hairs over apical portion, 5 liberally beset with suberect, black hairs; punctures on the more basal terga minute and close, becoming somewhat more distinct on the more apical terga, well separated but minute on 4 and 5; tergum 6 nearly straight in profile, with very short, suberect hairs visible toward base, quite densely covered with appressed, blackish tomentum, surface barely visible, very finely and densely punctate; sternum 6 well covered with short, black, scopal hairs, scopa otherwise yellowish-white, sterna deeply and distinctly punctate, punctures rather coarse and well separated on 3-5, apical margins narrowly yellowish-hyaline, and sternum 5 with a rather distinct, white, apical fascia.

MALE—Length 13 mm.; black including legs, tegulae yellowish; eyes parallel; clypeal margin about straight beneath the dense beard; mandibles 4-dentate (fig. 59), inferior margin with a very slight angle near base; apical segment of flagellum slender; space between lateral ocelli and eyes about half that between ocelli and margin of vertex; cheeks slightly narrower than eyes; punctures of vertex and cheeks fine and close but quite deep and distinct, becoming slightly coarser on cheeks below, face and clypeus with very fine, close punctures beneath dense pubescence; pubescence of head and thorax entirely pale, that on face below antennae pale yellowish, dense and elongate, becoming more fulvous above, with a dense transverse brush above anterior ocellus, hairs on vertex somewhat shorter, fulvous, becoming more elongate and whitish on cheeks below; venter of thorax rather thinly whitish pubescent, becoming

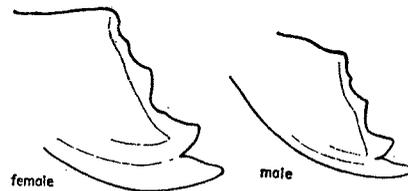


Figure 59
Mandibles in *Megachile (Archimegachile)*
lanata.

denser but rather short above, more fulvous in color, entirely deep fulvous, rather short but erect on scutum and scutellum, that on propodeum somewhat thinner and more whitish; punctures of scutum somewhat more distinct and coarse medially, somewhat finer and densely crowded anteriorly and laterally, very fine and densely crowded on scutellum and axillae; pleura somewhat shining, punctures quite deep and distinct, fine and very close above, becoming somewhat coarser and somewhat more widely separated below; propodeum rather smooth, punctures minute and obscure, quite close on posterior face; front coxal spines very short, subtriangular, with narrowly rounded tip, coxae thinly white pubescent anteriorly, spines rather densely long pubescent posteriorly; front tarsi dark, entirely simple; mid tibial spurs well developed; tegulae very minutely and closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2-5 shallowly depressed across base, basal margin of depressions distinct but hardly carinate, apical margin of terga depressed, with complete, dense, apical fasciae, 1 and 2 densely covered with fulvous pubescence, hiding surface, that on 1 copious and elongate, short on 2, apical fasciae yellow, discal pubescence of 3 much shorter and thinner, largely fulvous, but with a few black hairs apically, 4 and 5 with conspicuous, suberect, black hairs, overlying in part the white fasciae; punctures very fine and very close on the more basal terga, becoming somewhat more coarse and distinct but still quite close on the more apical terga; tergum 6 irregularly and rather finely rugoso-punctate, with conspicuous, long and erect, black, seta-like hairs, carina very low, with a very slight, median emargination, apical margin entirely lacking teeth; sterna 1-4 exposed, quite closely and deeply punctate, finely so on the basal sternum, becoming slightly coarser on the more apical plates, apical margins narrowly yellowish-hyaline, prominently fringed with whitish pubescence; setose area of sternum 5 broad and expansive, occupying much of the plate, median and apical areas largely bare, setae very abruptly and broadly dilated at tips, apical margin of sternum quite deeply, triangularly emarginate medially, each side quite broadly outcurved (fig. 61); setose area of sternum 6 not divided medially, occupying most of apical half of plate, setae quite robust, directed apically, considerably dilated at tips, plate without an apical lobe; tergum 7 transverse, largely hidden; gonocoxites strongly compressed above base, slightly sinuate, slender and acuminate at tip, with a prominent fringe of plumose bristles on inner surface over apical half, the more basal setae more elongate (fig. 62).

DISTRIBUTION—This is an Old World

species, widely distributed through the Ethiopian and Oriental regions, and has been established in the West Indies since the days of the slave trade. Within recent years it has appeared in the southern end of Florida, but may or may not have become well established.

Megachile (Chelostomoides) campanulae campanulae (Robertson)

(Figs. 61 & 62)

- Oligotropus campanulae* Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 171. ♀ ♂.
Megachile campanulae Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 202. (biology)
Oligotropus campanulae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Chelostomoides) campanulae Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 389.

FEMALE—Length 10-11 mm.; abdomen elongate and parallel-sided; entirely black, including tegulae and legs, spurs yellow; eyes subparallel; clypeal margin with a pair of distinct tubercles, one on each side of midline, and a slightly smaller one toward the side; mandibles distinctly 4-dentate, without bevelled edges; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width; punctures of vertex coarse, deep and distinct, uniformly slightly separated, those on cheeks not quite so coarse but considerably closer; face between ocelli and antennae quite coarsely and very closely punctate, fine and densely crowded between antennae and eyes, supra-clypeal area with some narrow, shining spaces medially, but punctures coarse and deep, becoming very close laterally, clypeus very closely and coarsely punctate, becoming somewhat more finely and more obscurely so toward apical margin medially; pubescence pale on head and thorax, rather short and thin, whitish and somewhat more copious on face around antennae, on inner orbits and on cheeks below, becoming thin on clypeus, cheeks above and on vertex where it is somewhat more yellowish; pubescence short, thin and entirely white on thorax laterally and posteriorly, quite dense around tubercles, very short, thin and entirely pale on scutum, whitish and somewhat more erect and elongate on scutellum; scutum and scutellum coarsely, deeply and closely punctate throughout, interspaces very narrow but shining, punctures somewhat more widely spaced on scutellum, finer and very close on axillae; pleura somewhat shining between coarse, deep and rather irregular punctures below, these becoming densely crowded anteriorly; lateral

faces of propodeum somewhat smoother but dull, with very close, fine, shallow punctures, posterior face more velvety, punctures very shallow, sparse and irregular; all basitarsi somewhat narrower and shorter than their tibiae; tegulae minutely and closely punctate; wings hyaline basally, becoming faintly clouded apically, veins piceous; abdominal terga 2-4 with deep, transverse, basal grooves, filled to a considerable degree with white tomentum, basal margins distinctly and sharply carinate, apical margins of terga depressed at extreme sides but not medially, the apical, white fasciae evident only toward extreme sides, that on 4 complete but rather narrow medially; basal tergum with rather thin, erect, pale pubescence, lateral angles densely white tomentose; discal pubescence of the following terga extremely thin, entirely pale, hardly evident; tergum 5 faintly grooved toward base but basal margin not at all distinct, apical margin of tergum depressed only toward sides and entirely lacking the apical fascia; tergal punctures quite deep and distinct, variable in size and spacing, rather coarse and sparse medially on each tergum, becoming somewhat closer laterally and toward apical margin, quite fine and close over most of basal tergum, rather uniformly coarse and close on 5; tergum 6 nearly straight in profile, with an abrupt, apical lip, largely covered with pale, subappressed hairs which obscure the surface; sternum 6 covered with short, scopal hairs which are pale toward base but become darker toward apex; scopa otherwise yellowish-white, the sterna rather uniformly, closely, deeply and rather coarsely punctate, apical margins narrowly depressed and very narrowly hyaline; sternal fasciae not evident.

MALE—Length 8-9 mm.; entirely black, including tegulae and legs, spurs yellow; eyes very slightly convergent below; clypeal margin with a quite robust tubercle on each side of mid-line; mandibles 3-dentate, inferior process about median, broadly triangular; apical segment of flagellum slender and parallel-sided; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, shallowly excavated just below base of mandible; vertex shining, punctures coarse, deep and rather sparse, becoming slightly finer and closer on cheeks; face below ocelli coarsely and very closely and deeply punctate, becoming finely rugose laterally and over supraclypeal area, punctures of clypeus very coarse and contiguous, becoming somewhat finer toward apical margin; pubescence of head and thorax entirely pale, rather short and thin, quite copious around antennae and over lower part of face, largely hiding surface, and quite long and copious on cheeks below, becoming thin and short above, thin and erect

on vertex; pubescence rather short, thin, entirely white on thorax laterally and posteriorly, quite dense around tubercles, very short and thin on scutum, becoming somewhat more erect and elongate on scutellum; punctures of scutum coarse, deep and close, slightly separated over most of surface, but interspaces very much narrower than diameter of punctures, those on scutellum somewhat more distant, interspaces about equalling diameters, but fine and very close on axillae; pleura somewhat shining below between coarse and deep punctures, these becoming finer and closer above; propodeum laterally somewhat smoother but with very fine, shallow and close punctures, posterior face somewhat more velvety, punctures more minute, sparse and vague; front coxal spines reduced to very obscure, blunt tubercles, coxae quite densely white pubescent; front tarsi entirely dark, segments 1-3 slightly dilated and slightly concave but hardly excavated beneath, with some elongate, brownish hairs along anterior margin, but the usual posterior fringe completely lacking; mid tibial spurs well developed; mid and hind tarsi slender and simple; tegulae minutely and closely punctate; wings subhyaline basally, becoming faintly clouded apically, veins piceous; abdominal terga 2-5 deeply grooved across base, white fasciate, basal margins quite distinctly carinate, apical margins of terga yellowish-hyaline, quite deeply depressed laterally but only slightly so medially, apical white fasciae evident only toward extreme sides of 1-3; basal tergum with rather copious, elongate, white pubescence, discal pubescence of following terga very thin and obscure, hardly evident, apparently entirely pale, 4 and 5 with more conspicuous, very short and erect, pale hairs; tergal punctures deep, distinct and rather coarse, rather uniformly separated, interspaces not much exceeding diameter of punctures, these slightly coarser at extreme sides than in center, tergum 1 more finely and closely punctate; tergum 6 vertical, with a rather dense, basal, white fascia, otherwise quite densely covered with short, suberect, dark tomentum, with a few more elongate, blackish hairs, carina very obscure, with a rounded median emargination, elevated but very slightly on each side above surface of tergum, median teeth of apical margin broadly carinate and very low, largely obscured by dense, white tomentum, very much nearer the acute, lateral teeth than to each other; tergum 7 transverse, not at all produced medially; sternum 4 retracted, entirely hidden but unmodified; sterna 1-3 exposed, quite closely and deeply punctate throughout, 2 and 3 somewhat swollen on each extreme side, apical margins depressed and densely long, white pubescent; setose area of sternum 5 broad, the setae sparse and minute (fig. 61); setose areas of

sternum 6 rather widely separated, oblique, restricted, the setae fine, apical lobe very broad and broadly rounded; gonocoxites narrowed above base, slightly dilated, obliquely compressed toward the rounded tips (fig. 62).

DISTRIBUTION—The New England states to Florida, west to Minnesota, Nebraska and Texas, April to September.

FLOWER RECORDS—*Asclepias*, *Baptisia*, *Campanula*, *Galactia*, *Malva*, *Melilotus* and *Oenothera*. Additional records by Robertson (1929) include the following: *Lobelia*, *Lythrum*, *Nepeta*, *Psoralea*, *Pycnanthemum*, *Rudbeckia*, *Strophostyles*, *Symphoricarpos* and *Verbena*.

***Megachile (Chelostomoides) campanulae wilmingtoni* (Mitchell)**

Oligotropus wilmingtoni Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 156. ♀ ♂.

Megachile (Chelostomoides) campanulae var. *wilmingtoni* Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 391.

This form largely replaces the more typical form in the coastal areas of the southeastern states and Florida. It differs from the typical form in the somewhat larger size (11-12 mm.), the more deeply infuscated wings, and in the presence of dark pubescence on tergum 6. In the female, the scopal hairs of sternum 6 are entirely black.

DISTRIBUTION—Florida to Virginia, along the coast, April to September over most of its range, but has been collected in November and February in Florida.

FLOWER RECORDS—*Galactia*, *Melilotus*, *Pontederia*, *Solidago* and *Strophostyles*.

***Megachile (Chelostomoides) exilis parexilis* Mitchell**

(Figs. 61 & 62)

Megachile (Chelostomoides) exilis var. *parexilis* Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 393. ♂.

FEMALE—Length 9-10 mm.; abdomen elongate and parallel-sided; entirely black, including tegulae and legs, spurs yellow; eyes subparallel; clypeal margin with a small, very shallow, median, emarginate area, with a small, median tubercle; mandibles 4-dentate, without bevelled edges; lateral ocelli subequally distant from eyes and margin of vertex; cheeks very slightly narrower than eyes; punctures of head and thorax coarse, deep and distinct, uniformly close across vertex, becoming some-

what finer and close on cheeks below, crowded below ocelli and on face laterally, supraclypeal area with some narrow, shining interspaces, clypeus with coarse, crowded punctures above, becoming fine and irregular toward apical margin; pubescence entirely pale on head and thorax, quite short and thin, somewhat more copious between antennae and on sides of face and cheeks below, becoming very short and thin on cheeks above, thin and erect on vertex; thorax with rather short, thin, white pubescence laterally and posteriorly, somewhat more elongate on propodeum, quite dense around tubercles; scutum with very short, thin and obscure, pale pubescence, that on scutellum somewhat more elongate; punctures of scutum uniformly close throughout, those on scutellum somewhat more widely separated but still close, those on axillae finer and densely crowded; pleura with some narrow, shining interspaces, punctures very coarse and deep, becoming relatively fine and close on venter, densely crowded above; lateral faces of propodeum more finely but quite closely and shallowly punctate, posterior face more velvety, punctures very minute, shallow and obscure; all basitarsi somewhat narrower and considerably shorter than their tibiae; tegulae minutely and closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2-4 with quite deep, transverse, basal grooves, these sharply carinate basally and more or less occupied by whitish tomentum, apical margins of terga depressed and yellowish or whitish fasciate, completely so on 3-5, but widely interrupted on 2; tergal punctures deep and distinct but rather fine, well separated medially on 3 and 4, rather uniformly fine and close across basal tergum, becoming quite coarse and close laterally on 2-4, 5 with a shallow, basal groove which is not carinate, punctures quite close and irregular throughout; discal pubescence extremely short and thin, hardly evident medially, but becoming somewhat more conspicuous at extreme sides, entirely pale on 1-4, but with sparse, short, erect, dark hairs on 5, tergum 6 nearly straight in profile, with numerous, suberect hairs visible, with an abrupt apical lip, punctures rather fine but deep and densely crowded, partially obscured apically by subappressed, fuscous tomentum; sternum 6 well covered with very short, fuscous, scopal hairs, apex not distinctly fringed; scopa otherwise pale yellow, the sterna deeply, distinctly and closely punctate, somewhat more coarsely so on the more apical sterna, apical margins rather abruptly depressed and yellowish-hyaline; sternal fasciae not evident.

MALE—Length 7-8 mm.; entirely black, including tegulae and legs, but front and mid tarsi brownish-testaceous; eyes very slightly

convergent below; clypeal margin beneath the dense, white beard with a small, median tubercle and a somewhat more robust tubercle on each side; mandibles 3-dentate, inferior process median, broadly triangular, quite densely fringed with short, pale pubescence; apical segment of flagellum slender and simple; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, with a bare, shining, shallowly concave area just below base of mandibles, very densely white pubescent back of this; vertex shining, punctures deep, distinct, rather close and coarse, becoming somewhat finer but still close on cheeks below, densely crowded on face below ocelli, becoming more finely rugose laterally and on supraclypeal area, clypeus with coarse, close, distinct punctures above, these becoming fine and densely crowded apically; pubescence entirely pale on head and thorax, quite copious and elongate, snowy white over most of face, but rather thin and erect on upper area of clypeus, exposing the surface, very short and thin on cheeks above the ventral white tuft, very thin and erect but quite elongate on vertex; pubescence rather thin and entirely white on thorax laterally and posteriorly, quite dense around tegulae, erect and quite thin on scutum, somewhat more elongate on scutellum, dense and snowy white on front coxae and venter; punctures of scutum and scutellum quite uniformly deep, distinct and close, moderately coarse, somewhat finer and more shallow but very close on axillae; pleura with some narrow, shining spaces between the coarse and quite close punctures, these becoming very close above; lateral faces of propodeum very finely and closely punctate, posterior face more velvety, punctures very shallow, sparse and minute; front coxal spines reduced to very small but subacute tubercles; front tarsal segments 1-3 broadly dilated, 1 and 2 quite deeply concave below, segment 2 about half the length of 1, and 3 nearly as long as 2, only slightly narrower but not at all concave beneath, the tarsi rather densely, short, white pubescent anteriorly, with a few, sparse, elongate hairs posteriorly but without a definite posterior fringe; mid tibial spurs well developed; mid and hind tarsi slender and simple, hind tarsi with rather elongate, hairs along anterior margin, forming a loose, indistinct fringe; tegulae minutely and closely punctate; wings subhyaline, veins piceous; abdominal terga 2-5 deeply grooved across base, these subcarinate basally on the more basal terga, more or less densely pale tomentose, apical margins of 2-4 quite deeply and abruptly depressed, yellowish-hyaline, fasciate only at extreme sides, tergum 1 with rather copious, erect, white pubescence becoming dense at each side, with very fine and close punctures medially and apically, these becom-

ing somewhat more coarse laterally and toward the basal concavity; discal pubescence of following terga very obscure, apparently entirely pale, somewhat more elongate toward base of each tergum; tergal punctures deep and distinct, rather coarse but well separated on 2-4, 5 densely white fasciate across base, punctures rather fine and close but irregular, apical margin deeply but very narrowly depressed, not at all fasciate, discal pubescence erect, thin and white; tergum 6 vertical, white tomentose across base, punctures extremely minute and densely crowded, carina very low and obscure, with a shallow, median emargination, median teeth of apical margin triangularly carinate, much nearer the quite robust, acute, lateral teeth than to each other; tergum 7 transverse, rather robust but quite flat medially, this and margin of 6 obscured by dense, white tomentum; sternum 4 entirely retracted, but unmodified; sterna 1-3 exposed, quite deeply and closely punctate, rather coarsely so laterally, apical margins to some degree depressed and with a dense, apical fringe of white pubescence; apical margin of sternum 5 with a dense fringe of short setae on each side, shallowly emarginate between, with a long, posteriorly directed pencil of setae on each side, setose area composed of a pair of short, oblique lines of setae that are slightly separated medially (fig. 61); setose areas of sternum 6 slightly separated medially, broad at inner end, setae very fine or minute, apical lobe very broad, subtruncate; gonocoxites narrowed above base, slender, slightly curved toward tip (fig. 62).

DISTRIBUTION—Maryland and Indiana to Florida, west to Arizona, March to October.

FLOWER RECORDS—*Asclepias*, *Baptisia*, *Erigeron*, *Hydrolea*, *Ilex*, *Melilotus*, *Oenothera*, *Phaseolus*, *Rhus*, *Tephrosia*, *Trifolium*, *Vaccinium* and *Vicia*.

Females of this subspecies have been found in fruit fly traps in Florida.

The typical form of *exilis* (Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 265. ♂) is more western in distribution and is nearly identical with this form. Females cannot be satisfactorily separated, but the males differ in the form of the 3rd segment of the front tarsus, this being strongly narrowed apically in typical *exilis*, the apex being only slightly broader than segment 4. In *parexilis* the anterior and posterior margins of segment 3 are nearly parallel, the apex being broadly truncate, much broader than segment 4.

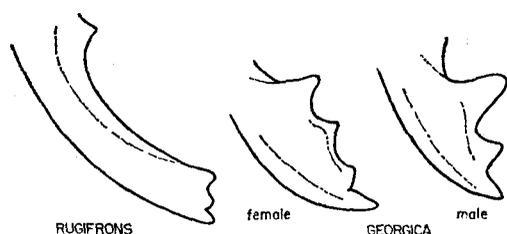


Figure 60
Mandibles in species of *Megachile*
(*Chelostomoides*).

Megachile (Chelostomoides) georgica
Cresson
(Figs. 60-62)

Megachile georgica Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 123. ♀ ♂.

Megachile penicillata Cockerell, 1915. Ann. Mag. Nat. Hist. (8) 15, p. 536. ♀.

Sarogaster georgica Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile (Chelostomoides) georgica Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 396.

FEMALE—Length 12-13 mm.; abdomen elongate and parallel-sided; tegulae yellowish-testaceous and spurs yellow, otherwise entirely black; eyes subparallel; clypeal margin about straight, unmodified; mandibles broad apically, 4-dentate, without bevelled edges (fig. 60); lateral ocelli considerably nearer eyes than to margin of vertex; cheeks narrower than eyes; vertex shining, punctures deep and distinct, rather coarse and uniformly close; quite coarse and close on cheeks, becoming closer along posterior margin of eyes, irregular and rather sparse on lower surface adjacent to hypostome; punctures below anterior ocellus close, deep and distinct, becoming fine and crowded laterally, very close, deep and distinct on supraclypeal area, coarse and crowded on clypeus above, becoming somewhat finer and more irregular apically; pubescence white, short but rather copious around antennae and on face laterally, thin and white on cheeks, becoming somewhat longer and more yellowish below, very short and somewhat tinged with yellow on clypeus and vertex; pubescence rather short, thin, entirely white on thorax laterally and posteriorly, dense around tubercles and behind bases, very short, thin, largely pale and very inconspicuous on scutum and scutellum, a pair of anterior, slightly oblique, narrow lines of white tomentum on scutum, the scutello-mesothoracic suture narrowly tomentose; dorsum of thorax closely, deeply, rather finely and closely punctate throughout, punctures of pleura much coarser, with irregular, shining spaces evident; lateral faces of propodeum somewhat shining, but finely and

closely punctate, posterior face somewhat more tessellate, punctures very shallow and irregular; all basitarsi considerably shorter and narrower than their tibiae; tegulae minutely and closely punctate; wings lightly infuscated, somewhat more deeply so apically, veins piceous; abdominal terga 2-4 with deep, transverse, basal grooves which are rather thinly pale tomentose, their basal margins sharply carinate, apical margins of terga quite deeply and abruptly depressed except on 2 medially, rather conspicuously white fasciate, this fascia broadly interrupted on 2 and narrowly so on 3; basal tergum with some erect, rather elongate, pale pubescence laterally, becoming very thin medially, lateral apical angles densely white tomentose, punctures rather sparse and shallow, becoming fine and close toward margin; discal pubescence of following terga very thin and inconspicuous, hardly evident, largely pale, punctures of 2-4 medially deep and distinct but rather fine and sparse, becoming somewhat coarser and closer at extreme sides; tergum 5 not definitely depressed nor grooved basally, apical margin quite deeply depressed but not fasciate, punctures deep, distinct and quite close, rather finely so toward base, more coarsely so toward apical margin, pubescence thin, short and erect, largely pale; tergum 6 very slightly convex in profile, but with an abrupt, apical lip, a considerable amount of pale, subappressed tomentum across base, this becoming fuscous toward apical margin, punctures very deep and distinct, very close, but rather coarse; sternum 6 well covered with short, black, scopal hairs, deeply and distinctly but irregularly punctate; scopa otherwise white, the sterna quite uniformly, closely, deeply and rather coarsely punctate, apical margins depressed and narrowly hyaline; no sternal fasciae evident.

MALE—Length 10-11 mm.; black, tegulae and front tarsi yellowish-testaceous, spurs yellow; eyes very slightly convergent below; median third of clypeal margin slightly incurved; mandibles 3-dentate, inferior process somewhat nearer apex than base, subtriangular and rather small, the tip incurved; apical segment of flagellum very slightly dilated medially; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes, with a very small, bare, concave area just below base of mandibles, otherwise lower margin densely long, white pubescent; vertex shining, punctures uniformly deep, and distinct, rather sparse and slightly separated, becoming somewhat more shallow but close and rather coarse on cheeks; face below ocelli with coarse and deep, crowded punctures, becoming minute and close laterally and on supraclypeal area, clypeus with an inconspicuous, median, sparsely punctate

tate line, very closely and deeply punctate on each side; pubescence of face quite short but rather dense, entirely white, and white on cheeks, dense below, very thin above, vertex with thin and rather short, erect, more yellowish hairs; thorax with short, white pubescence laterally and posteriorly, dense around tubercles and behind wing bases, short, erect and very thin on dorsum, obscurely yellowish on scutum medially, with a pair of somewhat oblique, very narrow lines of tomentum anteriorly, and scutello-mesothoracic suture narrowly white tomentose; scutum closely and deeply punctate throughout, punctures somewhat coarser in center, finer laterally, those on scutellum somewhat finer and more widely separated but still quite close, those on axillae fine and very close; punctures of pleura much coarser but rather shallow, rather fine and densely crowded on venter, lateral faces of propodeum somewhat shining, but closely and rather finely punctate, posterior face less shining, punctures shallow, becoming quite sparse near mid-line; front coxal spines rather slender and elongate, narrowly rounded at tip, the coxae largely bare anteriorly, very finely and irregularly punctate, without red bristles; front basitarsus narrow at base but becoming broadly dilated apically, somewhat broader than its tibia, flattened but not excavated below, segment 2 much shorter but about as broadly dilated apically, with a brownish integumental spot beneath, 3rd and 4th segments quite short, slender and narrow, the 5th more elongate but definitely shorter than the basitarsus, the more basal segments rather densely, short white pubescent, without a distinct posterior fringe; mid tibial spur well developed; mid and hind tarsi slender and unmodified, basitarsi much shorter than their tibiae; tegulae minutely and closely punctate; wings very lightly infuscated, veins brownish to piceous; abdominal terga 2-5 rather deeply grooved across base, grooves quite densely white tomentose, basal margins distinct, subcarinate, apical margins of terga depressed except on 2 medially, the depressed margins yellowish-hyaline and densely white fasciate laterally except on 4, basal tergum with rather thin, erect, whitish pubescence, the lateral posterior angles densely white tomentose, punctures quite close and deep throughout; discal pubescence of following terga very short, thin and inconspicuous, hardly evident, whitish and somewhat more conspicuous toward basal grooves, becoming somewhat more blackish on apical terga; punctures of terga 2-4 deep and distinct, rather sparse medially, becoming close and coarse laterally, somewhat closer on 4, 5 densely white tomentose across base, but with short, erect but quite conspicuous, black pubescence, closely, deeply and rather coarsely

punctate, apical margin very narrowly depressed, entirely black and not fasciate; tergum 6 densely, white tomentose across base, surface very finely and densely punctate, carina very low and inconspicuous, but with a rather broad, semicircular, median emargination, straight on each side, median teeth of apical margin low and carinate, considerably nearer the quite distinct and acute lateral angles than to each other, this area obscured with dense tomentum; tergum 7 rather inconspicuous, transverse, not at all produced medially; sternum 4 entirely retracted but unmodified; sterna 1-3 exposed, very closely, deeply and rather coarsely punctate, becoming somewhat more finely so toward apical margin of each, this rather broadly depressed on 2, more narrowly so on 3, with dense, apical fringes of rather elongate, white hairs; setose area of sternum 5 divided medially by a non-setose line, the setae fine and simple, numerous toward apical margin and median line (fig. 61); setose areas of sternum 6 broad and extensive, slightly separated medially, the setae flexed apically and rather robust, apical lobe very broad and broadly rounded; gonocoxites abruptly narrowed above base, then slightly dilated to the obliquely flexed and robust tips (fig. 62).

DISTRIBUTION—New Jersey to Florida and Texas, March to November.

FLOWER RECORDS—*Afzelia*, *Amorpha*, *Baptisia*, *Chrysopsis*, *Clethra*, *Crotalaria*, *Erigeron*, *Galactia*, *Helenium*, *Hypericum*, *Lobelia*, *Melilotus*, *Pentstemon*, *Phaseolus*, *Psoralea*, *Pycnanthemum*, *Stachys*, *Strophostyles*, *Tephrosia* and *Vaccinium*. This is also recorded by Robertson (1929) on *Desmodium*.

Megachile (Chelostomoides) rugifrons
(Smith)
(Figs. 60-62)

- Chelostoma rugifrons* Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 220. ♀.
Megachile rufimanus Robertson, 1891. Amer. Ent. Soc. Trans. 18, p. 65. ♀ ♂.
Chelostomoides rugifrons Cockerell, 1904. Canad. Ent. 36, p. 301. ♀.
Chelostomoides rufimanus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Chelostomoides) rugifrons Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 412.

FEMALE—Length 13-15 mm.; abdomen elongate and parallel-sided; entirely black, including tegulae and legs, spurs more testaceous; eyes slightly divergent below; clypeus

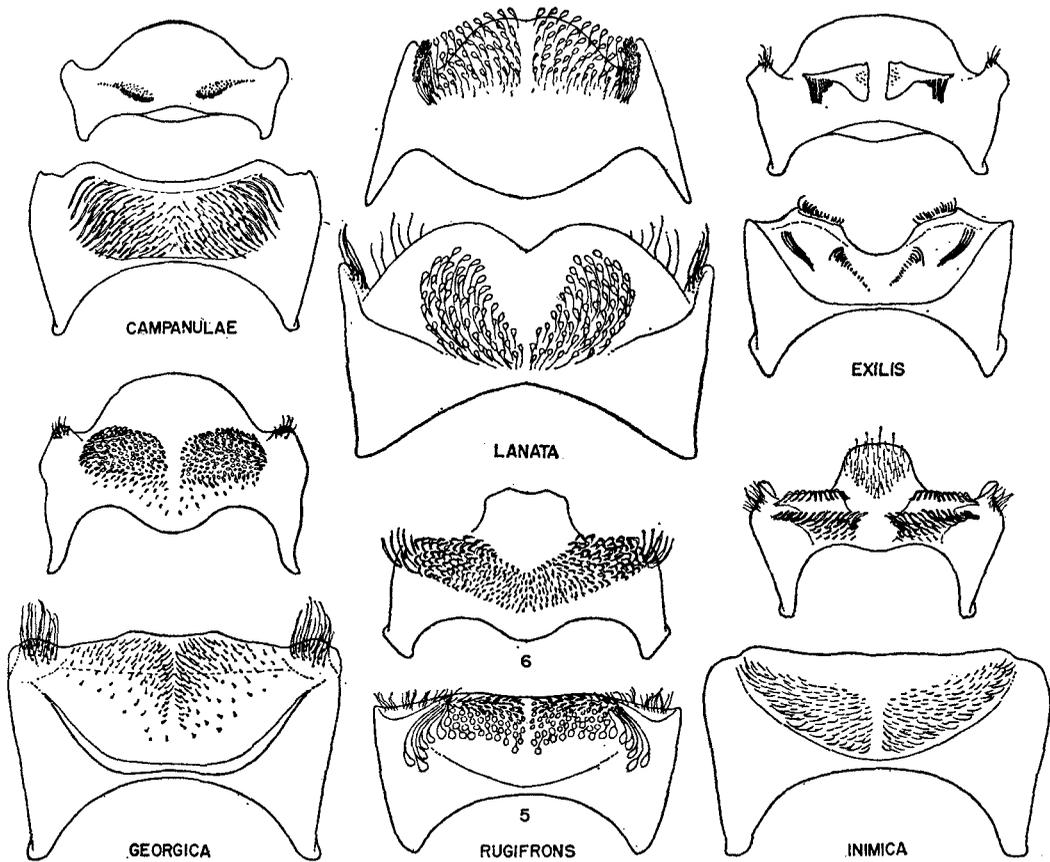


Figure 61—Sterna 5 and 6 in males of *Megachile* (*Chelostomoides*) and *M.* (*Archimegachile*).

much modified, outer face very short, angulate at each side, median area evenly sloped to articulation of labrum, upper portion of this shallowly punctate, apparently representing outer face, while the lower, impunctate, shining area represents the thickened edge; mandibles very slender and elongate, with an obscure, inner, basal angle, and with three small apical teeth (fig. 60); labrum much elongated, slightly narrowed just before apex, median length much greater than basal width; lateral ocelli very much nearer eyes than to margin of vertex; cheeks somewhat broader above than eyes, much narrowed below; punctures of vertex and cheeks coarse, deep and rather close, becoming somewhat crowded and irregular on cheeks below, very slightly separated on vertex medially; face below ocelli rather finely and densely punctate, becoming fine and densely crowded laterally, supraclypeal area shining, with fine, irregular and rather sparse punctures, lateral areas of clypeus with very fine, irregular but rather close punctures; pubescence white on face and cheeks, some-

what more yellowish on clypeus, labrum and cheeks below, short but rather dense around antennae and on face laterally, thin on cheeks, and vertex with short, erect, very inconspicuous, fuscous pubescence; thorax with thin, white pubescence laterally and posteriorly, this quite dense around tubercles and behind wing bases, scutum with very short, erect but rather thin, fuscous pubescence, this becoming more whitish anteriorly, and with a pair of fine, slightly oblique, anterior lines of white tomentum, scutellum with somewhat longer, erect, fuscous hairs; scutum with deep and distinct, rather fine and close punctures throughout, being slightly separated only in center posteriorly, scutellum with more widely separated and considerably coarser punctures, those on axillae very fine and close but distinct; punctures of pleura rather shallow but quite coarse, uniformly close, becoming crowded above; lateral faces of propodeum somewhat smoother, with very fine, close, shallow punctures, posterior face dull, with close, fine punctures; all basitarsi considerably shorter

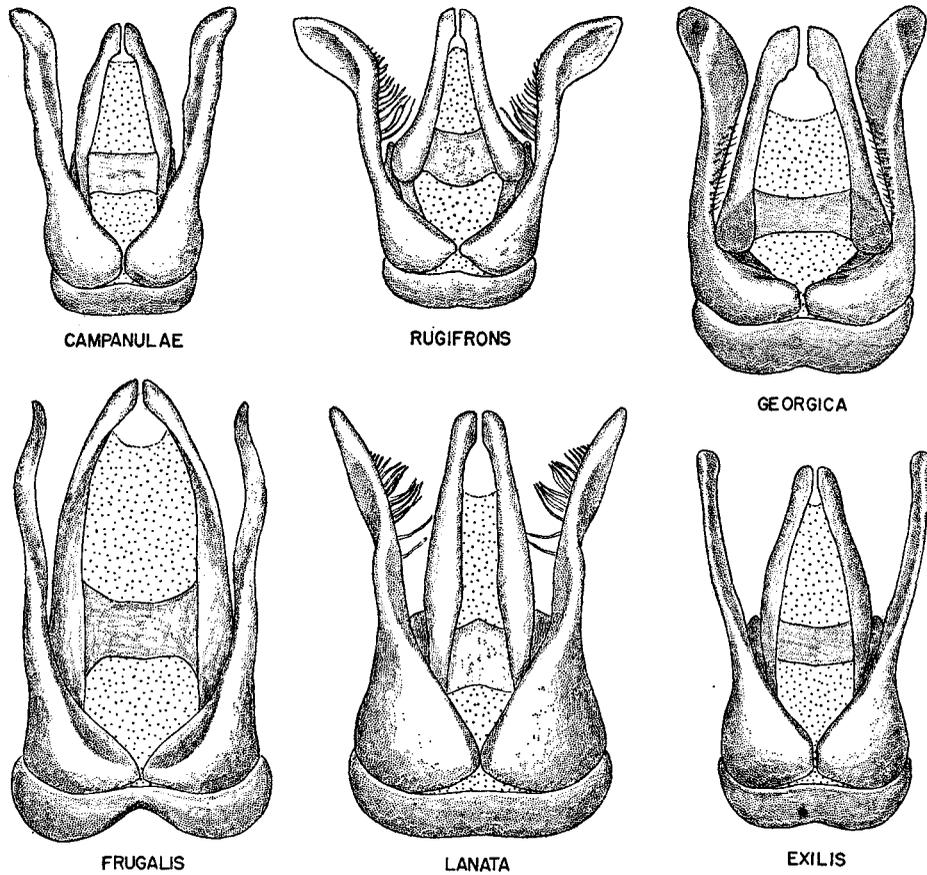


Figure 62—Genital armature in males of *Megachile* (*Chelostomoides*), *M.* (*Archimegachile*), and *M.* (*Sayapis*).

and narrower than their tibiae; tegulae minutely and closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2-4 rather deeply depressed across base, these depressions largely devoid of pale tomentum, basal margin distinct, subcarinate, apical margins of 2-4 with entire, white fasciae, these narrow medially but quite dense laterally, margins only slightly depressed except at extreme sides; basal tergum with very thin and rather short, pale pubescence, the lateral, apical angles becoming very densely white tomentose, punctures deep and distinct, but rather fine and only slightly separated; discal pubescence of following terga very obscure, short and sparse, largely pale on 2-4, the punctures deep, distinct but fine and quite sparse medially becoming quite coarse and close laterally; tergum 5 with a shallow indefinite, sub-basal impression which is not at all carinate, apical margin rather deeply depressed but not fasciate, punctures fine and rather close, slightly separated only in center, with rather copious

but very short, erect, blackish pubescence; tergum 6 nearly straight in profile, with an abrupt, apical lip, quite densely white tomentose across base, otherwise with short, erect, black hairs, punctures rather fine and densely crowded; sternum 6 deeply and very closely punctate, well covered with short, dark, scopal hairs, these becoming somewhat paler toward base, the apex narrowly subtruncate; scopa otherwise pale yellowish-white, sterna uniformly very closely, deeply and rather coarsely punctate, apical margins narrowly depressed, very narrowly hyaline; sternal fasciae absent.

MALE—Length 9-10 mm.; black, tegulae more testaceous, front tibiae bright yellow anteriorly, mid and hind legs largely dark, spurs pale yellow; eyes subparallel; median third of clypeal margin straight but very slightly produced; mandibles 3-dentate, without an inferior process; antennae markedly slender and elongate, flagellum somewhat red-

dened beneath; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes; punctures of vertex and cheeks very coarse and deep, slightly separated on vertex medially, becoming relatively close and irregular on cheeks below; face below ocelli densely rugoso-punctate, becoming very minutely roughened or tessellate laterally and on supraclypeal area, clypeus very finely and densely rugoso-punctate beneath dense pubescence; face and clypeus with rather copious, elongate, white pubescence, largely hiding surface, cheeks below with elongate but somewhat thinner white pubescence, this becoming shorter above, thin, elongate, erect and more yellowish on vertex; thorax with rather short, white pubescence laterally and posteriorly, quite dense around tubercles and behind wing bases; scutum with erect, somewhat shorter, dark hairs, these becoming pale anteriorly, with a pair of very short anterior lines of white tomentum, scutellum with somewhat longer, erect, largely pale hairs; punctures of scutum close, deep and distinct throughout, somewhat finer laterally, and to a slight degree separated near center posteriorly, scutellum with somewhat coarser, more widely separated punctures, these fine and close on axillae; pleura dull, punctures shallow but very coarse and close; lateral faces of propodeum rather dull, punctures close but shallow and obscure; front coxae with neither spines nor tubercles, quite densely pale pubescent; front tarsi rather pale, but slender and simple, with a rather short and thin, pale, posterior fringe; anterior face of front tibiae bright yellow, in some contrast to the outer, somewhat more reddened face, and front femora yellowish on apical portion of anterior face; mid tibial spurs well developed, the mid and hind tarsi slender and simple; tegulae minutely and closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2-4 rather deeply grooved across base, these grooves with conspicuous, white tomentum, basal margins more or less carinate, apical margins of terga rather broadly depressed, yellowish-hyaline, only obscurely fasciate laterally if at all; basal tergum rather thinly white pubescent, sub-

fasciate apically at extreme sides, punctures deep and distinct, rather coarse, becoming fine along apical margin; discal pubescence of terga 2-4 very short, thin and inconspicuous, hardly evident, punctures deep and distinct, well separated medially, becoming much coarser and closer at extreme sides; tergum 5 densely tomentose across base, apical margin narrowly but deeply depressed, entirely dark and not fasciate, surface somewhat shining medially, with fine, well separated punctures, these becoming coarse and close laterally and apically; tergum 6 narrowly but densely, white tomentose across base, surface dull, very densely and rather finely rugose, carina hardly evident, with a shallow, barely perceptible, median emargination, median apical teeth broadly carinate, much nearer the small but acute lateral angles than to each other; tergum 7 transverse, very low and inconspicuous, not at all produced medially; sternum 4 entirely retracted but unmodified; sterna 1-3 exposed, quite closely and deeply punctate, rather coarsely so laterally, becoming fine medially, apical margins rather narrowly depressed and yellowish-hyaline, 1 and 2 with dense apical fringes of rather elongated, white hairs, the 3rd only inconspicuously fringed laterally; setose area of sternum 5 transverse, subapical setae robust, abruptly flexed and broadly dilated apically, the more lateral setae very long, directed basally (fig. 61); setose areas of sternum 6 not divided medially, closely set with apically flexed, slightly dilated setae, the more lateral of these longer; apical lobe of 6 slightly broader than long, subtruncate; gonocoxites much narrowed above base, then dilated to the robust, laterally flexed tips (fig. 62).

DISTRIBUTION — Nebraska to Michigan and North Carolina, south to Texas and Florida, April to July.

FLOWER RECORDS — *Erigeron*, *Hypericum*, *Pontederia*, *Tephrosia*, *Vaccinium* and *Verbena*. Robertson (1929) records *rugifrons* (as *rufimanus*) on *Apocynum*, *Blephilia*, *Coreopsis*, *Lobelia*, *Nepeta* and *Psoralea*.

Table 6—Distribution of species of *Megachile* (*Phaenosarus*, *Xanthosarus*, *Argyropile*, *Leptorachis*, *Acentron*, *Pseudocentron*, *Melanosarus*, *Sayapis*, *Archimegachile* and *Chelostomoides* by states.

Megachile (Phaenosarus)	New England					North Central					Mid Atlantic					South-eastern											
	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New Jersey	New York	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
fortis								X																			
(Xanthosarus)																											
latimanus	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X
perihirta								X																			
(Argyropile)																											
parallela									X	X												X		X	X	X	X
townsendiana																						X				X	X
(Leptorachis)																											
petulana								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
(Acentron)																											
albitarsis								X	X													X	X	X	X	X	X
(Pseudocentron)																											
pruina																						X	X			X	X
(Melanosarus)																											
bahamensis																											X
xylocopoides																						X		X	X	X	X
(Sayapis)																											
frugalis									X				X	X		X					X				X	X	
inimica																											X
i. sayi								X	X	X			X					X			X	X		X	X	X	X
polycaris																										X	X
pugnata			X	X		X	X	X	X	X	X	X	X		X		X	X	X	X	X	X				X	
(Archimegachile)																											
lanata																											X
(Chelostomoides)																											
campanulae				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
c. wilmingtongi								X											X		X						X
exilis (western)																											
e. parexilis									X						X		X	X	X	X	X	X		X	X	X	X
georgica													X		X				X		X	X	X	X	X	X	X
rugifrons							X	X	X												X					X	X

Coelioxys Latreille

(Figs. 1 & 63)

Coelioxys Latreille, 1809. Gen. Crust. Ins., v. 4, p. 166. Type: (*Anthrophora conica* Fabricius = *Apis conica* Linnaeus) = *Apis quadridentata* Linnaeus. Desig. by Latreille, 1810.

Coelioxys subg. *Paracoelioxys* Gribodo, 1884. Soc. Ent. Ital. Bol. 16, p. 274. Type: *Coelioxys montandoni* Gribodo. Monob.

Paracoelioxys Radoszkowski, 1893. Soc. Ent. Rossica Horae 27, p. 53. Preocc. Type: *Paracoelioxys barrei* Radoszkowski. Desig. by Sandhouse, 1943.

Coelioxys Cockerell, 1905. Psyche 12, pp. 87-90. (key)

Coelioxys subg. *Liothyrapis* Cockerell, 1911. U. S. Natl. Mus. Proc. 49, p. 246. Type: *Coelioxys apicata* Smith (= *Coelioxys decipiens* Spinola). Monob.

Coelioxys Cockerell, 1912. Canad. Ent. 44, pp. 168-170. (key to males)

Coelioxys Sladen, 1915. Canad. Ent. 47, pp. 205-208. (key to Ontario spp.)

Coelioxys Crawford, 1914. Ent. Soc. Amer. Ann. 7, pp. 148-150. (key to females)

Coelioxys Cockerell, 1921. Amer. Mus. Novitates 21, pp. 7 & 8. (key)

These are very coarsely sculptured, parasitic bees, usually black, but ferruginous in part in some of the species. The abdomen in the females tapers posteriorly, often acutely pointed, while in the males it is multispinose at the apex. They are parasitic on species of *Megachile* and have some characters in common with that genus. Thus the notaulices are linear, there are no arolia between the claws, and the basal abdominal tergum is shallowly concave anteriorly. In the males sterna 1-4 are exposed, 5 is largely hidden, while 6 and 8 (fig. 63) are retracted, with 7 not represented by a sclerotized plate. Tergum 6 forms the apex of the male abdomen, usually with three pairs of spines or carinae, one dorsal, another ventral, and a shorter pair lateral in position. As in *Megachile* the true apical margin of the tergum is on the ventral surface. Tergum 7 is much reduced but is usually to some degree visible, while 8 is entirely membranous. The male genital armature (fig. 63) is relatively simple and unmodified. In both sexes the metanotum and posterior face of the propodeum are perpendicular, the scutellum quite broad and the axillae usually angulate, often conspicuously produced or spinose. The front coxae of both sexes have a pair of robust spines in most species; the pleura are divided into anterior and lateral faces by a vertical carina; the tubercles are carinate; the maxillary palpi are 3-segmented; the mandibles are 3-dentate; and in the front wings both recurrent veins are received by the 2nd submarginal cell. In the conspicuously hairy eyes they differ from all of the related genera of bees.

KEY TO SPECIES

Females

1. Scutellum shining, largely impunctate, posterior margin sharply angulate
 *dolichos* Fox (p. 200)
- Scutellum well punctured 2
2. Posterior margin of scutellum with a distinct median tubercle
 *germana* Cresson (p. 207)
- Posterior margin of scutellum straight or very broadly angular, but without a median tubercle 3
3. Clypeus bilobed *sayi* Robertson (p. 222)
- Clypeus flat and simple 4

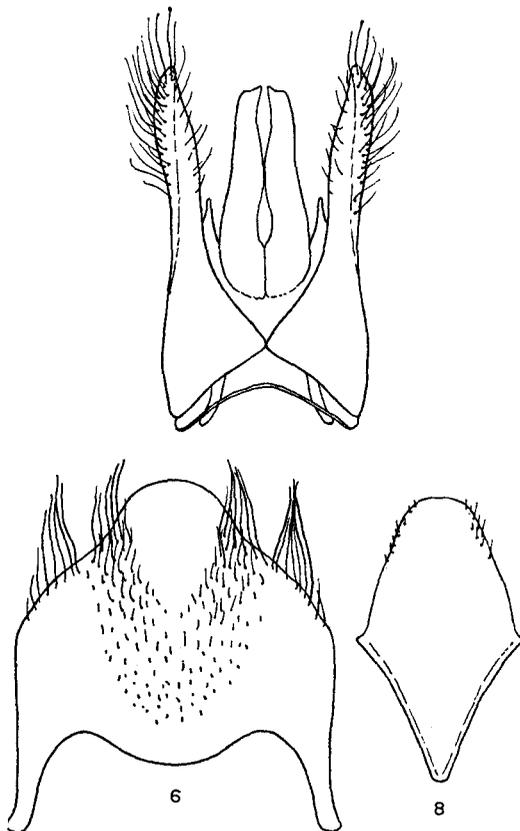


Figure 63
Genital armature and sterna 6 and 8 in male
of *Coelioxys sayi*.

- Sides
4. Sternum 6, either broadly or narrowly rounded, the sides neither notched, sinuate nor incurved 5
 Sternum 6 either notched laterally, or incurved on each side to form an apical, narrowed projection 11
5. Tip of tergum 6 abruptly upturned; basal tergum with both basal and apical white fasciae *modesta* Smith (p. 211)
 Tip of tergum 6 not upturned 6
6. Apical portion of tergum 6 impressed on each side of a low median ridge 7
 Tergum 6 flattened apically, without any evidence of a median carina 8
7. Sternum 6 rounded, apical half with a fringe of very short hairs
 *modesta* Smith (p. 211)
 Sternum 6 acutely triangular, not fringed
 *piercei* Crawford (p. 217)
- 8(6). Clypeus with a short but, ^{very} dense, apical fringe which completely hides the margin *texana* Cresson (p. 228)
 Clypeus not densely fringed apically .. 9
9. Punctures of sternum 5 minute and close, markedly different from the coarse sculpture of sternum 4; tergum 6 dull and densely tessellate, punctures fine, but close and deep
 *hunteri* Crawford (p. 209)
 Punctures of sternum 5 not much different from those of sternum 4, becoming rather fine medially and apically; tergum 6 usually shining, punctures minute, rather sparse except along base. 10
10. Legs and tegulae piceous to blackish
 *alternata alternata* Say (p. 195)
 Legs and tegulae pale ferruginous
 *alternata wisconsinensis* Cockerell (p. 196)
- 11(4). Sternum 6 sinuate laterally, without distinct notches 12
 Sternum 6 with distinct, though often minute, lateral notches 15
12. Sternum 6 broadly expanded, with a terminal slender spine, and fringed on each side of this spine with equally long, stiff, brownish hairs
 *obtusiventris* Crawford (p. 214)
 Sternum 6 relatively narrow, not of the above form 13
13. Tegulae and entire legs, including spurs, blackish or piceous
 *sodalis* Cresson (p. 226)
 Tegulae, spurs, and at least the tarsi, ferruginous 14
14. Clypeus somewhat enlarged and elevated above general level of face; median posterior area of scutum elevated and sparsely punctate
 *immaculata* Cockerell (p. 210)
 Clypeus not enlarged, flattened, at same level with remainder of face; scutum relatively flat, punctures rather close over most of disc
 *galactiae* new species (p. 204)
- 15(11). Scutellum with a distinct, median, longitudinal carina; legs, tegulae, mandibles and venter of abdomen ferruginous; tip of sternum 6 beyond lateral notches acuminate
 *asteris* Crawford (p. 196)
 Scutellum lacking a distinct median carina 16
16. Tergum 6 not carinate apically, being evenly convex from side to side ... 17
 Tergum 6 with a median, longitudinal carina toward apex, more or less excavated on each side 20
17. Cheeks very narrow, hardly more than half as wide as eyes in lateral view of head 18
 Cheeks nearly as wide as eyes
 *funerarea* Smith (p. 203)
18. Cheeks very narrow, less than half width of eyes; tergum 6 straight at sides, quite narrow and elongate; axilla short 19
 Cheeks not so narrow, slightly more than half width of eye; tergum 6 quite broad and short, slightly angulate laterally, tip narrowly truncate; axillae elongate
 *comstockii* Cresson (p. 200)
19. Abdomen red in large part
 *slossoni slossoni* Viereck (p. 226)
 Basal segment of abdomen red, remaining segments black
 *slossoni arenicola* Crawford (p. 224)
- 20(16). Tergum 6 abruptly narrowed near middle, resulting in distinct lateral angles 21
 Tergum 6 not angulate laterally 22
21. Scutum uniformly coarsely and closely punctate; tarsi ferruginous, but legs otherwise usually black
 *rufitarsis* Smith (p. 220)
 Scutum anteriorly with coarse but rather sparse punctures, the median anterior margin largely impunctate; legs entirely ferruginous
 *atlantica* new species (p. 198)
- 22(20). Front coxae with short, but slender and distinct, acute spines
 *8-dentata* Say (p. 215)

- Coxal spines represented by triangular, acute carinae 23
23. Clypeal margin outcurved, to some degree angulate medially
moesta Cresson (p. 213)
 Clypeal margin straight
porterae Cockerell (p. 218)
- Males**
1. Scutellum shining, largely impunctate, posterior margin angulate
dolichos Fox (p. 200)
 Scutellum quite completely punctate, usually not angulate, or very obscurely so 2
2. Posterior margin of scutellum with a distinct median tubercle
germana Cresson (p. 207)
 Scutellum not tuberculate 3
3. Abdominal tergum 2 with a pair of deep, very much elongated foveae, each groove about 15 times longer than its width
rufitarsis Smith (p. 220)
 Foveae of tergum 2, if present, relatively short or shallow 4
4. Basal concavity of abdomen with an elevated, subcarinate rim 5
 Basal concavity of abdomen not carinate 7
5. Tergum 7 with a median, apical, triangular spine; tergum 6 quite broad, with two or three apical crenulations between the distinct lateral spines
texana Cresson (p. 228)
 Tergum 7 not spinose; tergum 6 narrow, with a pair of ventral, elongate, apical spines and a pair of shorter, dorsal spines 6
6. Basal fringe of tergum 1 composed of elongate, greyish hairs; scutellum with a low, median ridge
asteris Crawford (p. 196)
 Tergum 1 with a basal, white fascia; scutellum not ridged
modesta Smith (p. 211)
- 7(4). Sternum 5 quite fully exposed; apical margin of 4 simple and entire, not depressed, at least in center 8
 Sternum 5 retracted, only the apical margin visible in the normal position; apical margin of 4 deeply and abruptly depressed, often emarginate medially . 9
8. Abdomen in large part ferruginous
slossoni slossoni Viereck (p. 226)
 Abdominal terga 2-6 black, the basal tergum and all the sterna ferruginous ..
slossoni arenicola Crawford (p. 224)
- 9(7). Abdominal terga with conspicuous, basal or submedian, widely interrupted, white fasciae, the apical fasciae reduced or interrupted medially; sternum 4 with a wide and deep, median, apical emargination 10
 Basal fasciae of abdominal terga, if present, less conspicuous than apical fasciae; emargination of sternum 4 relatively narrow and inconspicuous, if present 12
10. Disc of sternum 4 with a median, apical, emarginate area, and the depressed apical margin with a broad and quite deep, median emargination 11
 Disc of sternum 4 not emarginate, but the depressed apical margin with a distinct but narrow, median emargination
texana Cresson (p. 228)
11. Legs entirely black; tegulae piceous to blackish
alternata alternata Say (p. 195)
 Legs ferruginous in large part, but tarsal segments darker; tegulae testaceous-hyaline
alternata wisconsinensis Cockerell (p. 196)
- 12(9). Front coxal spines short, reduced to triangular, carinate ridges
floridana Cresson (p. 202)
 Coxal spines well developed 13
13. Tergum 2 not foveate 14
 Tergum 2 with a pair of distinct foveae 19
14. Legs black or piceous 15
 Legs red, at least in part 18
15. Pubescence of face below level of antennae short, subappressed and very dense
boharti new species (p. 206)
 Clypeus and lower part of face with a dense covering of elongate and erect pale pubescence 16
16. Punctures between transverse grooves and apical margins of terga 2 and 3 deep, distinct, quite coarse, and well separated; tergum 2 usually with a pair of very small and obscure foveae
moesta Cresson (p. 213)
 Punctures of terga 2 and 3 beyond the groove either very fine or very close; tergum 2 definitely not foveate 17
17. Transverse grooves of terga 2 and 3 very deep and distinct, becoming median in position at mid-line; dorsal protuberances of tergum 6 very short, broadly rounded, dorso-ventrally flattened
piercei Crawford (p. 217)

often just tucked under sides

each groove has

difficult to detect, usually like edge

have small depression

often showing a depression in itself is depressed

- Transverse grooves of terga 2 and 3 rather shallow and indistinct, at least at mid-line, quite basal in position; dorsal protuberances of tergum 6 laterally compressed, very short and subacute *sodalis* Cresson (p. 226)
- 18(14). Pubescence of face ochraceous, short, dense and subappressed, entirely hiding surface below level of antennae; disc of scutum quite flat, uniformly coarsely punctate *galactiae* new species (p. 204)
- Facial pubescence more greyish or cream-color, more elongate and erect; central area of scutum somewhat swollen, the punctures more coarse and sparse, those around notaulices finer and densely crowded *immaculata* Cockerell (p. 210)
- 19(13). Transverse sulcus of terga 2 and 3 entire, forming a groove across entire width of plate 20
- Transverse sulcus of terga 2 and 3 broadly and completely obliterated toward mid-line *funerarea* Smith (p. 203)
- all 20. Foveae of tergum 2 broad but very shallow, separated from hind margin of plate by a narrow, densely and very finely rugose area *porterae* Cockerell (p. 218)
- u & deep like depression sometimes not
Foveae of tergum 2 very small, pit-like, but usually deep and distinct 21
- is only the places after most closer
21. Vertex more sparsely punctate, interspaces in part much greater than diameter of punctures 22
- Vertex more closely punctate 23
22. Legs dark, at least in part; space between lateral ocelli nearly equal to that between ocelli and hind margin of vertex *sayi* Robertson (p. 222)
- Legs largely red; lateral ocelli considerably nearer to each other than to hind margin of vertex *8-dentata* Say (p. 215)
- 23(21). Legs and tegulae black; punctures of vertex contiguous *moesta* Cresson (p. 213)
- Legs and tegulae ferruginous; punctures of vertex to some degree separated *atlantica* new species (p. 198)

Coelioxys alternata alternata Say

(Figs. 64 & 65)

Coelioxys alternata Say, 1837. Boston Jour. Nat. Hist. 1, p. 401. ♀ ♂.

Coelioxys alternata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 13 mm.; black, including legs; eyes subparallel; lateral ocelli considerably nearer each other than to eyes, and slightly nearer margin of vertex than to each other; cheeks narrower than eyes, carinate posteriorly, terminated beneath by a rather acute angle; clypeus very slightly convex, apical margin crenulate; middle tooth of mandible low and inconspicuous; labrum considerably longer than the basal width; punctures rather sparse and shallow across vertex and between eyes and ocelli, with a slightly swollen impunctate area below anterior ocellus enclosing a few very close and fine punctures, a median raised impunctate line reaching from this to the clypeal margin; cheeks rather closely punctate, becoming finely rugose below, punctures fine and close around ocelli, rather shallow and irregular but quite close on the shining clypeus; thoracic punctures coarse and deep, well separated over most of scutum, but very close on scutellum, close on pleura above, becoming distinctly but not widely separated below, propodeum quite smooth but rather dull, with fine, shallow and vague punctures evident, dorsal area velvety, with a narrow line of fine, obscure striations along upper margin; carina of tubercles hyaline, elongate, erect and conspicuous; scutellum rounded, posterior margin slightly elevated medially; axillae slender and distinct, total length not exceeding median length of scutellum (fig. 64); wings subhyaline, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines reduced to shining, triangular tubercles; transverse grooves of abdominal terga 2-4 submedian in position, obliterated medially, apical margins of terga not depressed medially, but becoming very narrowly and strongly depressed at extreme sides; tergum 6 elongate triangular, the tip narrowly rounded, lateral margins grooved toward apex, shallowly concave on each side (fig. 65); sternum 6 narrowly rounded apically, reaching much beyond tip of tergum; punctures of abdominal terga rather sparse medially, becoming quite close toward sides, especially basad of the transverse groove of each disc; tergum 6 with very fine, well separated punctures, these becoming very sparse across median area; abdominal sterna yellowish-hyaline apically, discs with deep, distinct, well separated punctures, these becoming very fine and close over median area of 6, and finely rugoso-striate apically; pubescence very short and inconspicuous, entirely pale, forming obscure, tomentose bands on scutum anteriorly and laterally and on anterior and posterior margins of scutellum, the basal tergum with a thin and narrow fascia, evident toward sides both basally and apically; basal grooves and apical margins of the following terga more or less distinctly fasciate at extreme sides.

MALE—Length 10-12 mm.; black, the tegulae more or less testaceous-hyaline, and legs black; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; cheeks narrower than eyes, sharply carinate posteriorly, ending at a conspicuous, inferior angle above which it is excavated; clypeus slightly convex, apical margin with 4 low but distinct tubercles; median length of labrum slightly greater than basal width; punctures of vertex coarse and deep but well separated, an impunctate ridge at upper end of each eye, and anterior ocellus surrounded by a largely impunctate, swollen area; punctures of cheeks rather coarse, close and irregular, becoming irregularly and more finely rugose below, punctures fine and densely crowded over median area of face and on clypeus laterally, this more sparsely, irregularly sculptured medially; punctures of scutum coarse, deep, slightly separated in large part, becoming quite close at extreme sides, scutellum very coarsely and closely punctate; punctures of pleura coarse, deep and close above, becoming well separated but hardly sparse below; propodeum dull and densely tessellate, punctures fine, very shallow and obscure, becoming quite close on posterior face, dorsal area smooth and impunctate although dull and tessellate, becoming very narrowly and obscurely striate along upper margin; transverse carina of tubercles strongly elevated and conspicuous; scutellum rounded, hind margin slightly elevated medially; axillae short, total length about equal to median length of scutellum; wings subhyaline basally becoming faintly clouded apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines reduced to short, carinate tubercles; transverse grooves of abdominal terga sub-basal in position, entirely obliterated medially, largely occupied by densely tomentose fasciae, tergum 1 with a nearly complete, apical fascia, and terga 2 and 3 apically fasciate toward the sides; tergum 6 deeply excavated medially, the dorsal projections irregularly multidentate, ventral spines acute but rather short, lateral spines short but distinct; tergum 7 largely retracted, triangularly acute; apical margin of sternum 4 deeply depressed, with a broad and deep, apical emargination formed by a pair of conspicuous, triangular spines, punctures of abdominal terga coarse, deep and distinct, quite sparse medially, becoming quite close laterally, very fine along margins of transverse grooves on 2 and 3; punctures of tergum 6 very close and rather fine; sternal plates deeply, coarsely and quite closely punctate, especially on the more apical plates; pubescence short, rather thin in general, greyish-white, rather copious around antennae and along margin of clypeus and on

cheeks, rather dense around wing bases and on propodeum laterally; gonocoxites of genital armature somewhat enlarged toward apex, only very slightly exceeding penis valves in length, with a few rather short, fine hairs.

DISTRIBUTION—British Columbia to Ontario, Vermont and Massachusetts, south to Florida; April (in Florida) and May to September.

FLOWER RECORDS—*Melilotus* and *Rhus*. Robertson (1929) records this species on *Helianthus*, *Lepachys*, *Petalostemum*, *Pycnanthemum*, *Rudbeckia*, *Verbena* and *Verbena*.

HOST—J. T. Medler has reared *alternata* from nests of *Megachile pugnata*.

***Coelioxys alternata wisconsinensis*
Cockerell new combination**

Coelioxys wisconsinensis Cockerell, 1925. Pan-Pacific Ent. 1, p. 145. ♀.

This agrees with typical *alternata* in details of structure and sculpture, differing in both sexes in the color of the legs and tegulae which are bright ferruginous in most specimens. Occasional specimens exhibit some degree of intergradation between the black in *alternata* or the red in this form.

DISTRIBUTION—Michigan, Ontario and New York, south to North Carolina; June and July.

HOST—This subspecies also has been reared from a nest of *Megachile pugnata* by J. T. Medler.

***Coelioxys asteris* Crawford**

(Figs. 64 & 65)

Coelioxys asteris Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 156. ♀.

FEMALE—Length 12 mm.; black, tegulae yellowish-hyaline, legs ferruginous, and abdominal sterna more or less ferruginous; eyes very slightly convergent below; lateral ocelli considerably nearer each other than to eyes, and nearer margin of vertex than to each other; cheeks above much narrower than eyes and becoming very narrow below, inferior angles obscured by short, dense, whitish pubescence; clypeus quite flat, apical margin straight, covered with a dense fringe of yellowish hairs; mandibles conspicuously 3-dentate; length and basal width of labrum about equal; punctures of vertex coarse, deep and

distinct, becoming somewhat more shallow on cheeks, closer and somewhat finer just below ocelli, but fine, dense and irregular on sides of face below antennae, on supraclypeal area and on clypeus; punctures of thorax very coarse and deep, close but not crowded, but scutellum coarsely rugoso-punctate or reticulate and with a quite distinct, median ridge; propodeum smooth, finely tessellate and rather dull laterally, posterior face more shining, dorsal area very poorly demarked; pubescence very short and inconspicuous, entirely pale, rather dense between antennae and eyes; scutum with a conspicuous, anterior, tomentose band which is slightly interrupted medially, posterior margin with a similar very narrow band; anterior and posterior margins of pleura with rather loose, white tomentose bands; transverse carinae of tubercles strongly elevated, yellowish-hyaline, not produced along anterior margin of scutum; hind margin of scutellum quite abrupt, with a distinct, posterior face; axillae strongly compressed and quite prominent, but length no greater than median length of scutellum (fig. 64); wings rather deeply infuscated except at extreme base, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines reduced to carinate, triangular tubercles; basal abdominal tergum with a rather conspicuous, basal, whitish fascia, an apical fascia evident at extreme sides, surface becoming reddish laterally; transverse grooves of terga 2-4 submedian in position, becoming obliterated medially, not at all fasciate; terga 2-5 with entire, transverse, apical, whitish fasciae that are somewhat narrowed medially; tergum 6 elongate, triangular in outline, tip narrowly rounded, with a low but distinct, median, longitudinal ridge to the tip, very slightly depressed on each side and slightly grooved on each side medially, but without lateral angles (fig. 65); sternum 6 with a pair of subapical, lateral notches; punctures of terga deep, distinct and only slightly separated in areas basad of the transverse grooves, and over entire basal tergum, areas apical to the grooves in large part impunctate, becoming very narrowly punctate along the apical margins, these abruptly and quite deeply depressed except in center; punctures of tergum 6 fine and quite uniformly close at base, becoming densely crowded and obscured toward tip; punctures of the sterna coarse, deep, distinct and quite close, those of sternum 5 becoming very fine and crowded toward the triangular tip.

MALE—Length 11-12 mm., black, the tegulae yellowish-hyaline, legs testaceous to ferruginous; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, very slightly more distant from

margin of vertex; cheeks above much narrower than eyes, becoming still narrower below, inferior angle and hypostomal carinae densely short pubescent, obscuring the surface; clypeus flat, apical margin straight; mandibles appearing bidentate, the middle tooth poorly developed; median length of labrum somewhat greater than basal width; punctures of vertex coarse, deep and distinct, well separated but not sparse, becoming somewhat more shallow and vague on cheeks, crowded and irregular below ocelli, and largely obscured on face by dense, appressed, yellowish pubescence; thoracic punctures very coarse, close and deep, distinct in large part, but very coarse and crowded on scutellum, this with a distinct median, shining ridge; pleura somewhat shining and rather smooth, posterior face more tessellate, with minute, scattered, vague punctures, dorsal area somewhat shining but velvety, entirely impunctate, upper margin quite coarsely and conspicuously but narrowly striate; transverse carina of tubercles erect and conspicuous but not produced along anterior margin of scutum; scutellum rather narrow, hind margin abrupt, nearly straight; axillae strongly compressed, strongly protruding beyond hind margin of scutellum, maximum length somewhat greater than median length of scutellum; wings rather deeply infuscated except at extreme base, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines short but robust and well developed, densely pubescent along anterior outer side; basal abdominal tergum obscurely carinate, this with a thin fringe of elongate, pale hairs, apical margin white fasciate, punctures deep, distinct, rather coarse and close; terga 2-5 with transverse, submedian, shining, impunctate bands, the punctures coarse and rather densely crowded both before and behind these areas, apical margins with nearly complete, whitish, apical fasciae, terga 5 and 6 fasciate at base laterally; tergum 6 narrowly and deeply excavated just before tip medially, dorsal projections short and rounded, lateral angles prominent and acute, and ventral, apical spines elongate-triangular and quite slender, much exceeding the dorsal projections; sterna 1-3 rather broadly but shallowly depressed apically, these margins yellowish-hyaline and more or less fasciate; sternum 4 with a deep, rounded, median emargination, delimited on each side by a slender, spine-like projection which barely attains the apical margin of the depressed, hyaline rim; gonocoxites of genital armature strongly compressed, not much exceeding penis valves, bearing rather fine, elongate, evenly distributed, white hairs.

DISTRIBUTION—Texas to North Carolina and Florida; April to November.

FLOWER RECORDS—*Afzelia*, *Bidens*, *Cephalanthus*, *Erigeron*, *Eryngium*, *Helenium*, *Heterotheca*, *Melilotus*, *Pycnanthemum* and *Solidago*.

Coelioxys atlantica new species

(Fig. 65)

FEMALE—Length 12 mm.; black, tegulae yellowish-hyaline, legs beyond trochanters ferruginous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; cheeks considerably narrower than eyes, narrowed and angulate below; clypeus very slightly convex, apical margin nearly straight, fringed with rather short, dense, pale pubescence; median length of labrum somewhat greater than basal width; median tooth of mandible well developed; punctures coarse and deep, slightly separated across vertex, cheeks more rugose, and face below ocelli coarsely rugose, becoming finely so on supraclypeal area and on clypeus; pubescence of head and thorax entirely pale, slightly yellowish, short and subappressed over much of face, somewhat more copious around antennae and along sides of face, very thin and short on clypeus and supraclypeal area, thin and whitish on cheeks, becoming rather elongate and dense below; mesosternum densely white tomentose medially, pubescence becoming relatively thin on pleura above, with loose but rather distinct, whitish, anterior and posterior fringes; scutello-mesothoracic suture rather densely pale tomentose, scutum with a pair of transverse, anterior lines of tomentum that are subinterrupted medially, being connected by a few scattered, scale-like appressed hairs; posterior face of scutellum densely tomentose; pubescence of propodeum more erect and elongate, thin, entirely whitish; transverse carina of tubercles erect and conspicuous, yellowish-hyaline, projecting slightly along anterior margin of scutum; posterior margin of scutellum very slightly outcurved, the posterior and dorsal faces quite distinct but the line of division not carinate; axillae slender and elongate, tips reaching considerably beyond hind margin of scutellum; coxal spines short but rather distinct, broad and carinate at base, with a slender acute tip, densely pubescent posteriorly; wings subhyaline basally becoming lightly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum somewhat shining between coarse and deep punctures, these slightly separated medially, becoming very close, almost crowded, laterally and anteriorly; scutellum rather coarsely reticulate; axillae somewhat more finely reticulate; pleura shallowly reticulate, becoming somewhat more

coarsely so above; lateral faces of propodeum rather smooth but dull, densely tessellate, posterior face dull, with numerous fine and rather close punctures, dorsal area smooth but velvety, becoming irregularly striate along upper margin; basal abdominal tergum shining, punctures rather coarse, deep and distinct, well separated over most of disc, but becoming closer at extreme sides where the disc is rather densely white pubescent, punctures becoming very fine and close along the depressed apical rim, this with a complete, dense whitish fascia; terga 2 and 3 with complete, narrow and deep, transverse grooves which are basal toward the sides, but more median in position at center, the more basal punctures coarse, deep and quite regularly close, disc beyond the groove largely impunctate, with only a few, irregular scattered punctures medially, but becoming rather closely punctate at extreme sides, apical margins depressed, with entire, dense, whitish fasciae; tergum 4 with a shallow, transverse groove which is obliterated medially, punctures toward base quite coarse, rather close and deep, those toward apical margin sparse and irregular, becoming somewhat closer at extreme sides, apical margin depressed, completely, densely, white fasciate; tergum 5 rather sparsely punctate in general, apical margin with a complete, dense, whitish fascia; tergum 6 rather broad basally, rather abruptly narrowed at mid point and thus with lateral, obtuse angles evident, the apical portion narrowly triangular, tip narrowly rounded, basal portion very regularly, deeply and quite coarsely and closely punctate throughout, with a narrow, longitudinal, median, raised line which continues as a distinct ridge to the apex, surface rather deeply excavated on each side of this toward apex, and lateral margins deeply grooved (fig. 65); sternum 5 rather broad at base, narrowed toward apex, with a pair of distinct, lateral notches toward the tip, this part much longer than breadth at the notches, narrowly acute; sterna 1-4 somewhat shining, coarsely, deeply, quite closely and regularly punctate, apical margins slightly depressed, yellowish-hyaline, rather densely white fasciate; sternum 5 rather coarsely and closely punctate across base, angulate apically, apical portion very finely roughened, margin with a dense, whitish fascia to the tip.

MALE—Length 10 mm.; black, tegulae and legs largely brownish-ferruginous; eyes rather strongly convergent below; lateral ocelli slightly nearer margin of vertex than to eyes, and slightly nearer each other than to margin of vertex; cheeks very slightly narrower than eyes, subcarinate posteriorly, with a bare, deeply concave and elongate area below which has a marginal fringe of dense, whitish pubes-

cence; clypeus nearly flat, apical margin nearly straight, entire surface densely covered with whitish pubescence which obscures the surface; median length of labrum about equal to basal width; middle tooth of mandible about equidistant from apical and inner teeth; punctures quite coarse, deep and distinct, well separated across vertex, becoming sparse just back of lateral ocelli and toward upper margin of eye, cheeks becoming somewhat more finely and closely punctate below, face finely and densely rugose beneath the dense pubescence; pubescence of face and cheeks white, that on cheeks short and thin; pleura with marginal fringes of whitish hairs, scutum with sparse whitish pubescence, largely covered with fine, erect, pale pubescence; transverse carinae of tubercles low, largely obscured by a fringe of white hairs; posterior margin of scutellum nearly straight, posterior face rather sharply delimited from dorsal face, rather densely pubescent; axillae quite robust, acute apically, projecting quite conspicuously from sides of scutellum; coxal spines elongate, somewhat flattened, narrowly rounded apically, densely pubescent posteriorly and laterally; wings subhyaline basally, becoming faintly infuscated apically, 1st recurrent vein reaching 2nd submarginal cell slightly nearer base than 2nd does to apex; scutum very coarsely, closely and deeply punctate, punctures nearly contiguous throughout, becoming somewhat finer and more dense laterally; scutellum and axillae rather coarsely rugoso-punctate; pleura with rather shallow but coarse, contiguous punctures; lateral faces of propodeum dull, posterior face somewhat more shining, with rather close, minute, obscure punctures, dorsal area rather broadly velvety, becoming narrowly rugosostriate along upper margin; basal abdominal tergum shining but closely and deeply punctate, apical margin somewhat depressed, with an entire whitish fascia; terga 2 and 3 with entire, deep and distinct, transverse grooves, punctures basad of the grooves deep, distinct, quite coarse but close and regular, the punctures beyond the grooves more irregular, not quite so close medially where the surface is shining, becoming finely and densely rugose just behind the short but distinct foveae, apical margins of these terga densely white fasciate; terga 4-6 more or less densely fasciate at base, 4 with an apical, dense, whitish fascia which is somewhat narrowed medially, punctures quite coarse, deep and distinct, slightly but not widely separated medially; surface of tergum 6 very closely, deeply and finely punctate, a deep, median excavation just before tip, dorsal protuberances short, divergent, narrowly rounded, ventral spines more slender and elongate, lateral spines well developed, subacute; sterna 1-4 shining, with coarse, deep and quite uniformly close punctures, apical

margins rather deeply depressed, densely white tomentose, forming conspicuous fasciae; disc of sternum 4 not emarginate medially, depressed rim without a conspicuous, median emargination; sternum 5 largely retracted, apical margin nearly straight; sterna 6 and 8 entirely retracted; gonocoxites only slightly exceeding penis valves, rather broadly compressed, with scattered and rather conspicuous, elongate hairs.

TYPES—Holotype: Female, Wake Co., N. C., June 22, 1957 (Mitchell) [author's coll.]. Allotype: Sagamore, Mass. (J. Bequaert) [M. C. Z.]. Paratypes: MASSACHUSETTS: 5 ♀♀, Sagamore. (Bequaert); 3 ♂♂, Lynn, July 10 & 12, 1901 (Davis); 1 ♀, Needham, June 24, 1921, 1 ♀, 1 ♂., Forest Hills, July 20, 1926 and August 20, 1927 (both Mitchell); 1 ♂, Dorchester, July 5, 1909 (Bolster); 1 ♀, Provincetown (A. P. Morse); 1 ♀, Forest Hills, July 31, 1901; 1 ♂, no data. NORTH CAROLINA: 1 ♀, Raleigh, May 16, 1948 (Mitchell). NEW YORK: 1 ♂, Port Ontario, June 27, 1955; 1 ♀, Six-mile Creek, Ithaca, August 27, 1958 (both H. E. Evans). MARYLAND: 1 ♂, Baltimore, July, 1909 (F. E. Blaisdell). ILLINOIS: 1 ♀, 2 ♂♂, Chicago, July 15, 1899. MICHIGAN: 3 ♀♀, Midland Co., June 24, July 8 and 11, 1937-1944; 3 ♀♀, 1 ♂, Huron Co., July 11, 1941 and 1948; 1 ♀, Gladwin Co., July 7, 1935; 1 ♂, Clare Co., June 24, 1936; 1 ♀, Delta Co., July 2, 1955 (all Dreisbach); 1 ♀, Oakland Co., July 7, 1927 (A. W. Andrews); 1 ♀, E. S. George Reserve, Livingston Co., August 1, 1957 (F. C. Evans). NEBRASKA: 1 ♀, Omaha, August 1, 1948 (Dreisbach). CONNECTICUT: 1 ♂, Colebrook, August 3, 1921. MINNESOTA: 1 ♀, Mankato, June 23, 1913; 1 ♀, Washington Co., July 11, 1921. INDIANA: 1 ♀, Cass Co., September 10, 1953. FLORIDA: 1 ♂, Lk. Butler, April 14, 1931. ONTARIO: 1 ♀, Point Pelee, July 26, 1920. MANITOBA: 1 ♀, Aweme, August 20, 1914. (N. Criddle). QUEBEC: 1 ♀, Ile Perrot, August 25, 1956 (A. & H. Dietrich).

Paratypes are in collections of the Museum of Comparative Zoology, Cornell University, Purdue University, the Canadian Department of Agriculture, the University of Minnesota, the University of Rhode Island, the U. S. National Museum, the Florida Plant Board, U. N. Lanham, R. R. Dreisbach and the author.

This female is very similar to *8-dentata*, the chief difference being the markedly angulate sides of tergum 6. Another apparently constant difference is the much more narrow and elongate tip of the 6th sternum beyond the lateral notches. The description of the male is based on three specimens having the same collection data as females. They, also, bear a strong resemblance to *8-dentata*, the chief difference being the closer puncturation of the vertex in *atlantica*.

***Coelioxys comstockii* Cresson**

(Fig. 65)

Coelioxys comstockii Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 96. ♀.

FEMALE—Length 13 mm.; black, tergum 1 somewhat reddened; eyes convergent below; lateral ocelli subequally distant from margin of vertex and each other, more distant from eyes; cheeks about half width of eyes, shallowly grooved below; clypeus slightly convex; apical margin with a short, dense fringe hiding the edge; mid mandibular tooth slightly nearer apical than to inner tooth; punctures deep and close over entire head and thorax, except for finer contiguous punctures on clypeus and supraclypeal area, finer and densely crowded on scutum laterally, coarse and contiguous medially and on scutellum, more distinct on pleura; scutellum somewhat outcurved, upper and posterior surfaces indistinct; axillae slender and elongate; pubescence pale ochraceous, dense on face, but clypeus and vertex very thinly pubescent, dense and more elongate around tubercles and back of wing bases, more whitish on cheeks and pleura; coxal spines very short, triangularly acute; wings subhyaline basally, lightly infuscated apically, veins brownish-testaceous; basal concavity of tergum 1 subcarinate but not fasciate; terga 2 and 3 with distinct transverse grooves, these narrowly obliterated at center, submedian in location at mid-line, becoming basal at each side, punctures sparse over apical area toward mid-line, becoming close at extreme sides and toward apical margin which is only slightly depressed; tergum 4 not distinctly grooved but with a corresponding depressed area rather sparsely punctate, tergum 5 more flattened and much more finely punctate; terga 1-5 with dense, whitish, apical fasciae, that on 5 less evident; tergum 6 slightly angulate on each side, apical half triangular in outline, shallowly grooved on each side toward angle, not carinate medially, apex narrowly truncate (fig. 65); sternum 6 strongly narrowed apically, minutely notched

toward tip, median length of this area somewhat greater than width at the notches; sterna 1-4 closely and deeply punctate, white fasciate apically; sternum 5 triangular apically, narrowly fasciate, deeply punctate across base, becoming dull and impunctate toward apical margin.

DISTRIBUTION—New York.

This species remains to be rediscovered, for no specimens have been collected nor any found in any of the collections received for study. The holotype is in the Philadelphia Academy of Science.

***Coelioxys dolichos* Fox**

(Figs. 64-66)

Coelioxys dolichos Fox, 1890. Ent. News 1, p. 107. ♀.

FEMALE—Length 15 mm., entirely black, the tarsi becoming more or less brownish; eyes slightly convergent below; lateral ocelli slightly nearer margin of vertex than to each other, slightly more distant from eye; cheeks very much narrower than eyes, triangularly produced below; clypeus strongly convex, little if any produced apically, the margin somewhat thickened, very slightly outcurved; median tooth of mandibles low but distinct; median length of labrum slightly greater than basal width; vertex, interocellar area, and area below anterior ocellus largely shining and impunctate, with only a few scattered punctures; vertex with a single row of punctures along margin; supraclypeal area with coarse, deep and well separated punctures, the clypeus more finely and sparsely punctate medially, somewhat more closely at extreme sides; cheeks subcarinate posteriorly, with scattered, irregular, but deep and distinct punctures; median area of scutum largely shining and impunctate, with only a very few, widely scattered, rather fine punctures, these becoming closer, more coarse and deep around lateral and anterior margins; scutellum flattened, triangularly produced posteriorly, shining and impunctate medially, with a few, scattered punctures at each extreme side; axillae elongate-triangular, produced considerably beyond lateral limits of scutellum, with only a few, scattered, fine punctures (fig. 64); pleura closely and deeply punctate just below tegulae, but quite sparsely punctate below; lateral faces of propodeum very dull, finely and densely tessellate, posterior face tessellate, with some minute, vague and indistinct punctures barely evident, dorsal area rather smooth but densely tessellate, becoming irregularly rugostriate along upper margin; pubescence very short, white, quite dense along sides of face, hind border of eyes, around tubercles, and

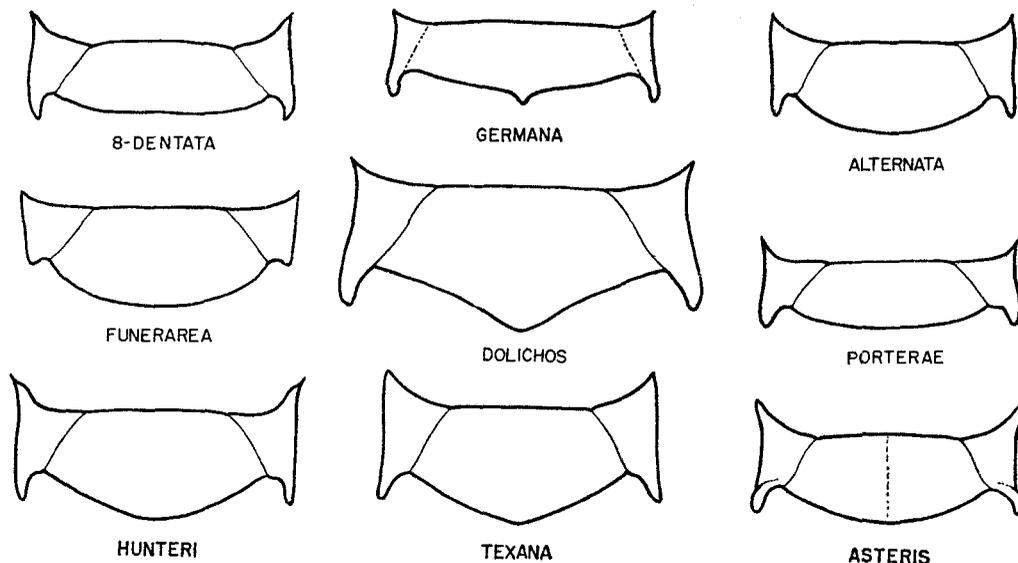


Figure 64—Scutellum and axillae in species of *Coelioxys*.

along anterior and posterior borders of pleura, quite dense along lateral margins of propodeum and across posterior face dorsally; transverse carinae of tubercles conspicuous and erect, extending but very slightly along anterior margin of scutum; wings deeply infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines reduced to very short, acute tubercles; transverse grooves of abdominal terga evident only toward sides, sub-basal in position, entirely obliterated medially, very closely and deeply punctate, the area beyond very sparsely, coarsely and deeply punctate, apical margins abruptly but very narrowly depressed, with white, apical fasciae which are quite dense and conspicuous at each extreme side, becoming thin and inconspicuous medially on the more basal terga, widely separated on the more apical terga; tergum 6 shining, finely and sparsely punctate in large part, becoming somewhat more closely punctate across base, narrowed apically, lateral margins slightly incurved just before the subtruncate apex, with a median, longitudinal carina, deeply excavated on each side of this near tip (fig. 65); sternum 6 narrow, projecting slightly beyond 6th tergum, with a distinct, median, longitudinal carina, which projects slightly beyond apex as a triangularly pointed tubercle; sterna 1-4 coarsely and deeply punctate, rather sparsely so medially, becoming quite close laterally, apical margins rather broadly depressed, becoming yellowish-hyaline toward rims; sternum 5 more narrowly rounded apically, punctures relatively close.

MALE—Length 11-12 mm.; entirely black; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, slightly more distant from margin of vertex; cheeks very narrow, subcarinate posteriorly, terminated by an obtuse angle below, above which it is rather deeply excavated, margins of the hypostome strongly carinate; clypeus slightly convex, apical margin nearly straight, with a dense fringe of elongate, yellowish pubescence; median mandibular tooth strongly developed; median length of labrum slightly greater than basal width; vertex and area between eyes and ocelli shining, sparsely punctate, becoming rather abruptly, coarsely, rugoso-punctate just below anterior ocellus, the supraclypeal area very finely rugose but densely pubescent; exposed area of clypeus shining and sparsely punctate; cheeks closely, coarsely and deeply punctate; scutum shining and largely impunctate medially, becoming rather coarsely and deeply but still sparsely punctate laterally and anteriorly; scutellum shining, largely impunctate with only a very few deep punctures at extreme sides and along posterior margin, broadly, triangularly produced posteriorly, overhanging the metanotum; axillae prominent, elongate-triangular, produced considerably beyond lateral margins of scutellum, rather sparsely punctate and shining; transverse carina of tubercles erect and conspicuous, extended somewhat along anterior margin of scutum; pubescence of face strongly yellowish, dense on each side of clypeus and quite dense over median area of face, thin and whitish on cheeks, forming a

whitish fringe along anterior and posterior margins of pleura, and quite dense on propodeum posteriorly; wings deeply infuscated, 1st recurrent vein nearly or quite interstitial with 1st transverse cubitus, the 2nd reaching 2nd submarginal cell near but not at the tip; coxal spines reduced to narrowly rounded tubercles; transverse grooves of abdominal terga 2-5 evident only by markedly depressed, closely punctate, basal areas toward sides, the apical half of these discs more sparsely, coarsely and deeply punctate, median areas of all shining, very sparsely and finely punctate, apical margins narrowly depressed, white fasciate toward sides of 2-5, but these widely interrupted medially, basal tergum with a complete, dense, white, apical fascia which becomes much narrowed medially; tergum 6 shining, sparsely and minutely punctate medially, but punctures becoming somewhat more coarse, close and deep at extreme sides, somewhat deeply excavated medially toward apex, the dorsal protuberances elongate and spine-like, rather strongly divergent, the ventral spines slender, considerably exceeding the dorsal spines, and lateral spines quite slender and elongate (fig. 66); abdominal sterna shining, sparsely and finely punctate medially, but punctures becoming quite coarse, close and deep at extreme sides; sternum 5 fully exposed, outcurved apically, punctures rather fine but somewhat closer medially, becoming quite close toward extreme sides; sterna 6-8 entirely retracted; gonocoxites of genital armature somewhat compressed, barely exceeding the penis valves in length, bearing a few, rather sparse, elongate hairs toward apex.

DISTRIBUTION — North Carolina to Florida; March to November.

FLOWER RECORDS — *Bidens*, *Borrichia*, *Flaveria*, *Gaillardia*, *Ilex*, *Itea*, *Rhus*, *Senecio* and *Solidago*.

HOST—K. V. Krombein has reared *dolichos* from nests of *Megachile xylocopoides*.

Coelioxys producta Cresson from Cuba bears a strong resemblance to *dolichos*, differing chiefly in having red legs. Possibly these two should be considered to be only subspecifically distinct, but no intermediates have been seen. Additional records from the West Indies, along with host records, may give a clue to their relationship.

Coelioxys floridana Cresson

(Fig. 66)

Coelioxys floridana Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 98. ♂.

MALE—Length 12 mm.; black, tegulae tes-

taceous-hyaline, legs largely brownish-testaceous; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; cheeks slightly narrower than eyes, subcarinate posteriorly, lower margin shallowly excavated, shining and impunctate; clypeus nearly flat, margin nearly straight, with a few, low, obscure crenulations; median tooth of mandible low and inconspicuous; median length of labrum somewhat greater than basal width; vertex and area between eyes and ocelli shining, punctures coarse and close but hardly sparse, face below ocelli becoming abruptly, coarsely rugose, very finely subrugose below antennae beneath the dense pubescence, clypeus rather finely and irregularly rugose; punctures of cheeks shallow, irregular and rather obscure, quite coarse in general; transverse carinae of tubercles well developed, strongly produced at upper end, slightly overlying anterior margin of scutum; hind margin of scutellum nearly straight; axillae elongate triangular, protruding much beyond margin of scutellum; punctures coarse and deep but distinct over most of scutum, becoming contiguous at extreme sides and across anterior margin, scutellum with similar but somewhat closer punctures, pleura very coarsely rugosopunctate beneath tegulae, doubly punctate beneath this, with very large, shallow, well separated punctures, between which there are numerous, fine, scattered punctures; lateral and posterior faces of propodeum dull and densely tessellate, punctures hardly evident, dorsal area smooth and tessellate, becoming irregularly but rather coarsely rugose along upper margin; pubescence whitish, rather elongate and dense on face and clypeus, white and very short but rather dense on cheeks, the hypostomal area with a dense brush of short pubescence; anterior and posterior margins of pleura with a loose, whitish fringe, scutum with a transverse, anterior, tomentose line which is interrupted medially, and scutello-mesothoracic suture with a very narrow, dense line of tomentum; propodeum with rather elongate, thin, whitish pubescence posteriorly and along posterior margins of lateral faces; wings lightly infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines reduced to triangular, carinate tubercles which are densely fringed posteriorly; transverse grooves of terga 2-4 sub-basal in position, entirely obliterated medially, closely and deeply punctate toward basal margin, but the more apical margin rather broadly impunctate, but disc becoming closely punctate just before the abruptly depressed apical rims, median areas of all terga very sparsely and finely punctate, rims more or less yellowish-hyaline; terga 1-5

with whitish, apical fasciae that are usually entire but somewhat narrowed medially, basal grooves of 4 and 5 also white fasciate, and 6 with a fasciate band across extreme base; tergum 3 with a pair of deep, rounded foveae just posterior to the end of each lateral groove; tergum 6 shining, finely and quite sparsely punctate, very deeply excavated toward tip, the dorsal protuberances triangular, narrowly rounded apically, rather short, the ventral pair elongate, acute, rather strongly compressed, lateral spines well developed (fig. 66); sterna 1-4 with coarse, deep and quite close punctures, apical margins of 2-4 rather abruptly and narrowly depressed, quite strongly white fasciate, 4 somewhat triangular in form, disc with a deep, median emargination lying just above the depressed, testaceous rim which is also shallowly emarginate medially; sternum 5 largely hidden, margin very shallowly incurved and submembranous; sterna 6 and 8 entirely retracted; tergum 7 largely hidden, rounded, not at all acute medially; gonocoxites of genital armature rather slender, with only scattered, erect, somewhat elongate hairs, slightly exceeding the penis valves in length.

DISTRIBUTION — North Carolina to Florida; July.

Coelioxys funerarea Smith

(Figs. 64-66)

Coelioxys funerarea Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 272. ♂.

Coelioxys lateralis Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 405. ♂. New synonymy.

Coelioxys lucrosa Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 97. ♀. New synonymy.

Coelioxys lateralis Cockerell, 1921. Amer. Mus. Novitates 21, p. 5. ♂.

Coelioxys lucrosa Graenicher, 1927. Ent. News 38, p. 233. (biology)

Coelioxys lucrosa Medler, 1958. Canad. Ent. 90, p. 326. (host)

Coelioxys lucrosa Medler and Koerber, 1958. Ent. Soc. Amer. Ann. 51, p. 343. (biology)

FEMALE — Length 12-16 mm.; entirely black, including tegulae and legs; eyes very slightly convergent below; face broad, distance between eyes above nearly equal to median length; lateral ocelli considerably nearer to each other than to eyes, separated from margin of vertex by about their own diameter; cheeks considerably narrower than eyes, somewhat excavated below just before inferior angle, this area pubescent; clypeus slightly convex, not much produced apically, margin slightly outcurved, densely covered with rather short, ochraceous pubescence; mandibles angulate medially as seen from above, the median

tooth small but distinct; median length of labrum somewhat greater than basal width; punctures rather coarse and deep, well separated on vertex between eyes and lateral ocelli, but close between and below ocelli; cheeks rather coarsely rugose; face below antennae rugose, clypeus very finely so, pubescence of head and thorax entirely pale, more or less yellowish and quite copious around antennae, on sides of face below, short and rather copious on cheeks below and on thorax laterally and posteriorly; transverse carinae of tubercles very low and inconspicuous, barely evident; scutellum rather evenly outcurved posteriorly, posterior face quite abrupt; axillae very short, posterior angle barely evident (fig. 64); scutum shining, deeply and distinctly punctate, punctures well separated over the broad, median area, but becoming quite close and somewhat finer between notaulices and tegulae; scutellum more finely punctate, punctures contiguous; axillae shining and more sparsely punctate; pleura somewhat shining between rather close, shallow but uniform punctures, these becoming very close just below tegulae; propodeum dull but rather smooth, punctures exceedingly minute but quite close, dorsal area of posterior face more velvety below, becoming very obscurely substriate along upper margin; wings subhyaline, becoming somewhat clouded along apical margin and in marginal cell, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines represented by very low, subcarinate tubercles; transverse grooves of median abdominal terga very shallow, barely evident, entirely obliterated medially, terga shining and sparsely punctate medially, but somewhat more finely and closely punctate across basal third of each one, the apical third very sparsely punctate, apical margins narrowly but quite deeply depressed at each extreme side, becoming quite flat medially, the depressed margins densely white fasciate at extreme sides, these becoming very narrow and indefinite medially; basal tergum with a dense patch of white pubescence at each extreme side; tergum 6 subtriangular in outline, slightly incurved toward the narrowly rounded tip, with a very faint and indefinite, median ridge extending from near the base nearly to the tip, surface shining, finely and quite closely punctate, but the punctures obsolescent toward the narrowed tip (fig. 65); sternum 6 narrow and elongate, much longer than the tergum, obscurely notched on each side near the tip, width at the notches slightly less than distance to the apex; sterna 1-4 shining, punctures well separated medially, becoming very close laterally, rather deep and distinct, apical margins very narrowly and slightly depressed, more or less hyaline and with narrow, white fasciae; sternum 5 tri-

angularly produced apically, punctures fine but fairly distinct toward base and at extreme sides, but disappearing toward the apex medially, apical margin quite conspicuously fasciate.

MALE—Length 9-12 mm.; entirely black, including tegulae and legs; eyes convergent below; lateral ocelli subequally distant from each other and margin of vertex, much more distant from eyes; cheeks nearly equal to eyes in width, subcarinate posteriorly, with a shining, shallow, excavated area below, densely pubescent between this and the hypostome; clypeus very slightly convex, apical margin nearly straight, densely pubescent, obscuring the surface; median tooth of mandibles conspicuous; median length of labrum about equal to basal width; punctures deep and rather coarse, close over most of vertex, cheeks becoming more rugose, and face below ocelli dull and densely, coarsely rugose above antennae, becoming very finely so below; pubescence entirely pale on head and thorax, more or less yellowish on front of face, copious and more whitish on cheeks below and on thorax laterally and posteriorly, rather thin on dorsum, dense and white on sternum; transverse carina of tubercles barely evident, very low and inconspicuous; scutellum slightly outcurved, posterior margin not abrupt; axillae very short, broadly triangular, apex barely produced beyond margin of scutellum; coxal spines well developed, more or less spatulate, with rounded apex, quite densely pubescent, especially posteriorly; wings subhyaline, becoming faintly clouded apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; transverse grooves of abdominal terga 2 and 3 quite deep and distinct laterally, obliterated medially, punctures in the grooves close and rather fine but distinct, apical margin of the groove on tergum 2 with a deep, somewhat elongate fovea on each side, apical margin of this fovea narrowly impunctate, median punctures of all terga quite sparse, surface shining, punctures becoming closer toward sides, densely crowded between foveae and apical margin on 2, margins of all quite abruptly depressed toward sides but less so toward median line, brownish-hyaline, densely white fasciate laterally, but rather widely interrupted medially; dorsal, apical projections of tergum 6 spine-like, rather elongate but narrowly rounded apically, surface quite deeply excavated between these, ventral spines narrow and elongate, about parallel, lateral spines quite slender and elongate (fig. 66); abdominal sterna 1-4 somewhat shining, rather finely punctate, punctures well separated medially, becoming closer toward sides, apical margins narrowly brownish-hyaline and narrowly pale fasciate,

apical margin of 4 not emarginate medially; sternum 5 largely retracted, apical margin barely evident, broadly outcurved, the median area straight; sterna 6 and 8 entirely retracted, 8 slightly narrowed apically, with narrowly truncate apex; penis valves fully equalling gonocoxites in length, the gonocoxites copiously long pubescent.

DISTRIBUTION—Yukon Territory and British Columbia to Nova Scotia, South to Illinois and Pennsylvania, with one record in Georgia; May to September.

HOSTS — *Megachile inermis* Prov., *M. relativa* Cress., and *M. frigida* Sm.

Coelioxys galactiae new species

(Figs. 65 & 66)

FEMALE—Length 10 mm.; black, tegulae testaceous, legs and abdominal sterna ferruginous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, slightly nearer each other than to eyes; cheeks much narrower than eyes, somewhat narrowed below, inferior angle obscured by dense pubescence, this area not excavated; clypeus flat, apical margin about straight, with a rather dense fringe of moderately long, yellowish pubescence; median length of labrum slightly greater than basal width; mandibles distinctly 3-dentate, median tooth approximate to the apical tooth; punctures rather deep and distinct, irregular in size and distribution, but rather close across vertex, cheeks rather irregularly rugoso-punctate beneath the pubescence, face below ocelli quite closely punctate, supraclypeal area rather shallowly and coarsely rugoso-punctate, surface at sides of face obscured by dense, subappressed pubescence, clypeus finely and irregularly rugose beneath dense, appressed tomentum; pubescence entirely pale, more or less yellowish around antennae and over face and clypeus, more whitish, quite short and decumbent on cheeks; ventral surface of mesothorax densely white tomentose, obscuring the surface, becoming thinner above but with rather dense anterior and posterior fringes, copious around tubercles, propodeum with more erect, elongate, whitish pubescence; transverse carinae of tubercles erect and conspicuous, testaceous-hyaline, extending somewhat along anterior margin of scutum; posterior margin of scutellum only slightly outcurved, posterior and dorsal faces not sharply differentiated; axillae acute, projecting conspicuously from sides of scutellum, length somewhat greater than median length of scutellum; coxal spines reduced to triangular, subcarinate tubercles which are densely pubescent posteriorly; wings

subhyaline, faintly infuscated along outer margin, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; scutum somewhat shining between quite coarse and deep punctures, these rather widely separated on each side of center, becoming somewhat finer and closer medially and along sides; punctures of scutellum scattered and irregular, with some rather broad, intervening spaces; punctures of axillae very close and coarse, becoming more reticulate; punctures of pleura rather shallow but coarse and very close in large part, area below tegulae more reticulate; lateral faces of propodeum rather smooth but dull, posterior face somewhat more shining, with rather close, minute and vague punctures beneath the thin, elongate pubescence, dorsal area velvety, becoming quite distinctly and rather coarsely striate along upper margin; basal abdominal tergum shining, punctures quite coarse, close along margin of the concavity, but otherwise rather sparse, the extreme sides densely tomentose and apical margin with a complete, dense, whitish, apical fascia; terga 2 and 3 with complete, transverse, but rather shallow grooves, these sub-basal at sides but becoming more subapical at center, the basal punctures quite coarse, close, regular and deep, the area apical to the groove very sparsely punctate medially, becoming somewhat more closely but coarsely and irregularly punctate at sides, apical margin slightly depressed, with entire, whitish, apical fasciae; terga 4 and 5 rather coarsely and sparsely punctate apically, punctures closer and finer toward base and somewhat closer at extreme sides, apical margins depressed and whitish fasciate; tergum 6 triangular, with a rather narrowly rounded tip, sides very slightly angulate at mid point, a low median ridge extending from near the base to the tip, surface quite deeply excavated on each side of this near tip, and sides rather deeply grooved from lateral angles toward tip, surface somewhat shining basally, with close and fine punctures, these becoming crowded apically, apex more densely rugose (fig. 65); sternum 6 broad basally, abruptly narrowed at apex, thus incurved at each side, the tip subtriangular, more or less acute; sterna 1-4 shining between coarse, close, deep and quite regular punctures, apical margins depressed and yellowish-hyaline, densely and rather loosely white fasciate; sternum 5 narrowly rounded or subtriangular in outline, basal area with rather coarse, sparse, scattered punctures, these becoming extremely minute and densely crowded over apical half, margin narrowly yellowish-hyaline, and fringed with whitish pubescence.

MALE—Length 11 mm.; black, tegulae testaceous-hyaline, legs and abdominal sterna

largely ferruginous; eyes slightly convergent below; lateral ocelli very slightly nearer each other than to margin of vertex, somewhat more distant from eyes; cheeks considerably narrower than eyes, carinate posteriorly, with a shining, bare, concave, excavated area below, this fringed posteriorly with rather elongate, curved hairs; clypeus about flat, apical margin straight but obscured by dense pubescence; median length of labrum somewhat greater than basal width; median tooth of mandible distinct, approximate to apical tooth; punctures coarse and deep, rather close but distinct across vertex and between ocelli, becoming more rugose on cheeks, quite coarse, irregular and rather shallow below ocelli, entire face below antennae densely covered with appressed pubescence which completely hides the surface; pubescence of face yellowish, whitish and rather short and subappressed on cheeks, ventral surface of thorax densely white tomentose, completely hiding surface, becoming rather thin and more erect on pleura above, scutello-mesothoracic suture with very fine, pale pubescence, and anterior margin of scutum with a pair of transverse, rather widely separated lines of whitish pubescence; pubescence of propodeum thin, elongate and erect, entirely whitish; transverse carinae of tubercles erect and quite conspicuous, more or less testaceous-hyaline but somewhat obscured by a fringe of pubescence, extending somewhat along anterior margin of scutum; hind margin of scutellum very slightly outcurved, posterior and dorsal faces not differentiated; axillae acute apically, projecting conspicuously from sides of scutellum, somewhat longer than median length of scutellum; front coxal spines robust and well developed, somewhat spatulate, with rounded tips, densely pubescent posteriorly and along inner sides; wings subhyaline becoming somewhat more deeply infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum coarse and rather deep, somewhat irregular, slightly separated on each side of mid-line but becoming close laterally, finer anteriorly; punctures of scutellum irregular, much like those of scutum, to some degree separated; axillae very coarsely, contiguously punctate, almost reticulate; pleura irregularly and rather closely punctate, punctures rather shallow, more definitely reticulate above; lateral faces of propodeum rather smooth but dull, posterior face somewhat more shining, with very minute, widely scattered, obscure punctures, dorsal area velvety, becoming rather narrowly and coarsely striate along upper margin; basal tergum shining between coarse, close and deep punctures, these quite regularly distributed, surface obscured by a narrow patch of dense tomentum at each extreme side, apical

margin with a complete, dense, whitish fascia; terga 2 and 3 with deep, distinct and complete transverse grooves, these sub-basal at extreme sides but more median in center, the more basal punctures coarse, close, deep and quite regular, apical portion of disc somewhat more irregularly and sparsely punctate medially, becoming more coarsely, closely and deeply punctate at sides, apical margins deeply depressed and with complete, dense, whitish fasciae; terga 4 and 5 densely white fasciate across the base, apical margins deeply depressed, fasciate only toward sides of 4, with only a trace on extreme sides of 5, surface somewhat shining, punctures coarse, deep and rather sparse at center, becoming closer laterally; tergum 6 densely tomentose across base, deeply excavated in center, the dorsal protuberances very short, broadly rounded and carinate, quite strongly divergent, ventral spines very short, subtruncate, the intervening space regularly rounded, lateral spines somewhat compressed, the tips rounded (fig. 66); sterna 1-4 somewhat shining between coarse, deep, regular and rather close punctures, apical margins depressed, yellowish-hyaline, quite densely whitish fasciate, that on 4 quite narrow; disc of sternum 4 very slightly emarginate apically, but the depressed rim also with a slight, median, apical emargination; sternum 5 largely hidden, apical margin broadly incurved, surface in general rather densely pubescent; sterna 6 and 8 entirely retracted, submembranous; penis valves of genital armature quite robust, about equalling gonocoxites in length, the latter somewhat compressed, slightly dilated apically, bearing numerous, elongate and erect hairs toward apex.

TYPES — Holotype: Female, 10 mi. S. Lillington, N. C., June 23, 1937. Allotype: Topotypical [both author's coll.]. Paratypes: NORTH CAROLINA: 3 ♀♀, Lillington, July 7, 1938; 1 ♀, Hoffman, July 4, 1928; 1 ♂, Holly Shelter, Pender Co., June 8, 1950 (on *Amorpha*); 3 ♀♀, Topsail Isl., Aug 3, 1955 (on *Galactia*); 1 ♂, West End, Moore Co., June 14, 1950 (on *Asclepias tuberosa*); 1 ♂, Wilmington, June 20, 1952 (all Mitchell); 1 ♂, Salvo, Dare Co., Aug. 6, 1958 (K. V. Krombein). ILLINOIS: 1 ♂, Chicago, July 15, 1899 (Percy Gardner Bolster coll.). FLORIDA: 1 ♀, Gold Head Branch St. Pk., Clay Co., May-June, 1954 (L. H. Krombein). 5 ♂♂, Levy Co., July 13, 1954 (H. V. Weems, Jr., on *Eriogonum tomentosus*).

Paratypes are in the U. S. National Museum, the Museum of Comparative Zoology and the author's collection.

Coelioxys boharti new species

MALE—Length 12 mm.; black, tegulae more brownish-testaceous, legs obscurely reddened; eyes slightly convergent below; lateral ocelli slightly nearer eyes than to margin of vertex, and slightly nearer each other than to eyes; cheeks somewhat narrower than eyes, subcarinate posteriorly, with an elongate, bare, slightly concave area below which is conspicuously margined posteriorly by a fringe of elongate hairs, anterior margin with very short but dense pubescence; clypeus nearly flat, apical margin about straight, with a pair of fine rather widely separated tubercles, margin and surface with dense, whitish pubescence; median length of labrum about equal to basal width; median tooth of mandible distinct, approximate to the apical tooth; punctures quite deep and distinct but not very coarse, well separated across vertex, becoming quite sparse between ocelli and eyes, close and irregular on cheeks; median area of face just below anterior ocellus with scattered, irregular punctures on a rather smooth, somewhat elevated field, but remainder of face around and below antennae densely covered with appressed, pale yellowish pubescence which completely hides the surface; pubescence of cheeks above very short but subappressed, obscuring the surface; venter of thorax densely white tomentose, completely hiding surface, becoming partially exposed above, but with dense anterior and posterior fringes; scutello-mesothoracic suture with a short line of pale tomentum on each side of center, scutum with a pair of transverse, anterior lines of tomentum, and the lateral margins narrowly tomentose; pubescence of propodeum entirely pale, rather copious, erect and long; transverse carinae of tubercles erect and rather conspicuous, extended but very slightly along anterior margin of scutum, partially covered with short, dense pubescence; posterior margin of scutellum very slightly outcurved, posterior face rather distinct and densely tomentose; axillae robust, triangularly pointed apically, projecting conspicuously beyond margin of scutellum; front coxal spines well developed, compressed and somewhat spatulate, the tips rounded, densely pale pubescent posteriorly, and with some short, dense pubescence anteriorly; wings rather deeply infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum coarse, deep and distinct, slightly and regularly separated over most of disc, but becoming close at extreme sides; punctures of scutellum dorsally coarse and close medially, becoming slightly separated laterally but still quite close, those of axillae somewhat finer but contiguous, becoming thus more reticulate; punctures of pleura rather shallow, coarse and ir-

regular, very close but not crowded below, becoming closer and more reticulate above; lateral faces of propodeum smooth but rather dull, posterior face somewhat more shining, with numerous, rather close but very minute and obscure punctures, dorsal area velvety, becoming rather coarsely striate across upper margin; basal tergum closely and deeply punctate throughout, punctures not very coarse, apical margin depressed and completely whitish fasciate, fascia becoming narrower medially, lateral margins of discs densely tomentose; transverse grooves of terga 2 and 3 submedian in center, becoming sub-basal at extreme sides, the more basal punctures quite regular, rather coarse, deep, distinct and well separated, the more apical punctures more irregular, rather widely separated at center, but becoming quite close at extreme sides, apical margins rather deeply depressed, completely whitish fasciate, disc of tergum 2 on each side with a narrow, transverse area of dense and fine punctures, which possibly represent foveae; tergum 4 thinly pale tomentose across base, apical margin deeply depressed and densely fasciate at the sides, this disappearing medially, surface shining, median punctures coarse, deep and rather sparse, becoming quite close laterally; tergum 5 densely tomentose across base, apical margin deeply depressed, fasciate only at extreme sides, disc shining, punctures rather well separated throughout; tergum 6 densely pale tomentose across base, deeply excavated at center, dorsal protuberances short, broadly rounded, subcarinate and divergent, ventral spines reduced to short, rounded protuberances which are markedly flattened, intervening space relatively shallow and rounded, lateral spines distinct and subacute; sterna 2-4 somewhat shining, punctures regular, deep, distinct and rather close throughout, apical margins depressed, yellowish-hyaline and densely white fasciate; disc of sternum 4 not emarginate medially, the depressed margin less conspicuously fasciate and with a narrow, but distinct, median emargination; sternum 5 largely hidden, apical margin submembranous, nearly straight medially; sterna 6 and 8 entirely retracted, membranous, 8 rather broadly rounded apically, without a conspicuous fringe; penis valves of genital armature relatively narrow at base, not much elongated, hardly equalling gonocoxites in length, these compressed, slightly dilated before the tip, but tips acuminate, apical half bearing numerous, erect and elongate hairs.

TYPE — Holotype: Male, Cocoa, Fla., July 1944 (G. E. Bohart).

This male bears a strong resemblance to the male of *galactiae* but differs in the darker color of the legs, the broader vertex,

and the appressed and scale-like pubescence of the pleura. Possibly it should be considered only subspecifically distinct from *galactiae*, but the female is needed before a positive opinion is justified.

Coelioxys germana Cresson

(Figs. 64-66)

Coelioxys germana Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 102. ♀.

Coelioxys germana Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE — Length 12 mm.; black, the tegulae testaceous-hyaline, legs brownish-testaceous, basal abdominal sterna more or less ferruginous; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and each other, separated from margin of vertex by about their own diameter; cheeks very narrow, carinate posteriorly, angulate but not excavated below; clypeus very slightly convex, apical margin nearly straight, with a rather dense, apical fringe of pale pubescence; median tooth of mandibles conspicuous; median length of labrum not much exceeding basal width; punctures deep, distinct and quite coarse, close but distinct along narrow vertex, somewhat more sparse between ocelli, slightly separated below ocelli and over supraclypeal area, the clypeus very finely, closely and irregularly punctate, the punctures variable in size; punctures of cheeks obscured by dense pubescence; pubescence entirely pale, short and rather thin over median areas of face, but dense along inner margins of eyes and on cheeks; lateral faces of pleura with dense, white, anterior and posterior fringes, the scutello-mesothoracic suture with a quite dense fringe of more ochraceous tomentum, and scutum with a pair of anterior lines of whitish tomentum that are rather broadly separated medially, propodeum with rather thin and more elongate, whitish pubescence; transverse carinae of tubercles evident but not conspicuous; upper and posterior surfaces of scutellum not sharply differentiated, but hind margin with a conspicuous, median tubercle; axillae slender and elongate (fig. 64); coxal spines short but distinct, triangularly acute; punctures of scutum deep, distinct and quite coarse, distinctly but not widely separated in large part, somewhat closer between notaulices and tegulae; scutellum rather closely punctate on each side of a shining median, impunctate area; punctures of axillae quite close but distinct; pleura shining and sparsely punctate below, between the marginal pubescent fringes, becoming closely punctate above just below tegulae; lateral faces of propodeum somewhat smoother, rather dull, very finely and obscure-

ly punctate, posterior face somewhat more shining, punctures minute and rather close, dorsal area more velvety, upper half becoming irregularly and finely rugoso-striate; wings subhyaline, becoming lightly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; transverse grooves of abdominal terga 2-5 submedian in position, shallow but rather distinct, obliterated medially, discs rather closely but distinctly punctate between the grooves and base, sparsely punctate apically, apical margins rather abruptly but very narrowly depressed toward the sides, 1-5 with very narrow, dense, white, apical fasciae that are much narrowed or subinterrupted medially; tergum 6 subtriangular in outline, lateral margins very shallowly incurved just beyond mid point, apex very narrowly rounded, surface shining over basal half, closely, deeply and finely but quite regularly punctate, becoming dull, finely rugose toward apex, with a barely evident, median, raised line toward the tip (fig. 65); sternum 6 elongate-triangular, with a pair of deep and distinct, lateral notches toward the narrow, acute apex, this part nearly twice as long as width at the notches; basal tergum quite distinctly carinate at each side, lower surface ferruginous, sterna 1-4 shining, deeply, rather coarsely and closely punctate, punctures becoming somewhat closer at extreme sides, apical margins somewhat depressed, yellowish-hyaline, white fasciate; sternum 5 narrowly produced apically, basal half closely and deeply punctate, the punctures becoming minute and indefinite toward the rather acutely pointed tip.

MALE—Length 9.5-11mm.; black, the tegulae testaceous-hyaline, legs brownish-testaceous, abdomen more or less ferruginous beneath toward base; face rather narrow, eyes quite strongly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, very slightly nearer to each other; cheeks very narrow, carinate posteriorly, very deeply excavated below, this excavation polished and impunctate; clypeus very slightly convex, densely short pubescent, completely hiding the surface, apical margin apparently very slightly outcurved; median tooth of mandibles rather low but distinct; median length of labrum about equal to basal width; punctures coarse, deep and distinct, slightly separated on vertex behind ocelli, somewhat more sparse between ocelli and eyes and on vertex laterally, quite close on cheeks above, but obscured by pubescence; face below ocelli rather coarsely rugose, remainder of face entirely obscured by dense, whitish or yellowish pubescence; pleura densely fringed anteriorly and posteriorly with white pubescence, the scutello-mesothoracic suture with a narrow but dense, ochraceous

line of tomentum, and scutum anteriorly with a pair of transverse, tomentose, ochraceous lines which are rather widely separated medially, propodeum with more elongate, thin, pale pubescence; transverse carinae of tubercles distinct but not conspicuous; posterior margin of scutellum with a distinct, median, triangular tubercle; axillae elongate and slender; coxal spines well developed, slender and elongate, densely fringed with white pubescence posteriorly; scutum and scutellum shining between distinctly but not widely separated punctures, these becoming somewhat closer laterally, each axilla with a few distinctly separated punctures; lateral faces of propodeum rather dull, but smooth, posterior face more shining, minutely and rather closely punctate, dorsal area smooth but velvety, upper portion becoming rather narrowly, irregularly rugoso-striate; transverse grooves of abdominal terga 2 and 3 deep and distinct laterally, where they are submedian in position but oblique in orientation, obliterated medially, punctures rather close between these grooves and the base, apical margin of this narrowly impunctate, but the punctures just beyond densely crowded to the abruptly depressed, apical rims which are densely white fasciate, the apical area narrowed medially, and largely impunctate; basal tergum quite distinctly carinate at each extreme side, punctures deep and distinct, well separated or sparse on each side; terga 4 and 5 grooved across base, the groove quite finely and densely punctate, area beyond this more sparsely punctate, especially in middle, apical margins deeply and abruptly depressed, whitish fasciate; dorsal protuberances of tergum 6 rather short, divergent, narrowly rounded apically, ventral spines narrow and elongate, acute apically, nearly parallel, lateral spines subtriangular and conspicuous, surface of the tergum shining, closely and rather finely punctate in large part, a deep but rather narrow excavation near center (fig. 66); sterna 1-4 shining, coarsely, deeply and rather closely punctate, apical margins rather broadly depressed, yellowish-hyaline, quite densely white fasciate; apical margin of 4 with a narrow, deep, median emargination delimited by a pair of slender, apical spines; sternum 5 fully exposed, quite closely, deeply and rather finely punctate, apical margin of the disc rather broadly emarginate medially, the apical margin deeply depressed, yellowish-hyaline, entire medially; sterna 6 and 8 entirely retracted, 8 subtriangular apically; penis valves much shorter than gonocoxites, the latter rather strongly compressed, with rather elongate, sparse hairs toward apex.

DISTRIBUTION — Illinois to New Jersey, south to Florida; April to August.

FLOWER RECORDS — *Coreopsis*, *Flaveria* and *Helianthus*. Robertson (1929) records this species on *Heliopsis*, *Lespedeza*, *Lycopus*, *Petalostemum*, *Psoralea*, *Pycnanthemum*, *Silphium*, *Teucrium* and *Verbena*.

Coelioxys hunteri Crawford

(Figs. 64 & 65)

Coelioxys hunteri Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 151. ♀.

FEMALE—Length 13-14.5 mm.; black, tegulae brownish-testaceous, legs more or less reddened; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; cheeks somewhat narrower than eyes, subcarinate posteriorly, angulate below and slightly concave just above the angle, but this closely sculptured; clypeus very slightly convex, apical margin very broadly outcurved, median area more nearly straight, margin with a very narrow fringe of pale hairs; median tooth of mandibles low but distinct; median length of labrum somewhat greater than basal width; punctures rather coarse, sparse across vertex and between ocelli, area around anterior ocellus strongly swollen and impunctate; punctures of cheeks fine and close beneath the short and thin pubescence; punctures fine and close around antennae beneath the pubescence, supraclypeal area rather closely and deeply punctate on each side of an obscure, median, impunctate line; clypeus finely and irregularly rugoso-punctate; pubescence of head and thorax short, entirely pale, copious around antennae and sides of face, the clypeus largely bare; pubescence short and rather dense on cheeks, short and sparse on pleura, but more dense just below wing bases and around tubercles, the scutello-mesothoracic suture with a very fine line of pale tomentum, and scutum anteriorly with a pair of transverse lines of tomentum which end at a rather dense spot on each side of mid-line; pubescence of propodeum rather thin and elongate, entirely whitish; transverse carina of tubercle erect and conspicuous, somewhat incurved medially, extended somewhat along anterior margin of scutum, scutellum rather broadly rounded apically, subtriangular, posterior surface quite abrupt and densely tomentose; axillae acute, projecting conspicuously from sides of scutellum (fig. 64); front coxal spines represented by low, carinate tubercles; punctures of scutellum rather coarse, well separated over median area, becoming rather close between notaulices and tegulae; scutellum more closely and deeply punctate, the punctures only slightly separated; punctures of axillae separated, but rather numerous; pleura somewhat shining,

punctures quite widely separated and sparse, becoming somewhat closer just below tegulae; lateral faces of propodeum somewhat smoother but dull, minutely and obscurely punctate beneath the elongate pubescence, posterior face minutely punctate toward sides but these disappearing medially, dorsal area velvety, becoming very narrowly and obscurely substriate along upper margin; wings subhyaline basally, becoming rather strongly infuscated toward apical margin, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base, or, in some specimens, these distances subequal; basal abdominal tergum with both basal and apical, white, tomentose fasciae; punctures rather sparse in large part; terga 2 and 3 with transverse, sub-basal grooves evident toward sides, but these obliterated medially, the grooves with tomentose fasciae, punctures rather fine and close between these and the base, remainder of disc sparsely punctate medially, becoming somewhat more closely punctate at extreme sides; terga 2-4 slightly depressed apically, with dense entire, white, tomentose fasciae, 4 rather sparsely punctate medially, becoming closely punctate toward sides; tergum 5 rather dull, more finely punctate, apical margin depressed but not definitely fasciate; tergum 6 dull, very finely, striately and closely punctate, apical third triangularly pointed, surface more deeply and striately punctate in part, but becoming impunctate along rim (fig. 65); sternum 6 considerably exceeding the tergum in length, triangularly acute at tip, surface rather dull, rather deeply punctate toward base but punctures becoming obscure toward apex, with a rather conspicuous, lateral and apical fringe of elongate hairs; sterna 1-4 shining, punctures deep, distinct, quite coarse, slightly separated in large part, somewhat closer at extreme sides, apical margins slightly depressed, yellowish-hyaline, and rather thinly, white fasciate; sternum 5 narrowly rounded apically, surface somewhat shining, doubly and finely punctate, with scattered, distinct punctures on a minutely and closely punctate background, apical margin very narrowly depressed but not fasciate.

DISTRIBUTION — New Mexico and Texas to Indiana, North Carolina and Florida; April to August.

FLOWER RECORDS — *Bidens*, *Helenium* and *Mentha*.

It seems possible that *hunteri* is the female of *floridana* Cresson, but the relationship remains to be proven.

Coelioxys immaculata Cockerell

(Figs. 65 & 66)

Coelioxys immaculata Cockerell, 1912. *Canad. Ent.* 44, p. 165. ♂.*Coelioxys sculptifrons* Crawford, 1914. *Ent. Soc. Amer. Ann.* 7, p. 153. ♀. New synonymy

FEMALE—Length 11-12 mm.; black, the tegulae yellowish-hyaline, legs largely ferruginous; eyes slightly convergent below; lateral ocelli much nearer each other than to eyes, separated from margin of vertex by only slightly more than their diameter; cheeks somewhat narrower than eyes, subcarinate posteriorly, not angulate below; clypeus slightly convex at each extreme side apically, the median area rather flat, apical margin about straight, with a few obscure crenulations, rather strongly fringed with pale, yellowish hairs; median tooth of mandible low but distinct; punctures coarse, deep and close in general, slightly separated across vertex and just below anterior ocellus, rather fine and densely crowded over remainder of face and on clypeus beneath the quite dense pubescence, cheeks rather coarsely rugoso-punctate; pubescence of head and thorax entirely pale, copious over upper part of pleura and on propodeum, otherwise rather thin and inconspicuous; transverse carina of tubercles very low and inconspicuous, largely hidden by pubescence; apical margin of scutellum slightly curved, posterior and dorsal surfaces not sharply differentiated; axillae acute, quite prominent; front coxal spines evident, but very short, triangularly carinate; punctures of scutum coarse and close in general, slightly separated in median area posteriorly, this area quite strongly elevated and the area toward the notaulices shallowly concave; scutellum coarsely rugoso-punctate; the axillae very finely rugoso-punctate; pleura very coarsely rugoso-punctate or reticulate below, becoming rather finely rugose just below wing base; lateral faces of propodeum rather smooth, minutely and obscurely punctate, posterior face somewhat more shining, punctures close but somewhat more distinct, dorsal area smooth and velvety, becoming obscurely and narrowly roughened or substriate along upper margin; wings subhyaline basally, becoming rather deeply infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; basal abdominal tergum rather closely and deeply punctate, becoming very finely so toward apical margin, this with a dense and complete, whitish, apical fascia; terga 2 and 3 with basal, uninterrupted, transverse grooves, punctures between this groove and apical margin sparse but deep and rather coarse, apical margins narrowly depressed and densely white fasciate; tergum 4 more shallowly grooved, more closely punctate

basad of this groove which is obliterated medially, punctures otherwise quite sparse, apical margin depressed and fasciate; tergum 5 hardly grooved but the basal half closely punctate, apical half very sparsely punctate, apical margin fasciate; tergum 6 triangular in outline, with a distinct, median, longitudinal carina, sharply depressed on each side of this, somewhat excavated toward tip, lateral margins of this area rather deeply grooved, sides nearly straight from base to tip, without angles or invaginations, surface rather dull but smooth, closely, rather deeply and finely punctate at base, punctures becoming densely crowded toward apex (fig. 65); sternum 6 rather broad at base, abruptly narrowed at tip, this produced portion extended beyond apex of the tergum, tip subacute; sterna 1-4 somewhat shining, coarsely, deeply punctate, punctures slightly but not widely separated, apical margins narrowly yellowish-hyaline, with rather dense, whitish fasciae; sternum 5 triangular in outline, the apex rather narrowly rounded, basal punctures coarse, deep and rather close, becoming minute and crowded toward middle and invident toward the densely tessellate apex, margin with a rather dense, fasciate fringe.

MALE—Length 9.5-11 mm.; black, tegulae yellowish-hyaline, legs more or less ferruginous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks subequal to eyes in width, subcarinate posteriorly, broadly but shallowly concave below, this area only very thinly and inconspicuously pubescent; clypeus slightly convex, apical margin about straight; median tooth of mandibles well developed; median length of labrum about equal to basal width; punctures coarse, close and deep in general, slightly separated across vertex, cheeks becoming more reticulate, and face below ocelli rugoso-punctate, coarsely so above antennae, very finely so below and on clypeus; pubescence of head and thorax entirely pale, quite copious around antennae and over lower part of face and clypeus, largely obscuring the surface, rather thin but evident on cheeks, becoming rather dense around margin of inferior concavity and below each eye; pubescence whitish and copious over thorax laterally and posteriorly, thin and inconspicuous above; transverse carina of tubercles very low, hardly evident and largely obscured by pubescence; dorsal and posterior face of scutellum not clearly differentiated, hind margin only slightly outcurved; axillae quite prominent, acute; front coxal spines long and well developed, narrowly rounded at tip, densely pubescent posteriorly and to some degree anteriorly as well; scutum closely and coarsely

punctate in large part, punctures slightly separated only in center of posterior half, densely crowded on each side of notaulices; scutellum and axillae coarsely rugoso-punctate; pleura coarsely reticulate, lateral faces of propodeum rather smooth but dull, posterior face somewhat more shining, with minute, irregular, scattered punctures, dorsal area more velvety, becoming narrowly rugoso-striate along upper margin; wings faintly infuscated, 1st recurrent vein reaching 2nd submarginal cell slightly nearer base than 2nd does to apex; basal abdominal tergum closely and deeply punctate across entire disc, with an entire, quite dense, apical, tomentose fascia, lateral margins densely white pubescent; tergum 2 with a transverse groove which is subbasal laterally but becomes submedian in position medially, punctures basad of this rather deep and quite close but not crowded, punctures between the groove and apical margin on each side, very fine and densely crowded, becoming quite sparse and rather coarse in the median area, apical margin of tergum quite deeply depressed, narrowly whitish-hyaline, with a dense, entire whitish, tomentose fascia; terga 3-5 rather deeply grooved toward base on each side of median area, punctures deep, distinct, quite close at extreme sides, becoming somewhat more widely separated or sparse medially, apical margins rather deeply depressed, yellowish-hyaline, with entire, dense, whitish, tomentose fasciae; tergum 6 tomentose across base, deeply excavated in center toward apex, dorsal protuberances rather blunt, rounded apically, distinctly divergent, the ventral pair of spines rather broad and flattened, more or less rounded at tip, the median emargination somewhat rounded, surface shining, closely and deeply punctate, punctures becoming crowded between dorsal and ventral spines, lateral spines rather blunt but conspicuous (fig. 66); sterna 1-4 deeply and rather coarsely and closely punctate throughout, apical margins depressed, yellowish-hyaline, densely white fasciate; sternum 4 very shallowly emarginate medially, the depressed, hyaline margin almost entire, with a very shallow, median emargination; sternum 5 largely retracted, apical margin with a broad, rounded and conspicuous, median emargination; sterna 6 and 8 entirely retracted, submembranous, 8 subtruncate apically; penis valves of genital armature exceeding the gonocoxites in length, the gonocoxites slightly dilated apically, with numerous, elongate hairs forming a rather definite tuft.

DISTRIBUTION — Indiana to the New England states, south to Florida, March and April in Florida; to July in the north.

FLOWER RECORDS—*Asclepias*, *Baptisia*, *Rubus* and *Tephrosia*.

Coelioxys modesta Smith

(Figs. 65 & 66)

- Coelioxys modesta* Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 271. ♀.
Coelioxys modesta Graenicher, 1927. Ent. News 38, pp. 233 & 274. (biology)
Coelioxys modesta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Coelioxys modesta Michener, 1947. Amer. Midland Nat. 38, p. 450.

FEMALE—Length 8-13 mm.; black, tegulae testaceous-hyaline and legs more or less reddened; eyes subparallel; lateral ocelli subequally distant from margin of vertex and each other, very slightly more distant from eyes; cheeks much narrower than eyes, carinate posteriorly, angulate below, but this area obscured with short, dense pubescence; clypeus very slightly convex, apical margin about straight, with a fringe of short but dense pubescence; middle tooth of mandible very low and inconspicuous; median length of labrum somewhat greater than basal width; punctures coarse and deep, separated to some degree on vertex and cheeks above, becoming irregular and rather sparse and obscure below, coarse and subcontiguous below ocelli, more finely rugoso-punctate on supraclypeal area and clypeus; pubescence entirely pale, very short, quite dense along sides of face and on cheeks below, forming anterior and posterior marginal fringes on pleura, scutello-mesothoracic suture with a tomentose line, and scutum with a pair of anterior transverse, tomentose lines which are widely interrupted medially, propodeum with more elongate but rather thin pubescence; transverse carina of tubercles erect and quite conspicuous, extended slightly along anterior margin of scutum; posterior margin of scutellum slightly outcurved, posterior face quite sharply distinct from dorsal face; axillae acute but quite short, extending but very slightly beyond limits of scutellum; front coxal spines reduced to low carinate tubercles; wings subhyaline basally, becoming rather deeply infuscated over apical half, recurrent veins reaching 2nd submarginal cell subequally distant and quite near, base and apex; punctures coarse, close and deep over most of scutum, scutellum and axillae, slightly separated only in scattered areas on disc of scutum; pleura shining, punctures shallow but quite coarse, well separated below, becoming rather close just below tegulae, lateral faces of propodeum smooth but dull, with barely perceptible, minute, scattered punctures, posterior face somewhat more shining,

with much closer but very fine and vague punctures, dorsal area velvety, becoming deeply, irregularly striate along upper margin; concave area of basal abdominal tergum subcarinate and with a distinct and complete white fascia, apical margin of tergum slightly depressed and with a complete white fascia, punctures rather sparse medially becoming somewhat closer at sides; transverse groove of terga 2 and 3 rather shallow, submedian in position, obliterated medially, area basad of the groove coarsely and rather sparsely punctate near middle, becoming quite closely punctate toward sides, apical part nearly impunctate across the broad median area, but with some rather close punctures toward the sides, apical margin depressed and white fasciate; terga 4 and 5 with hardly perceptible median grooves that are entirely obliterated medially, punctures relatively close toward base, more sparse toward the apex of each plate, apical margins rather abrupt and deeply depressed and white fasciate; tergum 6 triangular in outline, the sides nearly straight, basal half somewhat shining but very closely and rather finely punctate, apical half rather abruptly depressed on each side of median line, densely tessellate, without evident punctures and with numerous erect hairs, tip acute and usually slightly upturned (fig. 65); sternum 6 nearly parallel-sided on basal portion, apex triangularly pointed, with a dense fringe of short pubescence; sterna 1-4 shining, deeply, coarsely punctate, the punctures well separated or almost sparse in center, becoming quite close toward the sides, apical margins rather broadly but shallowly depressed, these areas yellowish-hyaline and white fasciate; sternum 5 triangularly acute apically, somewhat shining, punctures not as coarse as the preceding plates, well separated medially, becoming close laterally, margins shallowly depressed but dark, with a very obscure, apical fringe of short hairs.

MALE—Length 7-12 mm.; black, tegulae testaceous-hyaline, legs more or less reddened; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex and each other; cheeks much narrower than eyes, carinate posteriorly, with a broad, shallow, concave area beneath which it is bare, somewhat shining and obscurely reticulate; clypeus very slightly convex, apical margin about straight, with a dense fringe of short, white pubescence; middle tooth of mandibles low but distinct; median length of labrum very slightly greater than basal width; punctures coarse and deep, well separated but not sparse across vertex, somewhat closer but shallow and indefinite on cheeks, face below ocelli coarsely rugoso-punctate, becoming finely so below antennae and over clypeus; pub-

escence entirely pale, quite short, thin in large part, rather copious below ocelli, around antennae, on sides of face and on clypeus, very short and rather dense on cheeks above, becoming very dense along lower orbits and on hypostomal area; pleura with anterior and posterior marginal fringes of white hairs, the scutello-mesothoracic suture finely white tomentose, and scutum with a pair of anterior transverse lines of white tomentum that are widely interrupted medially; propodeum with more elongate, thin, whitish pubescence; transverse carinae of tubercles erect and rather conspicuous, extended slightly along anterior margin of scutum; hind margin of scutellum very slightly outcurved, posterior face not sharply differentiated from dorsal face; axillae quite slender and elongate, projecting rather conspicuously from limits of scutellum, tips not reaching beyond the posterior margin medially; coxal spines reduced to carinate, triangular tubercles; wings subhyaline basally, becoming rather deeply clouded over apical half, recurrent veins reaching 2nd submarginal cell about equally distant from base and apex; punctures coarse, deep and close over entire scutum, scutellum and axillae, being slightly separated only in center of scutum; pleura shining, punctures rather well separated but irregular below, becoming quite close just below tubercles; lateral faces of propodeum quite smooth but dull, without distinct punctures, posterior face more shining, with scattered, very fine and shallow, obscure punctures, dorsal area velvety, becoming narrowly and finely substrate along upper margin; concavity of basal abdominal tergum subcarinate, with a complete but narrow, white fascia, apical margin of tergum slightly depressed, with an entire, narrow, white, apical fascia which becomes rather dense laterally, punctures well separated but not sparse over entire disc; transverse grooves obliterated medially, submedian in position on tergum 2, more basal on 3 and 4, punctures well separated and rather evenly distributed across the bases of these terga, area just beyond the transverse grooves of 2 and 3 rather broadly impunctate, but becoming quite numerous and rather fine toward the depressed apical rims, these yellowish-hyaline and white fasciate; tergum 4 with somewhat finer, evenly distributed and well separated punctures, terga 3-6 more or less densely fasciate across the bases; tergum 6 very finely and closely punctate, deeply excavated in center of upper surface, dorsal protuberances very short, divergent, broadly rounded, the ventral spines more slender and elongate, slightly divergent (fig. 66); sterna 1-4 shining between coarse, deep and rather close punctures, apical margins rather broadly depressed, yellowish-hyaline and white fasciate; sternum 4 with a shallow, median,

apical emargination; sternum 5 largely hidden, apical margin broadly and rather deeply incurved, almost emarginate; sternum 6 and 8 entirely retracted, 8 rather broadly rounded apically; penis valves about equal to gonocoxites in length, the gonocoxites quite slender, narrowly rounded at tip, bearing numerous, elongate, pale hairs.

DISTRIBUTION — Nebraska to Quebec and the New England states, south to Texas and Florida; March to August.

FLOWER RECORDS — *Aster*, *Ceanothus*, *Helianthus*, *Melilotus* and *Rhus*. Michener (1947) records it on *Chrysopsis*, and Robertson (1929) lists the following: *Campanula*, *Lepachys*, *Lythrum*, *Psoralea*, *Pycnanthemum* and *Verbena*.

HOSTS — *Megachile* (*Megachile*) *centuncularis* (L.) and *M.* (*Chelostomoides*) *campanulae wilmingtoni* Mitch.

Graenicher (1927) reported rearing *C. modesta* from nests of *Megachile infragilis* (*centuncularis*), but neither the host nor parasite specimens have been seen by this writer. A specimen of *modesta* reared from the nest of *M.* (*Chelostomoides*) *campanulae wilmingtoni* by K. V. Krombein has been seen, however, as well as a specimen of the host from the same nest. This seems to be a rather wide divergence of hosts for parasite species, and indicates a need for additional data.

Coelioxys moesta Cresson

(Figs. 65 & 66)

Coelioxys moesta Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 403. ♀.

Coelioxys moesta Dalla Torre, 1896. Cat. Hym. 10, p. 488.

Coelioxys banksi Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 155. ♀. New synonymy

Coelioxys banksi and *C. moesta* Medler and Koerber, 1958. Ent. Soc. Amer. Ann. 51, p. 343 (biology)

Coelioxys moesta Medler, 1959. Canad. Ent. 91, p. 114 (host)

FEMALE—Length 9.5-12 mm.; entirely black, including tegulae and legs; eyes slightly convergent below, lateral ocelli much nearer each other than to eyes, and separated from margin of vertex by little more than their own diameter; cheeks subequal to eyes in width, carinate posteriorly, angulate but not excavated below; clypeus quite flat, broadly, triangularly produced apically, apex in some specimens slightly upturned; mandibles some-

what swollen medially on outer margin, middle tooth distinct but rather small; punctures coarse, deep and distinct in general, well separated but not sparse across vertex and between ocelli, becoming close and coarse on cheeks above, fine, shallow and obscure below; face below ocelli more finely rugoso-punctate, becoming very finely rugose on supraclypeal area, on sides of face and over clypeus, a short, median, longitudinal ridge between antennae; pubescence of head and thorax entirely pale, rather copious and elongate around antennae and ocelli and on cheeks below, short and rather thin on cheeks above, very short and subappressed on supraclypeal area and clypeus, becoming strongly yellowish on clypeus apically, yellowish on mandibles with numerous, elongate, erect hairs; pleura with rather elongate but thin, white and rather copious pubescence, posterior face of propodeum quite copiously long pubescent; transverse carina of tubercle very low and inconspicuous, largely obscured by erect pubescence; apical margin of scutellum somewhat outcurved, rounded, without a distinct, posterior and dorsal face; axillae very short and rather blunt, projecting but very slightly from margin of scutellum; coxal spines reduced to broadly carinate, triangular tubercles; wings subhyaline basally, lightly infuscated apically and along margin, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures coarse, close and deep, rather uniformly distributed over most of scutum, scutellum, axillae and pleura, but somewhat finer on axillae and on scutellum laterally, slightly separated in center of scutum posteriorly; lateral faces of propodeum smooth but dull, posterior face dull and tessellate, with rather close but fine and obscure, vague punctures, dorsal area more velvety, becoming very faintly reticulate along dorsal margin; basal abdominal tergum shining, punctures deep and distinct but rather sparse medially, becoming somewhat finer and closer laterally, apical margin slightly depressed and densely white fasciate; terga 2 and 3 with shallow, transverse grooves which are narrowly obliterated medially, sub-basal at extreme sides but becoming median toward the center, portion of each with deep, distinct, rather fine, well separated punctures, these becoming quite close at extreme sides, the apical half somewhat more coarsely and sparsely punctate in center, becoming close laterally, and fine and close toward the depressed, apical rims which are densely white fasciate; tergum 4 somewhat depressed toward base at sides, but not definitely grooved, punctures about as those on 3, apical margin definitely white fasciate; tergum 5 rather finely and closely punctate across base, punctures becoming somewhat more widely separated toward apical margin, this

with a very thin, apical fringe of whitish hairs; tergum 6 elongate-triangular, sides straight, with a median, longitudinal, faint line toward base, which continues as a quite distinct, median ridge toward apex, rather deeply depressed on each side of this, apex narrowly rounded (fig. 65); sternum 6 narrow and elongate, strongly downcurved and protruding much beyond apex of tergum, conspicuously notched on each side toward tip, this part somewhat longer than the width at the notches; sterna 1-4 shining, deeply and rather coarsely and closely punctate, punctures somewhat more widely separated medially, apical margins narrowly depressed, subhyaline, with narrow fringes of white pubescence; sternum 5 produced apically, subtriangular, with rather numerous but well separated, coarser punctures toward base, these becoming very fine, indefinite and close toward apical margin, with a thin, whitish, apical fringe on each side of tip.

MALE—Length 7-11 mm.; entirely black, including tegulae and legs; eyes somewhat convergent below; lateral ocelli subequally distant from each other and margin of vertex, considerably more distant from eyes; cheeks subequal to eyes in width, subcarinate posteriorly, with a very broad and shallow, flattened area below which is not distinctly concave, but is margined with rather dense pubescence anteriorly and a fringe of long hairs posteriorly, ending at the quite distinct hypostomal carinae; clypeus very slightly convex, apical margin slightly produced, nearly straight, surface entirely covered with dense, pale pubescence; median length of labrum very slightly greater than basal width; median tooth of mandible well developed; punctures quite coarse, deep and distinct, slightly separated across vertex, upper cheeks becoming coarsely rugoso-punctate, face below ocelli densely and rather coarsely rugose, becoming very finely but densely rugose below antennae and over clypeus; pubescence entirely pale, quite copious and dense over most of face below ocelli, short and rather dense on cheeks below, thinner above; pubescence quite copious but rather short on pleura and posterior face of propodeum, without distinct, marginal fringes on the pleura; transverse carina of tubercles very low but evident; posterior margin of scutellum slightly outcurved, the posterior and dorsal faces not distinctly separated; axillae very short, protruding very slightly beyond limits of scutellum; coxal spines well developed but rather short, round at apex, densely pubescent posteriorly and laterally; wings subhyaline at base, becoming faintly clouded apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of pleura and dorsum of

thorax quite uniformly coarse, close and deep; being contiguous in large part; lateral faces of propodeum rather smooth but dull, posterior face somewhat more shining, with close but very minute and obscure punctures, dorsal area more velvety, becoming rather broadly but very finely and obscurely rugose along upper margin; basal abdominal tergum shining, rather closely and deeply punctate, punctures slightly separated in median area, apical margin rather abruptly depressed, obscurely fasciate, with a dense, tomentose patch at each extreme side; terga 2 and 3 with transverse, uninterrupted, sub-basal grooves, basal area behind grooves rather evenly, finely and regularly punctate, punctures well separated; disc beyond the grooves more closely and coarsely punctate, but rather sparsely so in center, 2 with a quite deep and distinct but rather short fovea on each side, the margins of this narrowly impunctate, apical margins narrowly depressed, densely white fasciate toward sides but these rather widely interrupted or very narrow medially; terga 4 and 5 shining, closely and quite deeply punctate toward sides, the punctures more widely separated medially, with a basal, tomentose band and the depressed, apical rim white fasciate; tergum 6 white tomentose at base, very closely and finely punctate, rather deeply excavated in center, dorsal protuberances narrow and spine-like, elongate and strongly divergent, ventral spines less strongly divergent but equally long and slender, lateral spines much elongated and acute (fig. 66); sterna 1-4 shining, deeply and coarsely punctate, punctures rather well separated medially, becoming quite close laterally, apical margins rather broadly depressed and yellowish-hyaline, densely white fasciate; disc of sternum 4 not emarginate medially, but depressed rim with a very slight, median, triangular emargination; sternum 5 largely retracted, apical margin rather broadly incurved; sterna 6 and 8 entirely retracted, 8 rather narrowly subtruncate apically; gonocoxites of genital armature only slightly exceeding penis valves, somewhat compressed, with numerous, fine, erect, rather elongate hairs.

DISTRIBUTION — Alaska and British Columbia to Nova Scotia, south to Colorado, Indiana and Virginia; May to September.

FLOWER RECORD—*Solidago*.

HOSTS—*Megachile centuncularis* (L.) and *M. relativa* Cress.

***Coelioxys obtusiventris* Crawford**

Coelioxys obtusiventris Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 150. ♀.

FEMALE—Length 12 mm.; black, mandi-

bles, labrum, tegulae and legs ferruginous, abdominal sterna dark red; eyes slightly convergent below, lateral ocelli slightly nearer margin of vertex than to eyes; cheeks much narrower than eyes, margin sharply carinate below; clypeus nearly flat, margin nearly straight, not produced; mandibles 3-dentate; punctures of head and thorax deep and distinct, coarse and quite close on vertex and cheeks, crowded below ocelli, and over clypeus and supraclypeal area, slightly separated on scutum medially and on scutellum, close on pleura above, more coarse and more widely separated below; tubercles sharply carinate; coxal spines reduced to dentiform tubercles; scutellum with a slight median angle; axillae slender, conspicuous, produced much beyond margin of scutellum; pubescence whitish, very short and thin, rather dense on cheek, face and clypeus, the latter with numerous erect, yellowish hairs, pleura with narrow lines of pubescence anteriorly and posteriorly, propodeum with more copious, but short, white pubescence; wings lightly infuscated, more deeply so apically, veins brownish, margin of basal concavity of tergum 1 obscurely carinate, thinly white fasciate, terga 2 and 3 with rather shallow, transverse grooves which are widely interrupted medially; punctures of abdominal terga deep and distinct, but fine, well separated on 1 and across base of 2-4, very sparse on median area of each disc, becoming rather close along apical margin, very fine and sparse on 5 and 6; tip of tergum 6 very slightly upturned; 1-5 with narrow but entire white apical fasciae, apex of 6 densely brownish tomentose, impressed on each side; sterna 1-5 closely and deeply punctate, quite coarse at base, becoming fine on sternum 5; sternum 6 slightly flared apically, with a long apical spine, apical margin with a prominent fringe of long brownish hairs, nearly equalling the spine in length.

DISTRIBUTION—Florida.

This species is known only from the holotype specimen in the U. S. National Museum. It is evidently related to *C. modesta*, but is easily separated by the 6th sternum. This is triangularly pointed in *modesta*, without a distinct apical spine, and the fringe is very short.

***Coelioxys 8-dentata* Say**

(Figs. 64 & 65)

- Coelioxys 8-dentata* Say, 1824. In Keating, Narr. Long's 2nd Exped. 2, p. 353. ♂.
Coelioxys brevis Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 402. ♀ ♂. (preocc.)
Coelioxys altilis Cresson, 1879. Amer. Ent. Soc. Trans. 7, p. 219. (new name)

- Coelioxys cressoni* Dalla Torre, 1896. Cat. Hym. 10. p. 485. (new name)
Coelioxys 8-dentata Fox, 1900. Ent. News 11, p. 553. (host)
Coelioxys octodentata Hicks, 1926. Colo. Univ. Studies 15, p. 227. (biology)
Coelioxys octodentata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Coelioxys 8-dentata Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1060. (larva)
Coelioxys 8-dentata Michener, 1953. Kans. Univ. Sci. Bul. 35, pp. 1737-1742. (biology)

FEMALE—Length 8-12 mm.; black, tegulae yellowish-hyaline, legs beyond the trochanters reddish-testaceous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; cheeks considerably narrower than eyes, subcarinate posteriorly, strongly narrowed below, angulate below, but this area obscured by short dense pubescence; clypeus nearly flat, apical margin straight, densely fringed with rather short, pale pubescence; median length of labrum about equal to basal width; median tooth of mandible well developed, somewhat nearer apical tooth than inner angle; punctures deep and distinct, distinctly but not widely separated across vertex, close, coarse and irregular on cheeks above, becoming finer and more obscure below; some irregular smooth spaces surrounding anterior ocellus, but this area otherwise rather coarsely, irregularly punctate, a narrow, smooth, impunctate area near top of eye on inner margin; face below antennae irregularly rugose, the clypeus quite finely so; pubescence entirely pale, short, rather dense around antennae and on cheeks below, pleura with rather distinct, anterior and posterior fringes of white hair, scutello-mesothoracic suture with a tomentose line, and scutum anteriorly with a pair of transverse, tomentose bands that are widely interrupted medially; propodeum largely covered with elongate, whitish hairs; transverse carina of tubercles erect and conspicuous, extending but very slightly along anterior margin of scutum; posterior margin of scutellum nearly straight, posterior face quite distinct, densely white tomentose; axillae quite robust, acute apically, projecting quite conspicuously from margin of scutellum (fig. 64); front coxal spines short but quite distinct, broadly triangular, with narrowly acute apex; wings lightly infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum close, coarse, deep and distinct, being slightly separated only in center of disc, becoming somewhat finer and densely crowded between notaulices and tegulae, scutellum and axillae somewhat more finely rugoso-punctate;

pleura with coarse, confluent punctures, being almost reticulate; lateral faces of propodeum smooth but dull, posterior face somewhat more shining, with very minute and close, obscure punctures, dorsal area more velvety, becoming more finely substrate along upper margin; basal abdominal tergum shining, deeply punctate, the punctures somewhat sparse in center, very close at extreme sides, apical margins slightly depressed, with a complete, white, apical fascia; terga 2 and 3 with complete, rather deep, transverse grooves, punctures basad of these quite evenly distributed, deep, distinct and quite close, the apical portion of disc very sparsely punctate medially, becoming rather closely punctate at extreme sides, the grooves medially somewhat nearer the apical margin; margins of discs narrowly depressed, with entire, whitish, apical fasciae, these becoming very broad and dense laterally; tergum 4 with a shallow, transverse groove and 5 slightly impressed in the same relative position, punctures basal to this quite uniformly close, deep and distinct, the more apical areas almost impunctate medially, but becoming rather closely punctate at each side, apical margins narrowly depressed, with entire, white fasciae; tergum 6 subtriangular in outline, sides very slightly incurved at about mid point in length, but not at all angulate, with an obscure, median line which continues toward apex as a somewhat elevated ridge, rather deeply excavated on each side of this, the tip narrowly rounded, sides slightly grooved, punctures of basal part deep, distinct and moderately coarse, becoming fine and densely crowded toward apex (fig. 65); sternum 6 rather narrow, quite deeply notched on each side toward apex, this part somewhat longer than width at the notches; abdominal sterna 1-4 somewhat shining, very closely, deeply and quite coarsely punctate, apical margins slightly depressed, rather broadly yellowish-hyaline, densely white tomentose, forming complete but rather loose fasciae; sternum 5 subtriangular in outline, basal portion deeply and closely punctate, but punctures becoming fine and dense toward the impunctate and finely roughened, subacute apex, sides fringed with dense, white tomentum.

MALE—Length 8-10 mm.; black, tegulae yellowish-hyaline, legs largely brownish-feruginous; eyes rather strongly convergent below; lateral ocelli slightly nearer margin of vertex than to eyes, and slightly nearer each other than to margin of vertex; cheeks very slightly narrower than eyes, subcarinate posteriorly, with a bare, deeply concave and elongate area below which has a marginal fringe of dense, whitish pubescence; clypeus nearly flat, apical margin nearly straight, entire surface densely covered with yellowish

pubescence which obscures the surface; median length of labrum about equal to basal width; middle tooth of mandible well developed; punctures quite coarse, deep and distinct, well separated across vertex, becoming sparse just back of lateral ocelli and toward upper margin of eye, cheeks becoming somewhat more finely and closely punctate below, anterior ocellus surrounded in part by a somewhat elevated impunctate area, and narrow margin at upper end of eye impunctate, face otherwise finely and densely rugose beneath the dense pubescence; pubescence of face yellowish-white, subappressed in part, that on cheeks more whitish, short and thin; pleura with marginal fringes of whitish hairs, the scutello-mesothoracic suture with a line of fine tomentum, and scutum anteriorly with a pair of transverse, somewhat curved tomentose lines which are widely separated medially; propodeum largely covered with more erect and fine, pale pubescence; transverse carinae of tubercles erect but largely obscured by a fringe of yellowish hairs; posterior margin of scutellum nearly straight, posterior face rather sharply delimited from dorsal face, rather densely pubescent; axillae quite robust, acute apically, projecting quite conspicuously from sides of scutellum; coxal spines well developed, somewhat flattened, narrowly rounded apically, densely pubescent posteriorly and laterally; wings subhyaline basally, becoming faintly infuscated apically, 1st recurrent vein reaching 2nd submarginal cell much nearer base than 2nd does to apex; scutum very coarsely, closely and deeply punctate, punctures nearly contiguous throughout, becoming somewhat more dense laterally; scutellum and axillae rather coarsely rugoso-punctate; pleura with rather shallow but coarse, subcontinuous punctures; lateral faces of propodeum smooth but dull, posterior face somewhat more shining, with rather close, minute, obscure punctures, dorsal area rather broadly velvety, becoming obscurely rugoso-striate along upper margin; basal abdominal tergum shining but closely and deeply punctate, apical margin somewhat depressed, with an entire whitish fascia; terga 2 and 3 with entire, transverse grooves which are clearly evident at mid point of disc, punctures basad of the grooves deep, distinct, quite coarse but close and regular, the punctures beyond the grooves more irregular, very sparse and coarse medially, where the surface is shining, becoming finely and densely rugose just behind the rather distinct foveae, these somewhat elongated, margined with a shining impunctate ridge, apical margins of these terga densely white fasciate; terga 4-6 more or less densely fasciate at base, 4 and 5 with an apical, dense, whitish fascia which is somewhat narrowed medially, punc-

tures quite coarse, deep and distinct, slightly but not widely separated medially; surface of tergum 6 very closely, deeply and rather finely punctate, a deep, median excavation just before tip, dorsal protuberances divergent, rather narrowly rounded ventral spines more nearly parallel-sided, rather short and blunt, lateral spines well developed, subacute (similar to *sayi*, fig. 66); sterna 1-4 shining, with coarse, deep and quite uniformly close punctures, apical margins rather broadly depressed, yellowish-hyaline, densely white tomentose, forming conspicuous fasciae; disc of sternum 4 not emarginate medially, depressed rim without a conspicuous, median emargination; sternum 5 largely retracted, apical margin nearly straight; sterna 6 and 8 entirely retracted; gonocoxites only slightly exceeding penis valves, rather broadly compressed, with scattered and rather conspicuous, elongate hairs.

DISTRIBUTION—British Columbia and California, east to Quebec, the New England states, and Florida; May to October.

FLOWER RECORDS — *Asclepias Baptisia*, *Cuscuta*, *Eriogonum*, *Fragaria*, *Geranium*, *Helenium*, *Hieraceum*, *Melilotus*, *Oenothera*, *Phaseolus*, *Rhus*, *Rubus*, and *Rudbeckia*. Robertson (1929) lists the following additional host genera: *Amorpha*, *Apocynum*, *Aster*, *Bidens*, *Blephilia*, *Boltonia*, *Brauneria*, *Coreopsis*, *Crotalaria*, *Desmodium*, *Dianthera*, *Eryngium*, *Eupatorium*, *Helianthus*, *Heliopsis*, *Krigia*, *Lepachys*, *Lippia*, *Lobelia*, *Lythrum*, *Nepeta*, *Petalostemum*, *Polytaenia*, *Psoralea*, *Pycnanthemum*, *Solidago*, *Symphoricarpos*, *Trifolium*, *Verbena*, *Verbesina* and *Veronica*.

HOST—J. T. Medler has reared *8-dentata* from nests of *Megachile centuncularis* and *M. mendica*. It is also recorded from nests of *M. brevis* by Hicks (1926) and Michener (1953).

Coelioxys piercei Crawford

(Figs. 65 & 66)

Coelioxys piercei Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 152. ♀.

FEMALE—Length 10 mm.; black, tegulae brownish-testaceous, legs somewhat reddened apically; eyes slightly convergent below; lateral ocelli nearer each other than to eyes, and nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, subcarinate posteriorly, strongly narrowed below, obscurely angulate, slightly concave, due largely to the erect, posterior carina; cly-

peus nearly flat, margin about straight, with a dense fringe of elongate pale yellowish hairs; middle tooth of mandible well developed; median length of labrum somewhat greater than basal width; punctures coarse and deep, quite close over most of vertex and between ocelli, cheeks coarsely rugoso-punctate, face below ocelli somewhat more finely so, becoming very finely rugose below antennae and over clypeus; pubescence entirely pale, very short and decumbant over most of face, clypeus largely bare except for the apical fringe, pubescence rather short but quite dense on cheeks below; pubescence quite copious over pleura, without definite, marginal fringes, somewhat more elongate but still thin on propodeum, becoming somewhat more dense on each side of posterior face; transverse carina of tubercles low but distinct, largely obscured by the erect pubescence; posterior margin of scutellum somewhat outcurved, posterior and dorsal faces not sharply differentiated; axillae acute, quite robust, projecting quite conspicuously from sides of scutellum; coxal spines reduced to broadly carinate and sharply acute tubercles; wings subhyaline basally, becoming lightly infuscated over median and apical areas, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum coarse, deep and distinct, close in large part, becoming very slightly separated toward posterior margin medially, somewhat more dense and fine around notaulices; scutellum coarsely rugoso-punctate, the axillae somewhat more finely so; punctures of pleura shallow but coarse and close, becoming rugose just below tegulae; lateral faces of propodeum smooth but dull, posterior face densely tessellate, with fine, close but obscure and vague punctures, dorsal area velvety, becoming finely reticulate along upper margin; basal abdominal tergum shining, rather closely and deeply punctate, apical margins slightly depressed, with a complete, white fascia which forms dense white patches at extreme sides, but is rather narrow medially; terga 2 and 3 with deep, distinct and complete transverse grooves, these submedian at center, becoming basal toward the sides, punctures on basal side of these grooves rather close, coarse and distinct, but quite uniform, those toward the apex quite similar but more irregular and widely separated, apical margins rather deeply and narrowly depressed, densely white fasciate; terga 4 and 5 shallowly grooved across median portion of disc, surface somewhat more dull than the basal terga, more finely and closely punctate especially on 5, apical margins depressed and fasciate; tergum 6 triangular in outline, basal half or more very densely and finely, uniformly punctate, with a slight median ridge toward the tip, rather deeply excavated

on each side, the sides slightly angulate at this point, narrowly rounded at tip, quite deeply grooved on each side (fig. 65); sternum 6 more narrowly triangular, protruding considerably beyond tip of the tergum, sides quite straight; sterna 1-4 somewhat shining, coarsely, deeply and quite closely punctate throughout, apical margins depressed, yellowish-hyaline, rather narrowly but distinctly white fasciate; sternum 5 subtriangular in form, apex narrowly truncate, surface dull, with fine, densely crowded punctures, becoming somewhat coarser toward sides basally, apical margin narrowly white fasciate.

MALE—Length 9-11 mm.; black, including tegulae and legs; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks subequal to eyes in width, subcarinate posteriorly, broadly but shallowly concave below, this area only very thinly and inconspicuously pubescent; clypeus slightly convex, apical margin about straight, with a pair of small denticles on each side of center; median tooth of mandibles well developed; median length of labrum about equal to basal width; punctures coarse, close and deep in general, slightly separated across vertex, cheeks becoming more reticulate, and face below ocelli rugoso-punctate, coarsely so above antennae, finely so below and on clypeus; pubescence of head and thorax entirely pale, yellowish and quite copious around antennae and over lower part of face and clypeus, largely obscuring the surface, whitish and rather thin but evident on cheeks, becoming rather dense around margin of inferior concavity and below each eye; pubescence whitish and rather copious over thorax laterally and posteriorly, thin and inconspicuous above; transverse carina of tubercles very low, hardly evident, largely obscured by pubescence; dorsal and posterior face of scutellum quite distinct, hind margin slightly outcurved; axillae quite prominent, acute; front coxal spines long and well developed, narrowly rounded at tip, with an apical tuft of hairs on outer side; scutum closely and rather coarsely punctate in large part, punctures slightly separated only in center of posterior half, crowded around notaulices; scutellum and axillae coarsely rugoso-punctate; pleura with coarse, shallow, subcontiguous punctures; propodeum rather smooth but dull, posterior face with minute, rather close punctures, dorsal area more velvety, becoming narrowly rugoso-striate along upper margin; wings faintly infuscated, 1st recurrent vein reaching 2nd submarginal cell slightly nearer base than 2nd does to apex; basal abdominal tergum closely and deeply punctate across entire disc, with an entire, quite dense, apical, tomentose

fascia, lateral margins densely white pubescent; tergum 2 with a transverse groove which is sub-basal laterally but becomes more apical in position medially, punctures basad of this deep and quite close but not crowded, punctures between the groove and apical margin on each side, very fine and densely crowded, becoming slightly coarser in the median area, apical margin of tergum quite deeply depressed, densely white fasciate; tergum 3 much like 2, but punctures on each side not so densely crowded; terga 4 and 5 rather deeply depressed toward base, this basal area densely white tomentose, punctures of disc deep, distinct, quite close and evenly distributed, apical margins rather deeply depressed, narrowly white fasciate; tergum 6 tomentose across base, deeply excavated in center toward apex, dorsal protuberances broadly rounded apically, distinctly divergent, the ventral pair of spines rather broad and flattened, more or less rounded at tip, the median emargination somewhat rounded; surface of tergum 6 shining, closely and deeply punctate, punctures becoming crowded between dorsal and ventral spines, lateral spines distinct, acute (fig. 66); sterna 1-4 deeply and rather coarsely and closely punctate throughout, apical margins depressed, densely white fasciate; disc of sternum 4 not emarginate medially, but the depressed margin with a narrow but distinct median emargination; sternum 5 largely retracted, apical margin with a broad, shallow, median emargination; sterna 6 and 8 entirely retracted, submembraneous, 8 subtruncate apically; penis valves of genital armature exceeding the gonocoxites in length, the gonocoxites slightly dilated apically, with numerous, elongate hairs forming a rather definite tuft.

DISTRIBUTION—Texas to Florida and North Carolina; April and May.

FLOWER RECORD—*Oenothera*.

HOST—It seems probable that this species is parasitic upon *Megachile oenotherae*.

This is the first recognition of the male of *piercei*.

Coelioxys porterae Cockerell

(Figs. 64-66)

Coelioxys (lucrosa var. ?) *porterae* Cockerell, 1900. *Canad. Ent.* 32, p. 298. ♀.

FEMALE—Length 9-11 mm.; largely black, including the legs, but tegulae more brownish to piceous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, much more distant

from eyes; cheeks subequal to eyes in width, carinate posteriorly, the marginal carina becoming very high toward the inferior angle; clypeus nearly flat, apical margin about straight, finely crenulate, without a distinct, apical fringe; median length of labrum about equal to basal width; upper surface of mandibles swollen medially, resulting in an obscure, submedian angle, middle tooth rather low but distinct; punctures coarse, deep and distinct, only slightly separated across vertex, cheeks becoming coarsely rugoso-punctate, more finely so below, face just below anterior ocellus rather coarsely rugose, becoming finely so below antennae and on clypeus, a short, longitudinal, raised line between the antennae; pubescence entirely pale, quite short on head, somewhat more elongate around antennae and on cheeks below, somewhat yellowish, subappressed but rather thin over clypeus, rather copious along margins of pleura but not forming definite fasciae, rather copious around wing bases and on posterior face of propodeum; transverse carina of tubercle very low and inconspicuous, barely evident beneath pubescence; posterior margin of scutellum slightly curved, posterior face not sharply differentiated from the dorsal face; axillae acute, projecting from lateral margins of scutellum, but not exceeding its median length (fig. 64); front coxal spines very short but distinct, bearing a tuft of elongate, pale hairs posteriorly; wings hyaline at base, becoming lightly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum coarse and deep, slightly separated across median portion of disc between notaulices, but elsewhere very close; scutellum rather coarsely rugoso-punctate, axillae somewhat more finely so; pleura closely and coarsely but rather shallowly punctate, with only very narrow, intervening spaces evident, becoming coarsely and densely rugose below tegulae; lateral faces of propodeum dull and densely tessellate but rather smooth, posterior face dull but with more evident but extremely minute punctures, dorsal area narrowly smooth and velvety, but becoming finely rugose along upper margin; basal abdominal tergum somewhat shining medially, punctures deep and distinct but rather fine and close, apical margin narrowly depressed, white fasciate toward sides; transverse grooves of terga 2 and 3 complete, distinct but rather shallow, submedian in position but becoming more nearly basal at sides, punctures on the basal side deep and distinct, but rather fine, regularly close but not crowded, surface toward the apical margin much more sparsely punctate and shining, margins deeply depressed and white fasciate, fascia thin but evident medially; terga 4 and 5 with fine and rather close punctures toward

base, becoming sparse toward apical margin, this abruptly and narrowly depressed, more or less whitish fasciate; apical part of tergum 6 rather abruptly narrowed, the sides incurved but not angulate, a narrow, median, impunctate line from base toward the apex, which is continuous with a median raised ridge apically, rather deeply depressed on each side of this, the tip narrowly rounded, surface toward the base shining, finely, closely and distinctly punctate, punctures becoming densely crowded toward tip (fig. 65); sternum 6 narrow and elongate reaching much beyond the tergum, sides distinctly but rather finely notched toward apex, this part somewhat longer than width at the notches, very narrowly rounded apically; sterna 1-4 shining, rather coarsely and quite deeply punctate, punctures somewhat separated medially, becoming close laterally, apical margins very narrowly depressed, thinly white fasciate; sternum 5 broadly triangular, with a more or less pointed apex, narrowly fasciate along margin, closely but distinctly punctate at base, the punctures becoming minute and crowded apically, the more apical part of the disc densely tessellate, without evident punctures.

MALE—Length 9-12 mm.; largely black, including legs, tegulae more brownish to piceous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks slightly broader than eyes, carinate posteriorly, with a very broad, shallowly concave area below, posterior margin of this produced to form a rounded, carinate tubercle, surface of the concavity shining, impunctate and bare; clypeus nearly flat, apical margin nearly straight, with 4 or 5 low tubercles; median length of labrum about equal to basal width; median tooth of mandible distinct; punctures coarse and deep, distinctly but not widely separated across vertex, cheeks more coarsely rugoso-punctate above, becoming more finely and irregularly so below, face between antennae and ocelli coarsely rugoso-punctate, becoming finely so below antennae and on clypeus; pubescence entirely pale on head and thorax, rather copious over front of face and on clypeus, on cheeks below, over most of pleura and propodeum, very thin but erect and rather elongate on dorsum of thorax; transverse carina on tubercles very low and inconspicuous, largely obscured by pubescence; posterior margin of scutellum slightly outcurved, posterior face not sharply differentiated from dorsal face; axillae acute, projecting distinctly from sides of scutellum, but not exceeding median length of scutellum; front coxal spines quite long and erect, subcarinate, the tips broadly rounded, long white pubescent posteriorly; wings subhyaline basal-

ly, becoming faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum coarsely, closely and deeply punctate throughout, being somewhat more coarse and distinct in center posteriorly, becoming very fine and densely crowded between notaulices and tegulae; scutellum coarsely rugoso-punctate, the axillae somewhat more finely so; pleura rather coarsely but shallowly rugoso-punctate or reticulate; lateral faces of propodeum smooth but dull, posterior face dull but with rather close, minute and obscure punctures evident, dorsal area velvety, becoming very finely striate along upper margin; basal abdominal tergum shining, punctures deep and distinct, slightly separated in center, becoming very close toward sides, apical margin slightly depressed toward sides where they are white fasciate; transverse grooves of terga 2 and 3 complete, submedian along center but becoming somewhat more basal laterally, basal area deeply, distinctly and rather coarsely and regularly punctate, while the apical area is more shining and sparsely punctate medially, punctures becoming very close and rather fine at extreme sides, apical margins rather abruptly and deeply depressed, densely white fasciate laterally, becoming very thin medially; tergum 2 with a pair of broad, shallow foveae, adjacent punctures minute and densely crowded; tergum 4 with a more basal and shallow, transverse groove, punctures somewhat similar to 2 and 3, apical margin quite deeply depressed, subhyaline, fasciate as the others; tergum 5 thinly fasciate across the base as well as across the depressed apex, punctures rather close toward base, becoming more sparse toward the depressed margin; tergum 6 fasciate along the base, surface very closely and finely punctate, with a deep, median, subapical concavity, the dorsal projections very short, subtriangular, with rounded apex, strongly divergent, ventral spines more elongate, narrow and acute, intervening emargination broadly rounded, lateral spines distinct and acute (fig. 66); sterna 1-4 shining closely, deeply, regularly and rather coarsely punctate, apical margins rather deeply depressed, subhyaline, densely white fasciate; disc of sternum 4 not appreciably emarginate apically, but depressed margin with a very small, inconspicuous, median emargination; sternum 5 submembranous, largely hidden, apical margin broadly and shallowly incurved medially; sterna 6 and 8 entirely retracted, 8 somewhat narrowed apically, the apex narrowly rounded; gonocoxites of genital armature much exceeding penis valves in length, somewhat compressed, bearing numerous elongate setae along outer surface to the tip.

DISTRIBUTION—Alberta to Nova Scotia, in Canada, Wisconsin to Maine, south to North Carolina; April to August.

FLOWER RECORDS — *Baptisia*, *Coreopsis*, *Galax*, *Geranium*, *Houstonia*, *Hydrangea*, *Polygala*, *Pycnanthemum*, *Rubus*, and *Vaccinium*.

HOST—*Megachile relativa*.

Coelioxys rufitarsis rufitarsis Smith

(Figs. 65 & 66)

- Coelioxys rufitarsis* Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 271. ♂.
Coelioxys dubitata Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 272. ♀. New synonymy
Coelioxys rufitarsis Cockerell, 1900. Canad. Ent. 32, p. 298.
Coelioxys rufitarsis Graenicher, 1906. Wis. Nat. Hist. Soc. Bul. 4, p. 138. (biology)
Coelioxys dubitata var. *melanopoda* Viereck, 1917 (1916). Conn. State Geol. and Nat. Hist. Survey Bul. 22, p. 747. ♂.
Coelioxys rufitarsis Hicks, 1926. Colo. Univ. Studies 15, p. 230. (biology)
Coelioxys rufitarsis Graenicher, 1927. Ent. News 38, p. 233. (biology)
Coelioxys rufitarsis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12-13 mm.; black, tegulae more brownish-piceous, tarsal segments bright ferruginous, the tibiae and femora sometimes more or less ferruginous; eyes slightly convergent below; lateral ocelli slightly nearer margin of vertex than to each other, considerably more distant from eyes; cheeks considerably narrower than eyes, carinate posteriorly, angulate below, but this area covered with dense pubescence; clypeus nearly flat, apical margin about straight, with a fringe of rather short but dense pubescence; median length and basal width of labrum about equal; median tooth of mandible low but distinct; punctures deep and quite coarse, close but distinct across vertex, cheeks and face below ocelli coarsely rugose, becoming finely rugose below antennae and on clypeus; pubescence entirely pale on head and thorax, somewhat yellowish on face, copious around antennae and behind anterior ocellus, very short, dense and subappressed at sides of face, laterad of clypeus, thin and very short and obscure over most of clypeus, dense and white on cheeks below, becoming thin above; pubescence rather short but quite copious over pleura, more elongate and whitish on propodeum, very thin and inconspicuous on dorsum of thorax; transverse carina of tubercles rather low but distinct, more or less obscured by pubescence;

posterior margin of scutellum slightly outcurved, posterior face not sharply differentiated from dorsal face; axillae acute, projecting conspicuously from sides of scutellum, but length not exceeding median length of scutellum; coxal spines reduced to short but acute tubercles which are densely pubescent posteriorly; wings hyaline basally, becoming very faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum coarsely, closely and deeply impunctate, punctures slightly separated only in center posteriorly, densely crowded and somewhat finer laterally, but distinctly separated to anterior margin; scutellum coarsely rugoso-punctate or reticulate, the axillae somewhat more finely so; pleura more reticulate than punctate, punctures coarse and closely crowded; lateral faces of propodeum somewhat smoother but very dull, posterior face dull, with closely crowded, minute punctures, dorsal area smooth but velvety, becoming narrowly substrate along upper margin; basal abdominal tergum shining, punctures deep and distinct, well separated medially, becoming close laterally, and very close and fine toward the depressed apical margin, this narrowly white fasciate, but becoming rather broadly so at extreme sides; transverse grooves of terga 2 and 3 submedian at center, becoming somewhat more basal at extreme sides, punctures quite regular, coarse and close on basal side of groove, the apical side being largely impunctate, but with scattered punctures toward the apical margin, this depressed and densely white fasciate; terga 4 and 5 rather closely punctate toward base, sparsely so toward apical margin, the margins depressed and white fasciate; tergum 6 abruptly narrowed just beyond mid point, resulting in a pair of distinct lateral angles, a median, slightly raised, impunctate line at base, continuous with an elevated ridge toward the tip, surface deeply excavated on each side of this, the tip narrowly rounded, punctures toward the base deep, distinct, rather coarse and close, becoming densely crowded at the lateral angles, the apical part finely rugose (fig. 65); sternum 6 elongate, extending much beyond tip of tergum, narrowed apically, with a pair of distinct, lateral notches, this area much longer than width at the notches, rather narrowly rounded at apex; sterna 1-4 shining, closely, coarsely, deeply and quite regularly punctate, apical margins depressed, yellowish-hyaline, densely white fasciate; sternum 5 triangular in outline, basal portion deeply and quite closely punctate, but the punctures becoming rather abruptly fine and densely crowded just beyond base, apical half dull and densely roughened, the oblique, lateral margins densely, white fasciate.

MALE—Length 11-12 mm.; black, tegulae more brownish-testaceous, tarsi ferruginous, and tibiae usually ferruginous basally and apically; eyes rather strongly convergent below; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks slightly narrower than eyes, carinate posteriorly, quite deeply excavated below, this area shining and bare, relatively smooth, margined both anteriorly and posteriorly by dense pubescence; clypeus nearly flat, apical margin straight, with a pair of small, median tubercles; median length of labrum slightly greater than basal width; median tooth of mandible well developed; punctures coarse and deep, well separated across vertex, becoming closely crowded on cheeks, face below ocelli rather finely rugose, surface below antennae and on clypeus obscured by dense pubescence, very finely rugose beneath; pubescence entirely pale, rather creamy on face, somewhat more elongate and erect around bases of antennae, subappressed and directed upward on supraclypeal area, directed downward on clypeus, cheeks below with dense, white pubescence; pleura rather copiously covered with white pubescence, not forming definite marginal fringes, the pubescence becoming somewhat more yellowish but very thin above, elongate and copious over most of propodeum; transverse carina of tubercles erect and well developed on outer side, not extended along margin of scutum, largely obscured by pubescence; posterior margin of scutellum very slightly outcurved, posterior face not sharply differentiated from dorsal face; axillae rather elongate and acute, conspicuously diverging from sides of scutellum, and slightly exceeding median length of scutellum; coxal spines well developed, somewhat spatulate and elongate, rounded apically, densely covered with white pubescence; wings hyaline basally, becoming slightly infuscated along apical margin, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum coarsely, deeply and closely punctate, punctures slightly separated only in center of disc, becoming somewhat finer and more densely crowded laterally; scutellum rather coarsely rugoso-punctate or reticulate, the axillae only slightly more finely so; pleura dull, rather finely rugoso-punctate or reticulate; lateral faces of propodeum dull, densely tessellate, posterior face dull, very minutely and closely punctate, punctures rather vague, dorsal area velvety below, becoming finely and irregularly rugose along upper margin; basal abdominal tergum shining, coarsely and deeply punctate, punctures well separated medially, but becoming very close at extreme sides, apical margin abruptly depressed, yellowish-

hyaline, densely white fasciate, lateral margins of the dorsal face conspicuously white tomentose; transverse grooves of terga 2 and 3 very deep and complete sub-basal on 2 and subapical on 3, but becoming more nearly basal on each one at extreme sides, punctures on basal side coarse, deep, close and quite regular, apical margin of groove more or less impunctate, medially, becoming more coarsely and closely punctate at each extreme side, apical margins abruptly depressed, yellowish-hyaline, densely white fasciate, tergum 2 with a pair of much elongated and very narrow and deep foveae on each side, just apical to the groove; terga 4 and 5 white fasciate across base, apical margins deeply depressed and fasciate at extreme sides, punctures coarse, deep, distinct, close laterally, somewhat more widely separated medially; tergum 6 fasciate across base, surface densely and irregularly rugoso-punctate, rather finely so at sides, with a deep, median concavity, dorsal protuberances short, somewhat divergent, broadly rounded or subtruncate, the ventral spines more elongate and parallel, narrowly subtruncate apically, lateral spines rather elongate and slender (fig. 66); sterna 1-4 shining, coarsely, deeply and closely punctate, apical margins abruptly depressed, yellowish-hyaline, densely white fasciate on 2 and 3, fasciate toward sides on 4, disc of 4 not emarginate medially but the depressed margin with a very narrow emargination; sternum 5 largely retracted, apical margin slightly incurved medially, with a rather dense, apical fringe on each side; sterna 6 and 8 entirely retracted, 8 rather narrowly subtruncate apically; penis valves of genital armature fully equal to gonocoxites in length, the gonocoxites somewhat compressed, bearing copious elongate and erect pubescence.

DISTRIBUTION—British Columbia and California to Nova Scotia, the New England states, North Carolina and Georgia; June to October.

FLOWER RECORDS—*Asclepias*, *Baptisia*, *Helianthus*, *Melilotus*, *Rudbeckia*, *Solidago*, *Spiraea* and *Vicia*. Robertson (1929) lists the following additional plant genera: *Aster*, *Blephilia*, *Lobelia*, *Monarda*, *Petalostemum* and *Verbesina*.

HOSTS—*Megachile latimanus* Say and *M. melanophoea* Smith.

The subspecific designation of *rufitarsis* is made necessary by the present recognition of two additional subspecies in the western states.

Coelioxys sayi Robertson

(Figs. 63, 65 & 66)

Coelioxys sayi Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 346. ♀ ♂.

Coelioxys mendacina Cockerell, 1921. Amer. Mus. Novitates 21, p. 3. ♀ ♂. New synonymy

Coelioxys sayi Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9.5-12 mm.; black, tegulae more brownish-piceous, tibiae and tarsi more or less reddened; eyes very slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, this space not much greater than their diameter, considerably more distant from eyes; cheeks much narrower than eyes, subangulate and slightly concave below, but this area not sharply differentiated from that above; clypeus rather flat toward upper margin but much thickened apically, the margin somewhat incurved medially, forming two rather obtuse, rounded angles; median length of labrum slightly greater than basal width; upper margin of mandible rather broadly produced toward base, the median tooth rather small but distinct; punctures quite coarse and deep, rather sparse between eyes and ocelli, somewhat closer along posterior border of vertex, contiguous on cheeks, irregular and coarse just below anterior ocellus, becoming very densely and finely rugose between and below antennae and over clypeus, a quite distinct, raised, impunctate, longitudinal line between antennae; pubescence of head and thorax entirely pale, more or less yellowish, rather copious around antennae and below ocelli, but becoming subappressed and very short on supra-clypeal area and clypeus, somewhat more elongate on each side of face, the apical thickened margin of the clypeus with very dense, elongate, pale yellowish pubescence; pubescence of cheeks very short, somewhat more dense toward hypostomal area, quite short and sparse over most of pleura, becoming somewhat more dense anteriorly and posteriorly, but not forming distinct fringes; propodeum with copious elongate, pale yellowish pubescence; transverse carinae of tubercles low but evident, extended slightly along anterior margin of scutum; scutellum rather broadly outcurved posteriorly, posterior and dorsal surfaces not sharply differentiated; axillae very short, not much longer than basal width, acute tip projecting but very slightly beyond margin of scutellum; coxal spines very short, reduced to subtriangular, carinate tubercles; wings quite deeply infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; scu-

tum coarsely and deeply punctate, punctures slightly separated medially but becoming crowded laterally; punctures of scutellum coarse, slightly separated, those on axillae about equally coarse but very close; punctures of pleura very coarse, contiguous and rather shallow, becoming subreticulate above; lateral faces of propodeum smooth but very dull, posterior face somewhat more shining, with minute, scattered and vague punctures, dorsal area velvety, becoming obscurely subreticulate along upper margin; basal abdominal tergum shining, punctures coarse and deep, rather widely separated medially, becoming quite close and somewhat finer laterally, apical margin slightly depressed, with an entire, dense, white fascia; transverse grooves of terga 2 and 3 subapical medially, becoming more basal toward sides, the more basal punctures of the discs quite deep, distinct, rather coarse and regular, apical areas largely impunctate medially, becoming rather closely punctate at extreme sides, apical margins deeply depressed and completely white fasciate; terga 4 and 5 not definitely grooved, rather closely punctate basally, more sparsely so apically, the apical margins deeply depressed and completely white fasciate; tergum 6 abruptly narrowed just beyond mid point, thus obtusely angulate, closely, deeply and rather finely punctate between this and base, with a faint, median, longitudinal line which continues as a distinct ridge to apex, surface deeply excavated on each side of this and sides just beyond the angle rather deeply excavated, tip very narrowly rounded (fig. 65); sternum 6 narrow and elongate, gradually narrowed apically, with a pair of very minute but distinct notches on each side toward tip, this area slightly longer than breadth at the notches, subacute apically; sterna 1-4 shining, coarsely and deeply punctate, rather uniformly close in large part, apical margins depressed, yellowish-hyaline, completely white fasciate; sternum 5 subtriangular in outline, basal punctures quite deep and distinct, but apex becoming dull, finely and densely tessellate or roughened, punctures fading out from base, lateral oblique margins quite distinctly white fasciate.

MALE—Length 9-10 mm.; black, tegulae yellowish-hyaline, tarsi entirely, and tibiae at base and apex, ferruginous; eyes rather strongly convergent below; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks somewhat narrower than eyes, carinate posteriorly, deeply concave over most of lower half adjacent to the carinate posterior margin, this carina produced below into an obscure angle, the concavity shining and bare; clypeus very slightly convex, apical margin

nearly straight, densely covered with pubescence; median length of labrum about equal to basal width; median tooth of mandible distinct; punctures coarse and deep, rather close behind ocelli, but with wide, intervening, impunctate spaces between ocelli and eyes, cheeks becoming coarsely rugoso-punctate or reticulate, area below ocelli coarsely reticulate, becoming very densely rugose beneath the pubescence below antennae and over clypeus; pubescence entirely white on head and thorax, dense below antennae and along margins of hypostome; pleura with rather short, thin pubescence, forming indefinite, white fringes along margins; pubescence of propodeum more elongate and thin; transverse carina of tubercles very low and inconspicuous, somewhat obscured by pubescence; posterior margin of scutellum very slightly outcurved, posterior and dorsal surfaces not sharply differentiated; axillae subtriangular, very short, not much longer than the base is broad, projecting only slightly beyond margins of scutellum; coxal spines well developed, elongate, somewhat spatulate, with rounded tips, densely pubescent posteriorly; wings rather deeply infuscated over apical half, 1st recurrent vein reaching 2nd submarginal cell nearer base than 2nd does to apex; scutum coarsely and deeply punctate, punctures slightly separated medially, becoming densely crowded at extreme sides; scutellum coarsely rugoso-punctate or reticulate, the axillae somewhat more finely so; punctures of pleura rather shallow but coarse and subcontiguous, with a few shining interspaces evident below, becoming coarsely reticulate above; lateral faces of propodeum dull, very finely roughened, posterior face somewhat more shining, with very minute, close and vague punctures, dorsal area narrowly velvety below, the upper half becoming finely and obscurely rugose; basal abdominal tergum shining, punctures coarse, deep and quite close, only slightly separated medially, apical margin depressed, yellowish-hyaline and completely white fasciate; transverse grooves of terga 2 and 3 complete, subapical in position at center, becoming more basal at extreme sides, the more basal punctures deep, regular and quite coarse, the more apical part of disc shining and impunctate in large part, becoming rather irregularly and closely punctate at extreme sides; tergum 2 with a pair of very small, but deep and distinct foveae on each side, just beyond the groove, apical margins of both terga deeply and narrowly depressed, yellowish-hyaline and white fasciate; terga 4 and 5 somewhat depressed at base, this area white tomentose, interrupted medially, apical margins deeply and abruptly depressed, more or less hyaline, white fasciate at sides, interrupted medially on each, discs deeply and rather coarsely punctate medially,

where they are rather sparse, but becoming closer and finer toward lateral limits; tergum 6 fasciate at base on each side of center, surface somewhat shining, closely, finely and distinctly punctate, deeply excavated just before tip, dorsal protuberances flared, very short, subtriangular, ventral spines more narrow and elongate, tips narrowly rounded, lateral spines distinct and acute (fig. 66); sterna 1-4 shining, coarsely, deeply and rather uniformly punctate, punctures only slightly separated in general, apical margins depressed yellowish-hyaline, completely white fasciate; disc of sternum 4 not appreciably emarginate medially, but the depressed rim with a very small, median, apical emargination; sternum 5 largely retracted, the margin broadly and shallowly incurved medially, submembraneous, rather densely tomentose on each side; sterna 6 and 8 entirely retracted, 6 triangularly acute apically, rather densely long pubescent on each side, 8 strongly narrowed apically, the tip slightly incised; gonocoxites of genital armature much exceeding penis valves in length, somewhat compressed, bearing numerous, rather elongate, erect, fine hairs.

DISTRIBUTION—British Columbia to Ontario, south to Texas and Florida; March to October.

FLOWER RECORDS—*Azalia*, *Aralia*, *Asclepias*, *Aster*, *Bidens*, *Coreopsis*, *Daucus*, *Erigeron*, *Haplopappus*, *Helenium*, *Helianthus*, *Koellia*, *Lespedeza*, *Linaria*, *Melilotus*, *Nepeta*, *Phaseolus*, *Polygonum*, *Rhus*, *Rubus*, *Solidago*, *Spiraea*, *Trifolium* and *Vicia*. Robertson (1929) lists the following additional genera: *Amorpha*, *Blephilia*, *Crotalaria*, *Dianthera*, *Eryngium*, *Eupatorium*, *Geranium*, *Heliopsis*, *Monarda*, *Petalostemum*, *Psoralea*, *Rudbeckia*, *Symphoricarpos*, *Thasptium* and *Verbena*.

HOST—*Megachile mendica*.

This parasite has been reared from a nest of *Megachile mendica* by K. V. Krombein at Lake Placid, Fla.

***Coelioxys slossoni arenicola* Crawford**
(Figs. 65 & 66)

Coelioxys slossoni var. *arenicola* Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 156. ♀ ♂.

FEMALE—Length 12 mm.; black, tegulae yellowish-hyaline, mandibles except the teeth, labrum in part, legs except coxae, basal abdominal tergum and all of the sterna, ferruginous; eyes somewhat convergent below; lateral ocelli slightly nearer margin of vertex than to each other, considerably more distant

from eyes; cheeks very narrow above, becoming even narrower below, neither angulate nor excavated below; clypeus flat, apical margin straight, densely fringed with elongate, densely plumose pubescence; median length and basal width of labrum subequal; median tooth of mandibles conspicuous; punctures deep and distinct, slightly separated across vertex and between ocelli, a shining, slightly elevated, impunctate space between upper end of eye and lateral ocelli, and a similar elevated impunctate area more or less surrounding anterior ocellus and extending down nearly to level of antennae; other areas of face and clypeus beneath pubescence finely rugose, cheeks rather coarsely rugoso-punctate, becoming finely so below; pubescence of head and thorax entirely pale, very short, subappressed and pale yellowish on face and clypeus, more whitish on cheeks, pleura prominently fringed on both margins with dense, whitish pubescence, the scutello-mesothoracic suture with a dense and conspicuous line of yellowish tomentum, the lateral margins adjacent to tegulae, yellowish tomentose, and scutum with a pair of anterior, transverse, tomentose bands which are slightly separated medially; pubescence of propodeum rather short but copious, entirely yellowish-white and erect; transverse carinae of tubercles erect and conspicuous, extended somewhat along anterior margin of scutum; posterior margin of scutellum slightly outcurved, posterior and dorsal faces quite distinct; axillae rather short but acute, projecting rather conspicuously from margin of scutellum, length not exceeding median length of scutellum; front coxal spines reduced to very low, triangularly carinate tubercles that are densely pubescent posteriorly; wings subhyaline basally becoming lightly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum coarse, deep and distinct, rather uniformly close but not crowded; dorsal face of scutellum irregularly and closely punctate, with some irregular intervening spaces evident; axillae coarsely and closely punctate or reticulate; pleura below shining, punctures variable and irregular, of two rather distinct sizes, with evident, shining, intervening spaces, becoming quite coarsely reticulate just below tegulae; lateral faces of propodeum somewhat smoother but very dull, minutely, obscurely and closely punctate, posterior face somewhat more shining, punctures irregularly scattered and very minute, dorsal area more shining or velvety, becoming rather deeply and coarsely but narrowly striate along upper margin; basal abdominal tergum shining, entirely ferruginous, punctures deep, distinct, quite coarse and sparse, becoming finer and closer toward the slightly depressed, apical

rim, this with an entire, rather narrow, pale yellowish fascia; transverse grooves of terga 2-4 sub-basal and quite evident toward the sides but obliterated medially, punctures basad of the grooves, rather deep, distinct, close and rather coarse, only slightly separated in median area, the more apical portions of the discs beyond the grooves largely shining and impunctate, but with punctures becoming evident toward the rims and toward the lateral margins, apical rims depressed, with entire, pale yellowish fasciae; tergum 5 somewhat depressed toward base and rather closely punctate across base, becoming very sparsely punctate medially, punctures becoming more numerous toward the depressed rim and the extreme sides, the rim bearing a nearly complete, dense, pale yellowish fascia; tergum 6 elongate triangular in outline, slightly incurved near center of each side, the sides slightly excavated at this point, but not at all angulate, a narrow, median, longitudinal, impunctate line from base continuous with a distinctly raised, median ridge toward apex, surface slightly but not deeply excavated on each side, tip very narrowly rounded, the more basal punctures fine, well separated medially, becoming somewhat closer toward sides and apically, the tip dull but rather smooth (fig. 65); sternum 6 narrow and elongate, somewhat exceeding the tergum in length, with a pair of distinct notches toward the tip, length of this apical part considerably greater than width at the notches, tip narrowly rounded; sterna 1-4 shining, ferruginous, with deep, distinct and well separated punctures, these becoming somewhat closer at extreme sides, apical margins depressed, yellowish-hyaline, loosely white fasciate; sternum 5 broadly triangular in outline, closely punctate at base but punctures becoming minute and indefinite toward the apical, angulate tip, the oblique sides with a rather dense but narrow fringe of whitish pubescence.

MALE—Length 12 mm.; black, tegulae ferruginous-hyaline, mandibles except tips, entire legs except coxae, basal abdominal tergum and most of the abdominal sterna bright ferruginous; eyes rather strongly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; cheeks considerably narrower than eyes, carinate posteriorly, shallowly excavated or concave below, but this area densely tomentose, with an elongate posterior fringe; clypeus nearly flat, margin nearly straight; median length of labrum somewhat greater than basal width; median tooth of mandible very low and inconspicuous, hardly evident; punctures deep and distinct, slightly separated but not sparse across vertex, a narrow, shining, impunctate, somewhat raised space between

upper end of eye and lateral ocelli, and anterior ocellus partially surrounded by a similar raised impunctate area; cheeks rather finely rugose, becoming closely but more distinctly punctate above; surface of face and clypeus beneath the dense pubescence very finely rugose; pubescence very short, entirely pale on head and thorax, yellowish and rather copious around antennae, becoming appressed and dense over entire lower half of face and clypeus, cheeks more thinly white pubescent, quite dense on each side of hypostome; margins of pleura fringed with dense, whitish pubescence, the scutello-mesothoracic suture quite densely yellowish tomentose, lateral margins of scutum similarly tomentose and scutum with a pair of transverse, anterior lines of yellowish tomentum that are nearly or quite contiguous medially; pubescence of pleura more erect and thin, largely yellowish-white; transverse carinae of tubercles erect and conspicuous, yellowish-hyaline, produced slightly along anterior margin of scutum; posterior margin of scutellum gently outcurved, the posterior and dorsal faces quite distinct; axillae prominently produced apically, this projection strongly compressed and rounded as seen from the side, acute as seen from above; coxal spines well developed, slender, moderately elongate, narrowly rounded at tip, the coxae completely covered with dense, whitish pubescence; wings subhyaline basally, becoming lightly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum shining between coarse, deep and distinct punctures, these slightly separated over most of disc, but becoming somewhat closer at extreme sides and toward the transverse tomentose bands; dorsal face of scutellum and axillae closely and rather deeply punctate, punctures slightly but not widely separated, contiguous in part; pleura shining below, punctures of two distinct sizes, at least slightly separated, becoming coarsely reticulate above, just below tegulae; lateral faces of propodeum smooth but dull, minutely and obscurely punctate, posterior face somewhat more shining, punctures very fine, irregularly scattered and obscure, dorsal area velvety but somewhat shining, the narrow upper margin with a row of quite distinct, short striations; basal abdominal tergum entirely ferruginous, rather deeply, closely punctate medially, punctures becoming much more coarse and sparse toward each side, apical margin with a complete, pale yellowish fascia, the tergum subcarinate at each extreme side; transverse grooves of terga 2 and 3 obliterated medially, quite distinct laterally, sub-basal at extreme sides but becoming more nearly median toward the mid line, the more basal punctures of the disc rather deep, distinct, close laterally becoming

more widely separated medially, the apical margin of groove on each side rather narrowly shining and impunctate, disc rather deeply punctate between this and the depressed apical rims, these densely yellowish fasciate at the sides, becoming very thin or interrupted medially, groove of tergum 3 pale tomentose in part; terga 4 and 5 with basal transverse grooves, these densely tomentose, the more apical portions of the disc beyond these grooves impunctate in part, but becoming rather closely punctate along the depressed rims, these with apical fasciae evident at the sides; tergum 6 shining, densely tomentose across base, punctures very fine, irregularly scattered on the median area, becoming rather coarse on each side where they are to some degree separated, disc with a deep, median excavation just before tip, the dorsal protuberances slightly divergent, short but acute, ventral spines more elongate and slender, very slightly divergent, lateral spines short but distinct and acute (fig. 66); abdominal sterna 1-4 ferruginous, shining, deeply, distinctly and rather coarsely punctate, punctures only slightly separated in median area, close laterally, apical margins slightly depressed, yellowish-hyaline, densely clothed with rather loose, whitish pubescence; sternum 5 fully exposed, broadly rounded, apical median area shallowly depressed, apical margins depressed and distinctly fasciate on each side of center; sterna 6 and 8 entirely retracted, submembranous, 8 strongly narrowed apically; penis valves of genital armature very short, considerably exceeded by the somewhat compressed gonocoxites, these with numerous, fine but rather elongate, erect hairs.

DISTRIBUTION—Texas to Georgia and North Carolina; June to September.

FLOWER RECORDS—*Helianthus*, *Phaseolus* and *Strophostyles*.

Coelioxys slossoni slossoni Viereck

Coelioxys slossoni Viereck, 1902. Canad. Ent. 34, p. 327. ♀ ♂.

This form is very similar to *arenicola*, showing no evident structural differences. In this typical form the abdomen is almost entirely ferruginous, lacking the black tergal plates of segments 2-6 of *arenicola*. In the male, also, there is a tendency to a more complete ferruginous color of the abdominal terga, but in some cases it is about the same as in *arenicola*.

DISTRIBUTION — Florida; March to September.

FLOWER RECORD—*Bidens*.

Coelioxys sodalis Cresson

(Figs. 65 & 66)

Coelioxys sodalis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 99. ♂.

Coelioxys tristis Provancher, 1882. Nat. Canad. 13, p. 241. ♀. New synonymy.

Coelioxys ribis Cockerell, 1900. Canad. Ent. 32, p. 301. ♀. New synonymy.

Coelioxys ribis var. *kincaidii* Cockerell, 1904. Ann. Mag. Nat. Hist. (7) 13, p. 33. ♀. New synonymy.

Coelioxys ribis Graenicher, 1927. Ent. News 38, pp. 233 & 273. (biology)

FEMALE—Length 11-13 mm.; entirely black, including tegulae and legs; eyes somewhat convergent below; lateral ocelli slightly nearer margin of vertex than to each other, and slightly nearer each other than to eyes; cheeks slightly narrower than eyes, carinate posteriorly, much narrowed and densely pubescent below, obscuring the inferior angle, clypeus nearly flat, apical margin straight, with 4 or 5 small denticles and a rather dense fringe of short, yellowish hairs interspersed with a few elongate hairs; median length of labrum subequal to basal width; mandibles quite slender, middle tooth about equal to the others; punctures quite coarse and deep, close but not crowded across vertex, becoming densely crowded on cheeks, coarsely reticulate just below anterior ocellus, face below antennae and clypeus finely sub-rugose; pubescence of head and thorax entirely pale, somewhat yellowish and quite dense on face, short and subappressed on clypeus, but more or less erect elsewhere, whitish and rather elongate on cheeks below, yellowish-white and rather copious on dorsum of thorax and on propodeum, somewhat more whitish but copious on pleura; transverse carinae of tubercles very low, barely evident beneath the dense pubescence; posterior margin of scutellum quite strongly outcurved, posterior face not sharply differentiated from dorsal face; axillae acute, rather slender apically, produced conspicuously from sides of scutellum, but tips not exceeding median length of scutellum; front coxal spines reduced to very short and inconspicuous, blunt tubercles; wings hyaline basally, becoming very faintly clouded along apical margin, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum slightly separated medially, rather shallow and not very sparse, becoming somewhat finer and densely crowded laterally; punctures of scutellum much coarser and contiguous, those on axillae much finer toward base, becoming inevident on the minutely roughened tips; punctures of pleura not especially coarse, slightly separated below, surface more reticulate above; lateral

faces of propodeum dull, finely reticulate, posterior face somewhat more finely reticulate, dorsal area smooth and velvety, but becoming rather broadly and very finely rugose along upper margin; basal abdominal tergum shining over the median 3rd, densely and copiously pale pubescent on each side, punctures very fine and rather sparse medially, becoming somewhat closer toward sides, apical margin only slightly depressed and subfasciate; transverse grooves of terga 2 and 3 submedian at mid-line, becoming more basal laterally, the more basal punctures quite deep, distinct and relatively close, the broader apical areas very sparsely, irregularly, and finely punctate, apical margins rather deeply depressed, with entire, whitish, apical fasciae; terga 4 and 5 sparsely and finely punctate except at extreme sides, apical margins very narrowly depressed and narrowly white fasciate; tergum 6 triangular in outline, the sides straight, very slightly grooved just beyond the mid point but neither incurved nor angulate, with a very fine, median, longitudinal ridge extending from near the base toward the tip, surface quite deeply excavated on each side near the tip which is narrowly rounded, surface somewhat shining at base, very finely and rather closely punctate, punctures becoming crowded toward apex which is more tessellate or subrugose (fig. 65); sternum 6 quite broad at base, abruptly narrowed toward the rather slender, narrowly rounded apex, the sides thus markedly incurved but not notched; sterna 1-4 rather sparsely and shallowly punctate medially, punctures becoming very close and relatively deep at sides, apical margins rather broadly impressed, yellowish-hyaline and rather densely white fasciate; sternum 4 triangular in outline, very finely punctate medially at base, becoming somewhat more coarsely so laterally, punctures becoming densely crowded, minute and obscure toward apex, the margins narrowly white fasciate.

MALE—Length 8-12 mm.; entirely black, including tegulae and legs; eyes somewhat convergent below; lateral ocelli slightly nearer margin of vertex than to each other, and considerably nearer each other than to eyes; cheeks subequal to eyes in width, not noticeably carinate posteriorly, with a rather deep, bare concavity below, upper margin produced rather conspicuously below lower end of eye as a distinct tubercle, lower margin with a fringe of elongate hairs; clypeus nearly flat, apical margin straight, with 5 small denticles, rather conspicuously fringed with elongate, pale hairs; median length of labrum subequal to basal width; mandibles rather slender, median tooth well developed; punctures quite coarse and deep, distinct and slightly separated in part across vertex, cheeks more dense-

ly rugose, and face below ocelli densely and rather finely rugose, especially below antennae and on clypeus; pubescence of head and thorax entirely pale and somewhat yellowish, quite long and copious around antennae, between ocelli and over lower part of face, more definitely white but rather short on cheeks, whitish and copious over pleura and propodeum, somewhat more yellowish, elongate and rather thin over dorsum of thorax; transverse carinae of tubercles very low and inconspicuous, barely evident, obscured by pubescence; posterior margin of scutellum rather broadly outcurved, posterior and lateral surfaces not differentiated; axillae acute apically, rather short, projecting but little from margin of scutellum; coxal spines short but well developed, rather robust, tips narrowly rounded, densely long pubescent posteriorly; wings subhyaline, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum quite deep and distinct throughout, rather coarse and slightly separated medially, becoming much finer and densely crowded laterally; punctures of scutellum quite densely crowded, not much coarser than those of scutum; axillae with much finer and densely crowded punctures, being nearly rugose; pleura rugose or rather finely reticulate below, becoming more coarsely reticulate above; lateral faces of propodeum finely reticulate and dull, posterior face finely, obscurely and closely punctate, dorsal area smooth, more velvety, becoming very narrowly, irregularly striate along upper margin; basal abdominal tergum shining, punctures rather fine and close but deep and distinct, quite regular, surface bearing rather copious, elongate, white pubescence, apical margin narrowly depressed and rather loosely pale fasciate; terga 2 and 3 markedly depressed across base but without definite grooves, punctures deep and distinct but rather fine and close, evenly distributed in general, but becoming considerably finer and closer on each side of mid-line on tergum 2, foveae completely lacking, apical margins rather deeply depressed, narrowly yellowish-hyaline, with entire whitish fasciae; terga 4 and 5 rather evenly, deeply and distinctly punctate, rather closely so on 4, somewhat more sparse on 5, apical margins narrowly depressed, yellowish hyaline, with entire white fasciae; tergum 6 deeply excavated in center toward apex, dorsal protuberances very short, subtriangular, compressed and nearly parallel, overlying base of the ventral spines which are more elongate, the tips narrowly truncate, intervening space rounded, lateral spines robust, tips very slightly curved, surface of tergum shining, finely and closely punctate medially, punctures becoming somewhat coarser and more sparse on each side (fig. 66); sterna 1-4 shining, closely, deeply and not very

coarsely punctate, punctures evenly distributed, apical margins narrowly yellowish-hyaline, rather densely white fasciate; disc of sternum 4 not appreciably emarginate, but the depressed apical margin very slightly incurved medially; sternum 5 largely hidden, submembranous, apical margin rather broadly and deeply incurved medially, densely pubescent on each side of this apically; sterna 6 and 8 entirely retracted, largely membranous, 8 rather regularly rounded apically; penis valves of genital armature fully equal to the gonocoxites in length, gonocoxites slightly swollen, bearing numerous, elongate, erect hairs.

DISTRIBUTION—British Columbia and Northwest Territory to Nova Scotia, Wisconsin, New York and the New England states; May to August.

FLOWER RECORDS—*Rhodora* and *Rubus*.

HOST — *Megachile wootoni* (*melanophoea*) Smith.

***Coelioxys texana texana* Cresson**

(Figs. 64-66)

Coelioxys texana Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 272. ♀.

FEMALE—Length 13 mm.; black, tegulae yellowish-hyaline, scape and pedicel of antennae, legs and venter of abdomen in large part ferruginous; eyes nearly parallel; lateral ocelli subequally distant from margin of vertex, from eyes and each other; cheeks very narrow, subcarinate posteriorly, carinate margin meeting the hypostomal carinae below at a distinct angle, this area not excavated; clypeus very slightly convex, apical margin nearly straight, very finely tuberculate, with a dense fringe of rather short, whitish pubescence; median length of labrum somewhat greater than basal width; median tooth of mandible somewhat smaller than the others; punctures quite deep and distinct, not very coarse, but well separated across vertex, becoming somewhat closer and more obscure on cheeks, area surrounding anterior ocellus markedly swollen and impunctate, a narrower impunctate band extending from this to upper margins of eyes; supraclypeal area rather deeply, distinctly and closely punctate, clypeus more irregularly rugose, with shining, irregular anastomosing lines; pubescence entirely pale, somewhat yellowish and rather copious around bases of antennae and on sides of face, very sparse and more whitish on cheeks; pubescence sparse on pleura, with thin fringes anteriorly and posteriorly, scutello-mesothoracic suture narrowly yellowish tomentose, posterior surface of scutellum densely tomentose

and scutum with a pair of anterior, transverse curved lines of tomentum which are somewhat broader toward median line, with a few scattered, scale-like hairs between; propodeum with finer, more erect and elongate, quite dense pubescence; transverse carinae of tubercles erect and conspicuous, yellowish-hyaline, extending along anterior margin of scutum for a considerable distance; posterior margin of scutellum broadly angulate, posterior and dorsal surfaces quite sharply differentiated but not carinate; axillae well developed, acute apically, tips about equalling the median length of the scutellum (fig. 64); front coxal spines reduced to very short and inconspicuous, blunt or subcarinate tubercles; wings subhyaline at base becoming faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum rather dull, punctures coarse, deep and distinct, slightly separated in the broad, median area, becoming very close laterally; punctures of scutellum somewhat smaller and closer than those of scutum, and axillae with a few, scattered, indistinct punctures; punctures of pleura rather shallow, coarse and widely separated in general, becoming close only just below the tegulae; lateral faces of propodeum rather smooth, surface obscured by rather dense pubescence, posterior face rather dull, with minute, indefinite, scattered punctures, dorsal area velvety, becoming quite deeply, abruptly and narrowly striate across upper margin; basal abdominal tergum shining, coarsely and deeply punctate, punctures slightly separated but not sparse throughout, margin of basal concavity conspicuously yellowish fasciate, and apical margin with an entire, narrow, yellowish fascia; terga 2 and 3 with submedian, slightly oblique, transverse grooves on each side, these widely interrupted medially, quite densely pale tomentose, forming a rather distinct, submedian fascia, punctures quite coarse and deep, well separated medially, becoming somewhat closer laterally, apical margins narrowly depressed, yellowish-hyaline, with entire yellowish fasciae; tergum 4 faintly impressed on each side, but not definitely grooved, with only a few scattered, scale-like hairs, punctures somewhat finer and closer at extreme base, becoming rather sparse and somewhat coarser toward depressed apical margin which has an entire, pale yellowish fascia; tergum 5 rather dull, punctures rather fine and close basally, becoming somewhat more sparse toward apical margin, this depressed and thin, yellowish fasciate; tergum 6 rather broad at base, apex triangularly pointed, each side thus slightly outcurved, upper surface quite flat, rather dull, finely and closely punctate at base, punctures becoming more sparse apically, apical and sublateral margins bearing scattered, coarse and elon-

gate punctures, being almost striate (fig. 65); sternum 6 nearly parallel-sided, apex broadly rounded, produced considerably beyond apex of tergum; sterna 1-4 shining, deeply and coarsely punctate, punctures well separated medially, becoming closer laterally, apical margins rather broadly yellowish-hyaline and loosely white fasciate; sternum 5 broadly rounded apically, coarsely punctate across extreme base, but the median, apical areas with very minute and close punctures interspersed with somewhat coarser and more sparse punctures on a shining surface, thus doubly punctate, apical margin rather broadly hyaline, not definitely fasciate.

MALE—Length 11-12 mm.; black, tegulae yellowish-hyaline, scape and pedicel of antennae, legs and venter of abdomen in large part ferruginous; eyes slightly convergent below; lateral ocelli slightly nearer each other than to eyes, much nearer eyes than to margin of vertex; cheeks much narrower than eyes, inferior angle rounded, this area not excavated; clypeus slightly convex, apical margin nearly straight, with a pair of submedian tubercles which are slightly separated; median length of labrum somewhat greater than basal width; mandibles distinctly 3-dentate; punctures deep and distinct, rather coarse, slightly separated across vertex, becoming somewhat closer and rather obscure on cheeks, very fine and close below, surface becoming somewhat shining below mandibles; area surrounding anterior ocellus markedly swollen and impunctate and upper margin of eye with a similar impunctate area, these areas subcontiguous; punctures of face beneath the dense pubescence close and fine, clypeus somewhat more coarsely and irregularly, but deeply punctate; pleura sparsely pubescent with thin anterior and posterior fringes, the scutello-mesothoracic suture narrowly yellowish tomentose, posterior margin of scutellum densely tomentose, scutum with a pair of slightly curved, transverse, anterior lines of tomentum that are somewhat broadened at inner end, with a few, scattered, scale-like hairs between; pubescence of propodeum more erect and elongate, whitish, rather dense along posterior, lateral margins; transverse carinae of tubercles erect, well developed, yellowish-hyaline, extended considerably along anterior margin of scutum; posterior margin of scutellum broadly rounded or subangulate, posterior and dorsal faces quite sharply differentiated but not carinate; axillae quite robust, acute apically, tips not exceeding median length of scutellum; coxal spines reduced to acute tubercles; wings hyaline basally, becoming faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequal-

ly distant from base and apex; scutum somewhat shining, punctures coarse, deep and distinct, well separated across posterior half of disc and in center, becoming rather close but irregular at each side anteriorly; punctures of scutellum deep and distinct, somewhat finer and closer than those of scutum; punctures of axillae quite coarse, not very close; pleura somewhat shining below, punctures rather shallow but coarse, rather widely separated in general, becoming close only just below tegulae; lateral faces of propodeum dull, rather finely and deeply punctate beneath the copious pubescence, posterior face finely and closely punctate, dorsal area velvety, becoming irregularly and finely rugoso-striate along upper margin; basal abdominal tergum shining, punctures deep and distinct, rather coarse, well separated throughout, margin of concavity quite distinctly yellowish fasciate, but this interrupted medially, apical margin slightly depressed, with complete, whitish, apical fascia; tergum 2 with very short, transverse, sub-basal grooves toward sides, these widely separated medially, filled with scale-like, pale pubescence forming an indefinite fascia, median punctures deep and distinct but very sparse, becoming quite fine and close between inner end of groove and the apical margin, but coarser and less close toward sides, apical margin deeply depressed and impunctate but not definitely fasciate; terga 3-5 with dense, basal fasciae which are interrupted medially, apical margins deeply depressed and impunctate, not fasciate, punctures coarse and sparse medially becoming quite close at extreme sides; tergum 6 fasciate across base, deeply excavated in center, dorsal protuberance irregular, short, somewhat flared and multidentate or crenulate, ventral spines short but acute, strongly divergent and widely separated, dorsal surface shining, rather deeply and finely punctate, punctures quite close within the central cavity (fig. 66); sterna 1-4 shining, deeply, coarsely, quite closely and regularly punctate, apical margins depressed, yellowish-hyaline, thinly whitish fasciate; depressed apical margin of sternum 4 with a rather deep, median emargination, acutely angulate on each side of this; sternum 5 largely retracted, apical margin very shallowly incurved medially; sterna 6 and 8 entirely retracted, submembranous; gonocoxites slightly exceeding penis valves in length, somewhat swollen apically, bearing only extremely short, fine and obscure hairs toward apex.

DISTRIBUTION—Primarily southwestern, occurring in Mexico and Arizona, reaching Minnesota in the north and Florida in the south; March to September.

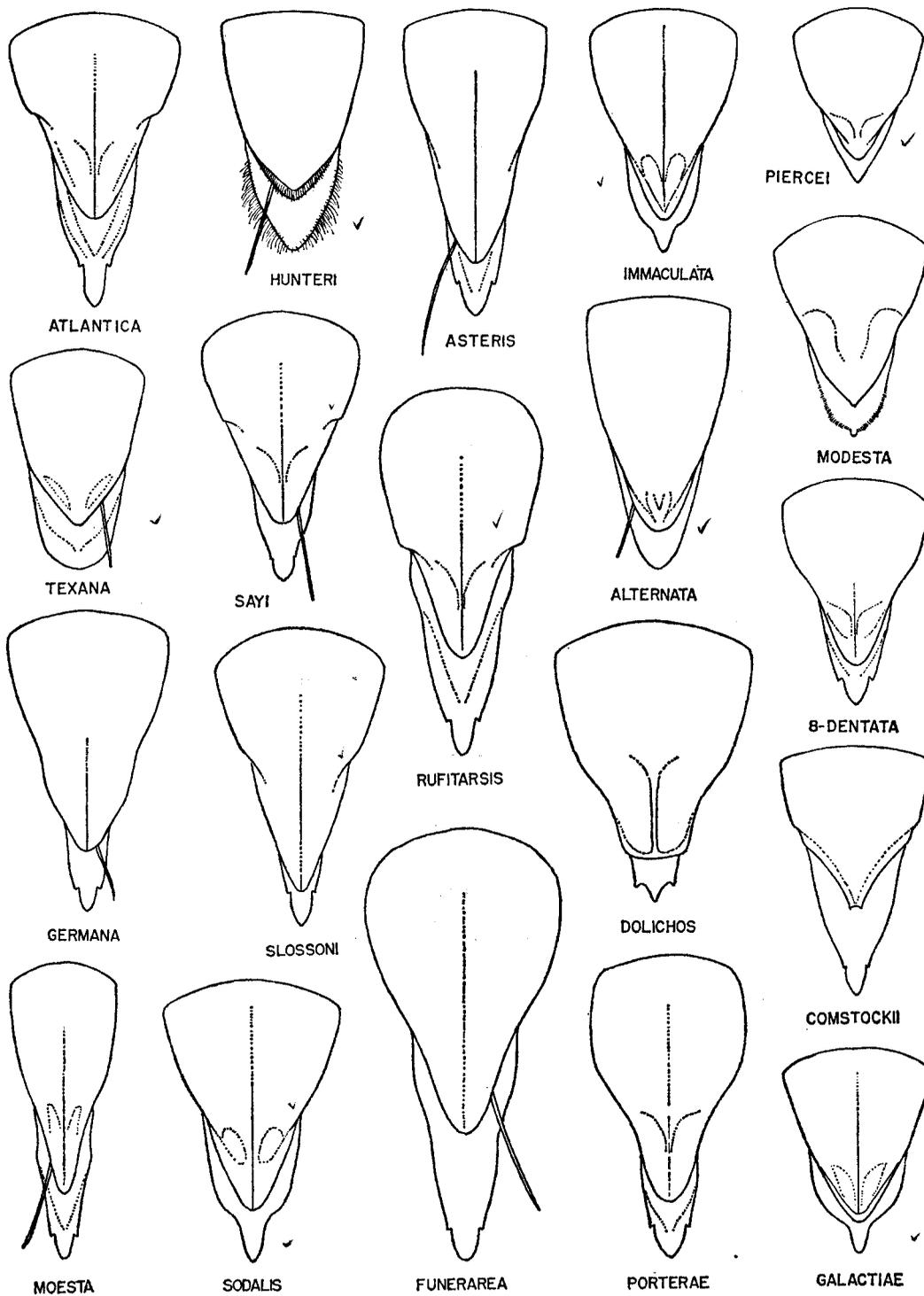


Figure 65—Apex of abdomen in females of *Coelioxys*.

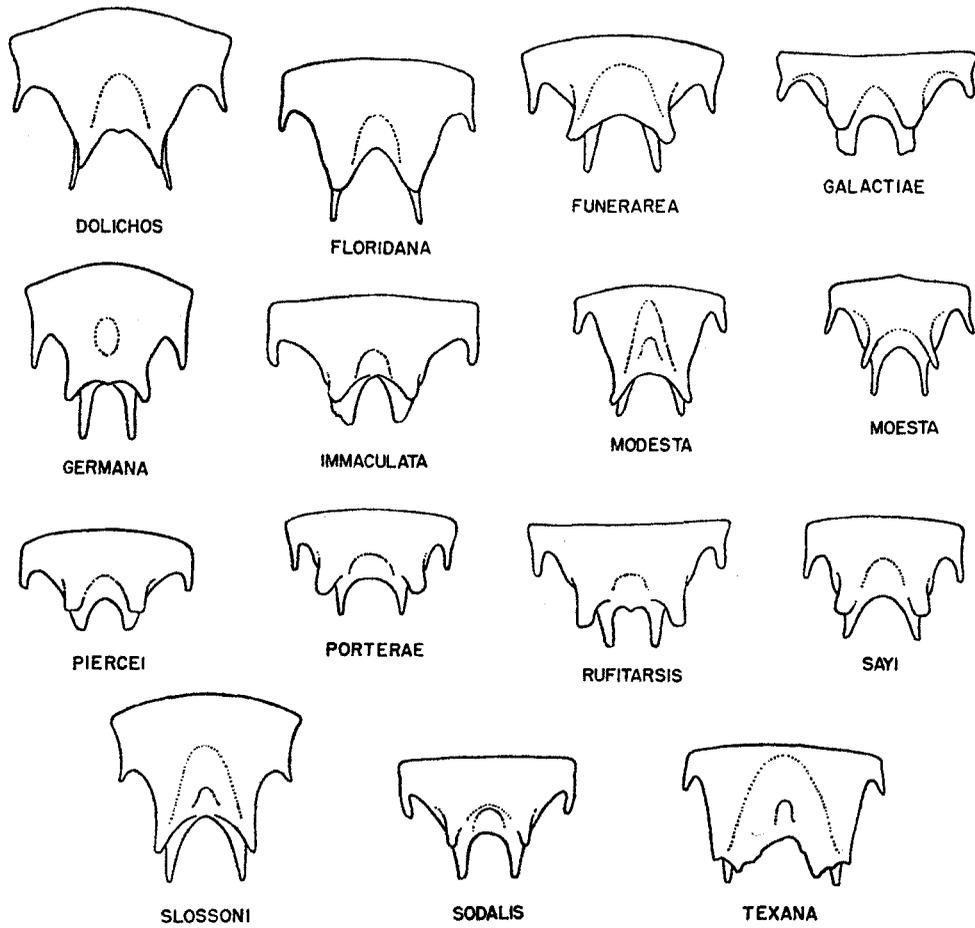


Figure 66—Apex of abdomen in males of *Coelioxys*.