

A REVISIONAL STUDY OF THE BEES
OF THE GENUS PERDITA F. SMITH, WITH
SPECIAL REFERENCE TO THE FAUNA OF
THE PACIFIC COAST

(Hymenoptera, Apoidea)

Part VII
(Including Index to Parts I to VII)

BY

P. H. TIMBERLAKE

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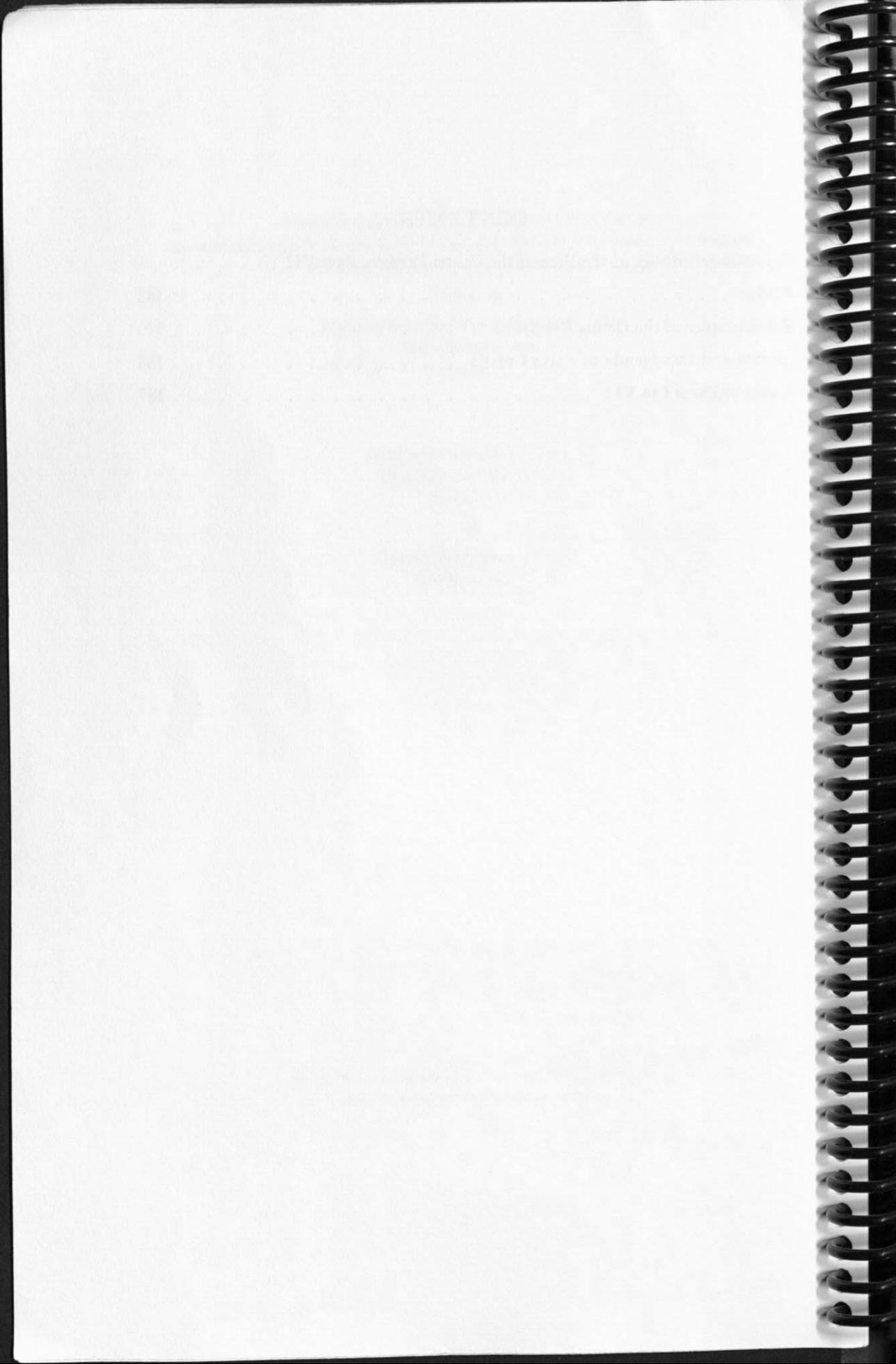


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A REVISIONAL STUDY OF THE BEES OF THE GENUS
PERDITA F. SMITH, WITH SPECIAL REFERENCE
TO THE FAUNA OF THE PACIFIC COAST
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PART VII

BY

P. H. TIMBERLAKE

IN THE PRECEDING parts of this revision all the groups of the genus *Perdita* have been tabulated and the species described in more or less detail, with only a few omissions of previously known forms. In this supplementary part many more species are added and the omissions have been rectified. A bibliography of the genus, an index to all trivial names and corrigenda for preceding parts are added.

A few remarks about the terminology used in this work may be useful. In general the terminology is self-explanatory and conforms to general usage. My use of the term "collar" for a part of the pronotum, however, needs explanation. This term has been used almost invariably for the posterior part of the pronotal disk, especially if the exposed part is transverse and prominent as in the genus *Nomada*. In this work I have applied the term to the elevated anterior margin of the pronotal disk, and apparently Cockerell used the term in the same sense in his descriptions of *Perdita*. The terminology of the parts of the genital armature is similar to that used by Snodgrass (1941) and like that used by Swenk for *Colletes* except that "caulis" is used for "cardo" and "parameral lobes" substituted for "stipites." The basal ring of the caulis, which is distinct in many genera of bees, is only faintly traceable in *Perdita*.

Again I wish to thank the many collectors who have supplied me with abundant material for many years past and who continue to find novelties in our western states and in Mexico. I especially wish to thank Dr. Jerome G. Rozen, Jr., of the American Museum of Natural History, and the late Dr. Harold J. Grant, Jr., of the Academy of Natural Sciences of Philadelphia, for the loan of types in their care. It is with great appreciation and gratitude that I acknowledge the indispensable help from Mrs. Celeste Green for preparing the drawings of the genitalia. The text figures of the head of the various species of *Perdita* in this and preceding parts are the work of Charles S. Papp, to whom I am much indebted. Invaluable aid from the National Science Foundation has been received for the preparation of this and the preceding part.

It is my wish and intention that the types recorded as belonging in the collection of the University of California at Riverside should go ultimately to the collection of the California Academy of Sciences in San Francisco.

Genus *Perdita* F. SmithSubg. *Cockerellula* Strand

Seven species have been described in this little group and two more are added herewith. The male of one of these has the apical processes of tergite 7 situated above or just preceding the apical margin of the segment; this bee may be distinguished from its closest allies by aid of the following key:

KEY TO SUBGENUS COCKERELLULA

1. Second and third ventral segments of abdomen with broad thickening or swelling across apical middle of disk 2
 Second and third ventral segments without evident discal swelling 3
2. First ventral segment with strong median fold; apical processes of tergite 7 large, broad, somewhat longer than wide, with notch between them quadrate, broader than long; mesonotum slightly dullish, almost densely punctured *asteca* Timberlake
 First ventral segment without a median fold; apical processes small, ridgelike, blunt at apex, and separated by concavity of disk and shallow emargination; mesonotum more shining and more finely punctured *bidenticauda* Timberlake
3. First ventral segment strongly and conspicuously folded in middle; tergite 7 strongly narrowed and produced apically, the two processes short and separated by broad shallow emargination; face marking pale yellow, sometimes almost whitish, reaching slightly above antennae in middle *knilli* Timberlake
 Apical fold of first ventral segment weak and inconspicuous; apical processes of tergite 7 thinly laminate, linear as seen from above, slightly divergent, emargination between them broad and deep; yellow of face not extending above antennae except at sides. . *rubida*, n. sp.

Perdita rubida, n. sp.

(Plate figs. 1191, 1192, 1299)

Male.—Head and thorax dark blue green, posterior middle of mesoscutum and scutellum more blackish. Small rufous spot at anterior end of cheeks. Mandibles except red tips, labrum, and face below level of antennae, yellow; supraclypeal mark more than twice as broad as high, its upper margin level with middle of antennal sockets; lateral marks large, hardly higher than wide, and oblique from upper outer margin of antennal sockets to orbits at middle of eyes. Thorax entirely dark. Abdomen ferruginous, basal declivity of tergite 1 and small spot at basal corner of tergite 2, fuscous. Legs black; apex of front femora, anterior side of front tibiae, and front tarsi, dull yellow. Antennae dull yellow, fuscous above on scape and pedicel and more brownish on flagellum. Tegulae pale testaceous, large mark at base fuscous. Wings slightly dusky hyaline, nervures and margins of stigma testaceous brown, subcosta more fuscous.

Head broader than long, inner orbits strongly divergent anteriorly. Cheek and temples as wide as eyes. Lateral ocelli twice their distance apart from occipital margin and about same distance from nearest eye plus diameter of both. Antennae inserted below middle of face and below level of middle of eyes; joints of flagellum broader than long, except apical joints as long as wide. Anterior half of frons above eyes with median ridge bearing fine median sulcus. Face below antennae gently convex, with parocular areas broader than intervening space; subantennal plates very small. Disk of clypeus very low and broad, twice as broad as long, lateral extensions sharply inflexed, with visible part in frontal aspect narrowed outward and reaching less than halfway to base of mandibles. Mandibles thick at base, strongly curved, tapering slightly to blunt apex and reaching only slightly beyond median line. Proboscis short, galeae reaching base of stipites. Pronotum normal, but posterior margin of disk below level of mesoscutum. Pterostigma small, narrowly lanceolate; marginal cell about as large as first submarginal cell, and obliquely truncate at apex; first recurrent nervure received by first submarginal cell; second submarginal cell narrowed about two-thirds to radius. Tarsal claws strongly bifid. Head and thorax minutely tes-

sellate and dull, frons more roughly sculptured and duller than other parts; punctures minute and moderately distinct, close but less distinct on frons, well separated on mesonotum and widely spaced on vertex and lower face. Pubescence fine, short and sparse, most evident on occiput, anterior border of mesoscutum, on metanotum and lateral ridges of propodeum; hair on disk of mesoscutum very short and thin; face appearing nude, but frons with extremely fine and short hair. Abdomen depressed, widest across second segment. Tergite 7 with two laminate processes, inserted just above apical margin and wide apart, appearing linear and slightly divergent as seen from above, and nearly as broad as long and rounded at apex as seen from side; emargination between them broader than deep. Sternite 1 with small fold at middle of apical margin; following segments of venter turgid, without evident preapical swelling and with thin and extremely fine appressed hair. Subgenital plate narrow, much longer than wide, rounded at apex, with thin marginal fringe. Genital armature short and broad, caulis about as broad as long,

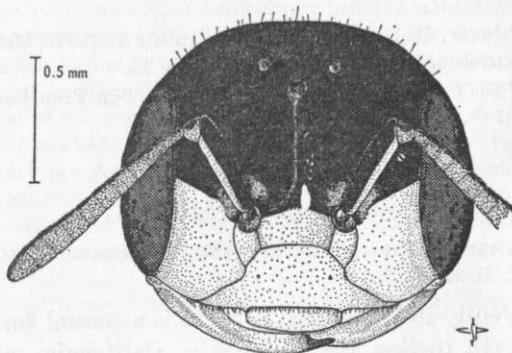


Fig. 1. *Perdita rubida*. Frontal view of head of male.

with large basal orifice; parameral lobes slender, inserted low on sides of caulis, and fringed on both sides with short hair; sagittae short and thick, more sclerotized laterally, with preapical broadened part, and as seen from side thickly fusiformly oval, with short blunt nose; superior pair of volsellae very small, inferior pair large. Length: 4 mm.; anterior wing, 2.7 mm.

Holotype male.—Nine miles south of San Juan del Rio, Durango, Mexico, Aug. 21, 1960 (Arnaud, Ross, and Rentz).

Type in collection of the California Academy of Sciences, San Francisco.

Perdita peninsularis, n. sp.

The female of *peninsularis* goes to *opuntiae* in the key to *Cockerellula* (Univ. Calif. Publ. Entom., 9:354–355), but differs in being much smaller, entirely black, and in many details of structure such as the short facial foveae, rather obscure punctures of mesoscutum and the sparser, coarser hair of the tibial scopa.

Female.—Head, thorax and abdomen black, without markings, but apical depression of tergites brownish. Legs blackish, tibial spurs testaceous. Antennae fuscous, flagellum more brownish above and broadly brown beneath. Mandibles reddened at apex. Proboscis fuscous. Tegulae testaceous, base brownish. Wings dusky hyaline, nervures testaceous, subcosta ferruginous.

Head as long as wide, inner orbits of eyes parallel. Cheeks only slightly receding, as broad as eyes and broadest opposite beginning of posterior third of eyes. Lateral ocelli nearly twice their distance apart from occipital margin and somewhat closer to nearest eye. Facial foveae broader than interval between them and eyes, and reaching from a level considerably above antennal sockets about two-thirds of distance to level of anterior ocellus, and somewhat over four times longer than wide. Face below antennae strongly convex; disk of clypeus twice as wide as high, with lateral extensions strongly inflexed, only partly visible in frontal aspect of head. Mandibles thick, weakly tapering, blunt at apex and reaching far margin of proboscival fossa. Proboscis

of moderate length, galeae reaching base of stipites. Pterostigma narrowly lanceolate; marginal cell nearly three times longer than wide and obliquely truncate at apex; second submarginal cell narrowed almost to a point on radius. Inner spur of hind tibiae very minutely serrate. Tarsal claws large, with distinct inner tooth. Head and thorax minutely tessellate, moderately dull; mesoscutum with sparse, minute, moderately distinct punctures; frons obscurely punctured, but punctures of clypeus and anterior corners of face comparatively coarse and shallow. Pubescence short, rather fine and white; hair of face short and erect, that of mesonotum very short, fine, rather dense but inconspicuous, with longer coarse erect hairs intermixed; cheeks and anterior border of face with short appressed hair; hair on sides of propodeum short and dense; hair of front legs long and rather dense, and scopal hairs of hind tibiae thin, coarse, and strongly curved; apical fimbria of abdomen dense and pale brown. Abdomen oval, about twice as long as wide; pygidial plate mostly concealed in type, but obtuse at apex. Length: 4.5 mm.; anterior wing, 3.3 mm.

Holotype female.—Triunfo, Baja California, Mexico, July 7, 1938 (Michelbacher and Ross).

Paratype.—One female, same data, except collected July 13.

Type in collection of the California Academy of Sciences, San Francisco; paratype in collection of the University of California, Riverside.

Subg. *Macroteropsis* Ashmead

Perdita arcuata arcuata Fox

New record.—Eleven males, Pinnacles, on west side, San Benito Co., California, on *Sphaeralcea*, July 2, 1956 (P. D. Hurd, Jr.).

This record apparently indicates that *arcuata* is a coastal form extending from Baja California, north to San Benito County, California, with the subspecies *dinognatha* restricted to the desert regions of California, Nevada, and Arizona. However, San Benito County is not strictly coastal and several dessert species of flowers and bees are known from the vicinity of the Pinnacles.

Perdita haplura Cockerell

New records.—Two females, Pecos River Canyon, 38 miles northwest of Del Rio, Val Verde Co., Texas, April 13, 1963 (R. B. Roberts); 1 male, 1 female, 24 miles west of Carrizozo, Lincoln Co., New Mexico, on *Sphaeralcea angustifolia* var. *cuspidata*, Sept. 12, 1961 (P. D. Hurd, Jr.).

Perdita portalis Timberlake

New record.—One male, 5 miles south of Fresnillo, Zacatecas, Mexico, on *Sphaeralcea*, Aug. 9, 1954 (Ray F. Smith), and 1 female, Aug. 7 (Linsley and MacSwain).

Perdita atrella, n. sp.

In the key to the species of *Macroteropsis* (Univ. Calif. Publ. Entom., 9:357) *atrella* falls with *P. arcuata arcuata* Fox, but is much smaller, entirely black, and comparatively nude. In *arcuata* the face, cheeks, and thorax have abundant more or less coarse hair. In *atrella* the face below antennae has fine, appressed short hair, but the hair of frons and mesoscutum is extremely fine and very short, with a few longer erect hairs on the scutum. Some rather coarse erect hair around the margin of the scutellum is the only conspicuous hair on the mesonotum.

Female.—Black, without light markings. Malar space, anterior margin of postgenae and clypeus narrowly testaceous. Mandibles testaceous yellow, shading into red at apex. Antennae reddish brown beneath. Tarsi, especially hind pair, somewhat brownish. Apical depression of tergites more nearly concolorous than in *arcuata*, except that of tergite 5 which is testaceous. Venter

dark, but sternite 6 and apical margin of sternite 5 much reddened. Tegulae dusky testaceous, subhyaline on outer margin. Wings dusky hyaline, much more greyish than in *arcuata dinognatha*; nervures fuscous.

Head about as broad as long, cheeks evenly rounded and as broad as eyes. Posterior ocelli closer together than distance to occipital margin and still more remote from nearest eye. Facial foveae well impressed, but short, not equaling space between posterior ocelli, their upper end closer to level of anterior ocellus than lower end is to level of antennal sockets. Antennae inserted well below middle of face. Face below antennae strongly convex; disk of clypeus about twice as broad as high, with lateral extensions strongly inflexed and only partly visible in frontal aspect. Mandibles robust, reaching far margin of labrum. Proboscis rather long, galeae reaching about halfway to base of stipites, but glossa extending well beyond fossa. Venation normal for *Macroteropsis* (stigma lanceolate, marginal cell about as long as first submarginal cell, and basal nervure far behind nervulus); nervulus more obliquely inclined basad than usual, meeting medius in acute angle, the junction triangularly thickened. Head and thorax very minutely shagreened, rather dull and impunctate, except for shallow punctures on clypeus. Abdomen minutely lineolate, with apical depression of tergites smooth and more shining. Pubescence white, that of anterior part of face and cheeks short, appressed, and rather fine, becoming longer and erect on vertex, occiput, undersurface of head and sternum, and still longer and coarser on margins of scutellum; hair of frons and mesoscutum abundant, but very short, fine and appressed, with a few short erect hairs interspersed on scutum. Tubercles margined with white tomentum; hair of front coxae moderately long and rather thin; hair of legs coarse, scopal hair of hind tibiae not greatly longer than greatest width of tibiae. Apical fimbria of abdomen thin and coarse. Length: about 4.5 mm.; anterior wing, 2.8 mm.

Holotype female, 20 miles south of Estacion Llano, Sonora, Mexico, Aug. 18, 1964 (M. E. Irwin).

Type in collection of the University of California, Riverside.

***Perdita tepicensis*, n. sp.**

(Plate figs. 1193, 1194, 1300)

This is allied to *latior* and *echinocacti* and agrees with the latter species in having a tubercle on the second ventral segment, but differs from both in having head and thorax almost dull black, without distinct punctures on the frons and vertex. In the key to males of *Macroteropsis* it falls with *echinocacti*.

Male.—Head and thorax dull black, with at most a slight bluish luster on frons (but specimen apparently at some time preserved in alcohol, which may have had some effect on coloration). Anterior end of gular region, mandibles except reddish tips, labrum and face below level of antennae, yellow. Thorax without markings, anterior rim of flanks of pronotum narrowly ferruginous; tubercles tinged with brown. Abdomen dark ferruginous, tergite 1 fuscous except on apical margin, and following tergites tinged with fuscous across their middle and more distinctly fuscous on lateral margins. Legs blackish; apex of front femora, anterior side of front tibiae brown; and front tarsi yellow. Antennae ferruginous; apical half of scape above and upper side of flagellum brownish. Proboscis testaceous yellow, basal half more brownish. Tegulae testaceous subhyaline. Wings dusky hyaline, nervures ferruginous, margins of stigma and subcosta brownish.

Head moderately broader than long; cheeks evenly rounded, about two-thirds as wide as eyes. Lateral ocelli about one and one-half times their distance apart from nearest eye and somewhat closer to occipital margin. Face below antennae gently convex; clypeus transverse, disk fully twice as broad as high, broadly truncate at summit; lateral extensions narrowly visible in frontal aspect to base of mandibles. Subantennal plates very small, subtriangular, no longer than wide. Mandibles strongly curved, reaching far margin of fossa, and abruptly narrowed on inner margin before apex, without formation of inner tooth. Proboscis moderately short, galeae not reaching base of stipites; maxillary palpi three-segmented. Pronotum normal, posterior margin of disk low and rounded to tubercles. Venation normal for *Macroteropsis*; second sub-

marginal cell narrowed somewhat less than half above. Tarsal claws very large and bifid. Head and thorax alutaceous, dull, without evident puncturation and clothed with short, fine, white pubescence, which becomes much longer on cheeks, undersurface of head and thorax, and intermixed with much longer, erect, mosslike hairs on mesonotum. Hair of hind tibiae very coarse and shorter than greatest width of tibiae. Abdomen ovate, much broader than thorax. Median process of second ventral segment evenly sloping to base of segment in profile view and abruptly declivous behind. Tergite 7 with sides converging to rather narrow, truncate apex. Subgenital plate elongate, slightly ovately widened in apical half, with long apical fringe. Genital armature similar to same parts of *echinocacti*, but dorsal lobes of caulis more abruptly narrowed to form the side walls overlapping volsellae; sagittae elongate fusiform, with a small inconspicuous bristle on each side subapically. Length: about 4.5 mm.; anterior wing, 3 mm.

Holotype male.—West of Tepic, Nayarit, 1,600 feet, Mexico, Aug. 19, 1961 (C. F. Bennett). Type in collection of the University of Kansas, Lawrence.

***Perdita robertsi*, n. sp.**

Differs from other species of *Macroteropsis* in having head and thorax black, with anterior margin of parocular areas of face and base of mandibles white. Also differs in having abdomen dull ferruginous, somewhat as in the males of *latior* and *echinocacti*.

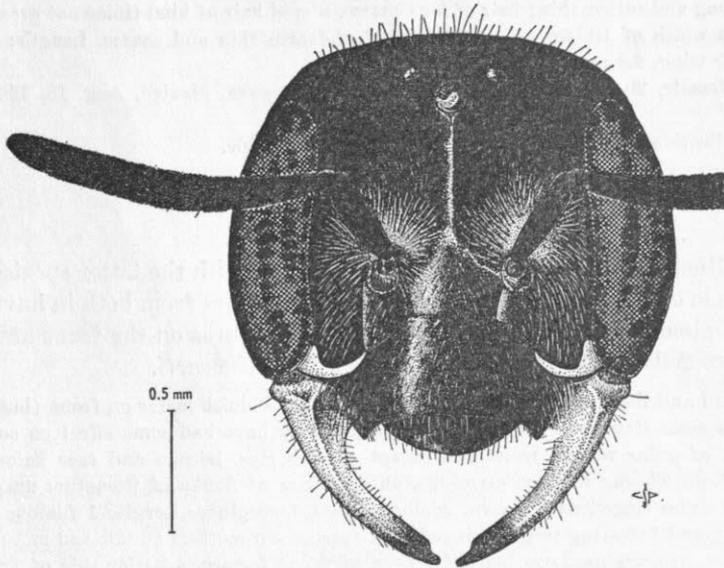


Fig. 2. *Perdita robertsi*. Frontal view of head of female.

Female.—Head and thorax black, anterior margin of parocular areas of face narrowly yellowish white and thorax entirely dark. Abdomen dull ferruginous, tergite 1, except on apical margin, and tergite 5 strongly dusky, and tergites 2 to 4 slightly dusky across median part of disk. Legs black, tibial spurs testaceous. Antennae black, shading into brown on each side and becoming almost yellow narrowly beneath. Mandibles rufotestaceous, becoming dark red at apex and yellowish white on basal fourth. Proboscis dilute fuscous. Tegulae fuscous, with apex testaceous. Wings dusky hyaline; nervures testaceous; subcosta, margins of stigma, and metacarpus fuscous.

Head as long as wide; inner orbits almost parallel. Cheeks only slightly receding and about as wide as eye at beginning of posterior fourth. Lateral ocelli slightly more distant from nearest eye than from occipital margin. Antennae short, joints of flagellum broader than long. Facial

foveae moderately impressed, slightly wider than interval between them and eyes, and reaching from upper level of antennal sockets somewhat more than halfway to level of anterior ocellus. Mandibles stout, parallel-sided beyond basal fourth, and obliquely truncate at apex (no inner tooth, but apex probably worn). Proboscis moderately long, galeae as long as stipites, labial palpi slightly longer than galeae, and maxillary palpi somewhat less than half as long as galeae. Venation as usual in *Macroteropsis*, stigma narrowly lanceolate, and marginal cell long, with metacarpus about three times as long as apical truncation. Spurs of hind tibiae curved at apex, those of middle tibiae minutely denticulate on inner margin. Abdomen broadly oval, pygidial plate concealed in type. Head and thorax minutely tessellate and moderately dull. Punctures of face fine, moderately close, sparser on vertex and a little stronger on clypeus, becoming more crowded on middle of upper part of disk. Punctures of mesonotum minute, finer than those of face, but distinct and mostly about two to three puncture-widths apart. Pubescence short, suberect, fine and white; very short and fine on vertex and mesonotum, best developed on posterior margin of disk of pronotum, on tubercles, metanotum and posterior face of propodeum; hair on lateral ridges of propodeum shorter and very dense. Scopal hair of hind tibiae rather coarse and strongly curved. Abdomen appearing nude, but with abundance of very fine and short, sericeous hair; apical fimbria short and thin. Length: about 5.5 mm.; width of abdomen, 1.8 mm.; length of anterior wing, 3.5 mm.

Holotype female.—Pecos River Canyon, 38 miles northwest of Del Rio, Val Verde Co., Texas, April 13, 1963 (R. B. Roberts).

The specimen is without flower record, but Roberts collected *P. haplura* and *P. texana* at the same spot, presumably at flowers of *Sphaeralcea* and *Opuntia*, and *robertsi* was perhaps on *Opuntia*, as it bears some coarse pollen from that flower.

Type in collection of the University of California, Riverside.

Subg. *Macroterella* Timberlake

A new species of *Macroterella* and the male of *opacella* have been discovered recently, and keys to distinguish the new forms have been prepared.

KEY TO FEMALES OF MACROTHERELLA

1. Entirely dark species2
 Head and thorax black, large part of face, cheeks, pronotum, scutellum, metanotum, and base of propodeum yellow; abdomen ferruginous.....*mellea* Timberlake
2. Pterostigma not narrowly lanceolate, although only moderately wide.....3
 Pterostigma narrowly lanceolate; wings dusky hyaline, nervures dark, especially subcosta and margins of stigma*solitaria* Cockerell
3. Mesonotum with evident although not conspicuous pubescence.....4
 Mesonotum impunctate and nude.....5
4. Mesonotum dull, obscurely punctured; pubescence very short, with somewhat longer and coarser hairs interspersed*tristella* Timberlake
 Mesonotum minutely tessellate, moderately shiny, with minute, very sparse punctures and erect, rather long whitish hair*nigrella* Timberlake
5. Face black, without a metallic tinge.....6
 Face with a weak but evident greenish tinge; head rotund, as broad as long, facial foveae well impressed, about two and one-half to three times longer than wide.*opacella* Timberlake
6. Head slightly broader than long; facial foveae rather long and paralleling eye margin; wings slightly whitish hyaline*mortuaria* Timberlake
 Very similar, but facial foveae shorter and slightly divergent from eye margin anteriorly; wings more whitish*carinata*, n. sp.

KEY TO DISTINGUISH MALES
 OF OPACELLA AND CARINATA FROM MORTUARIA

(Revision of couplet 3 of old key, Univ. Calif. Publ. Entom., 9:361)

1. Abdomen brownish red or ferruginous; head sometimes partly ferruginous, especially in

- macrocephalous specimens2
 Abdomen blackish, nearly as dark as thorax; face yellowish white below level of antennae; apex of tergite 7 with two lobes separated by deep slotlike emargination *opacella* Timberlake
 2. Face yellowish white below level of antennae; tergite 7 rather depressed dorsally, sides infolded beneath to produce apico-ventral notch *mortuaria* Timberlake
 Similar, but apex of tergite 7 carinately tectiform above, apex strongly notched by infolded sides beneath *carinata*, n. sp.

Perdita opacella Timberlake

(Plate figs. 1195, 1196, 1301, 1353)

Perdita opacella Timberlake, 1956, Univ. Calif. Publ. Entom., 11:324, ♀.

This has been known from one female from the Grand Canyon, Arizona, but a small series of both sexes has been collected at flowers of *Cleome* southwest of Moab, Utah.

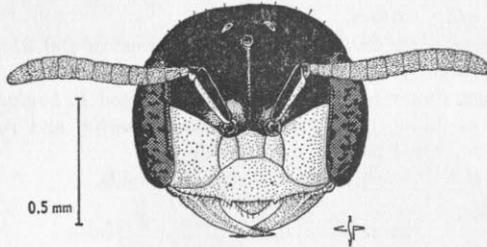


Fig. 3. *Perdita opacella*. Frontal view of head of male.

Male.—Head and thorax black. Mandibles except red tips, labrum, and face below level of antennae creamy white. Supraclypeal mark nearly twice as broad as high and rounded above. Sutures of subantennal plates dark, especially at lower end and against supraclypeal area. Lateral marks very broad, not much longer than wide, each covering about one-third of width of face at level of subantennal plates and ending obliquely on orbits above middle of eyes. Tubercles and sometimes inferior end of flanks of pronotum more or less brownish or reddened. Abdomen fuscous, more or less tinged with brownish ferruginous but usually nearly as dark as thorax. Legs fuscous, more or less tinged with brown; tarsi pale brownish, apex of front femora, front tibiae except beneath, and front tarsi dull yellow; middle and hind knees also yellowish. Antennae fuscous, scape white and flagellum brown beneath. Tegulae testaceous, more hyaline on outer margin. Wings whitish hyaline, nervures pale testaceous, subcosta, and margins of stigma pale brownish.

Head moderately enlarged, broader than thorax and broader than long; inner orbits of eyes parallel. Cheeks and temples as broad, or slightly broader than eyes and widest nearly opposite upper end of eyes. Lateral ocelli about twice as far from nearest eye as distance apart and somewhat closer to occipital margin. Facial foveae small, hardly more than twice as long as wide. Antennae short, inserted below middle of face, joints of flagellum mostly thicker than long. Face below antennae gently convex; disk of clypeus about twice as broad as high, lateral extensions narrowly visible to base of mandibles in frontal aspect. Mandibles tapering, acute and reaching far margin of proboscis fossa. Pronotum normal, disk depressed below anterior edge of mesoscutum. Pterostigma slender, widest at middle, hardly half as wide as first submarginal cell; marginal cell nearly as large as first submarginal, part beyond stigma slightly longer than part beneath, and metacarpus distinctly longer than apical truncation. Head and thorax finely tessellate and moderately shining, frons and mesonotum with very minute and sparse punctures. Pubescence short, very sparse, and most evident on underside of thorax and on lateral ridges of

propodeum; face and mesonotum nude, but cheeks with close-set, extremely fine, short, and appressed hair. Abdomen broadly ovate, less than twice as long as wide, and widest across base of third segment. Tergite 7 (plate fig. 1353) depressed, apex with two divergent processes, below which are two blunt lobes emarginate at apex and separated by a deep slotlike emargination (but only the divaricate processes easily visible). Subgenital plate about three times longer than wide, disk with rather dense, fine short hair that fringes the margin. Caulis of genitalia about one and one-half times longer than wide and rather depressed; parameral lobes very short and hardly longer than wide; sagittae ovals expanded, lateral rods more sclerotized but hardly discrete, blunt at apex in both dorsal and lateral views; inner pair of volsellae moderately elongate, the other pair very short. Length: 3-3.5 mm.; anterior wing, 2.7-3 mm.

New record.—Seven females, 11 males, Kane Springs, 15 miles southeast of Moab, San Juan Co., Utah, on *Cleome lutea*, Aug. 9, 1957 (C. D. Michener).

Perdita carinata, n. sp.

(Plate figs. 1197, 1198, 1302)

This little bee is closely allied to *mortuaria* and hardly distinguishable in the female sex, but with distinctive male characters.

Female.—Head and thorax black, abdomen more fuscous, with apical depression of tergites slightly brownish; venter dull ferruginous, first four sternites broadly fuscous in middle. Legs black, front knees, anterior wide of front tibiae and front tarsi testaceous yellow, middle and hind tarsi fuscous. Antennae fuscous, flagellum brown except above. Mandibles testaceous, more reddish at apex and more yellowish at base. Proboscis brownish fuscous. Tegulae testaceous, more hyaline on outer margin. Wings whitish hyaline, nervures pale yellowish, margins of stigma dilute brownish, subcosta brown.

Head as broad as long, cheeks moderately receding and as broad as eyes. Posterior ocelli about their distance apart from occipital margin and much more distant from nearest eye. Facial foveae short, well impressed, usually somewhat divergent from eye margin at anterior end, and reaching from distinctly above level of antennal sockets not more than halfway to level of anterior ocellus. Antennae short, inserted below middle of face, joints of flagellum much thicker than long. Face below antennae gently convex; disk of clypeus large, more than twice as broad as high, lateral extensions short, reflexed, and not much visible in frontal aspect. Mandibles rather slender, curved, not tapering except close to apex and subacute. Proboscis short, galeae somewhat shorter than stipites. Pterostigma narrow, somewhat more than three times longer than wide, and not more than one-half as wide as first submarginal cell; marginal cell nearly equal beneath and beyond stigma and almost squarely truncate at apex; second submarginal cell narrowed a little more than one-half to radius. Pygidial plate triangular, narrowly obtuse at apex. Head and thorax minutely and smoothly tessellate, moderately dull and nearly impunctate; punctures very minute, sparse and obscure on frons and mesonotum, but fine, distinct and well spaced on clypeus. Pubescence short and very sparse, with face and mesonotum virtually nude, undersurface of head and thorax thinly hairy. Length: about 3.5 mm.; anterior wing, 2.7 mm.

Male.—Head and thorax mainly black or more or less dull brownish ferruginous. In most extreme macrocephalous specimens head mainly ferruginous except infuscation across frons. Thorax often with pronotum, metapleura, and flanks of propodeum ferruginous. Base of mandibles, labrum, and face below level of antenna, pale yellow. Abdomen ferruginous. Legs fuscous, front and middle knees, front tibiae and tarsi testaceous yellow, middle and hind tarsi pale brown; sometimes dark part of legs become ferruginous, especially on tibiae. Antennae brown, beneath white on scape and pale yellow on flagellum. Tegulae and wings as in female.

Head usually much enlarged, much broader than long and broader than thorax. Lateral ocelli much more than their distance apart from nearest eye, and in extreme megacephalous examples twice their distance apart, and somewhat closer to occipital margin. Facial foveae oval, twice as long as wide. Clypeus low and broad, disk much broader than high, lateral extensions long, narrow, and exposed in frontal aspect. Parocular plates much broader than intervening space and about equal to width of disk of clypeus. Mandibles robust, weakly curved, almost straight on

outer margin, dilated within, and acute at apex. Pronotum normal, disk depressed below anterior border of mesocutum. Head and thorax minutely tessellate, but much more weakly than in female, the middle of vertex and disk of mesocutum and scutellum smoother and more or less polished. Punctures of frons, vertex, and mesonotum very minute, but distinct, sparse and becoming more widely spaced on middle of mesoscutum. Pubescence much as in female, but abdomen without apical fimbria; hair of hind tibiae short and coarse. Abdomen but little longer than broad, widest across third segment. Disk of tergite 7 compressed, sharply ridged or tectiform to apex. Subgenital plate like that of *mortuaria* but slightly longer and more parallel-sided. Genital armature also similar, but inferior pair of volsellae longer and more prominent. Length: about 3.2 mm.; anterior wing, 2.6 mm.

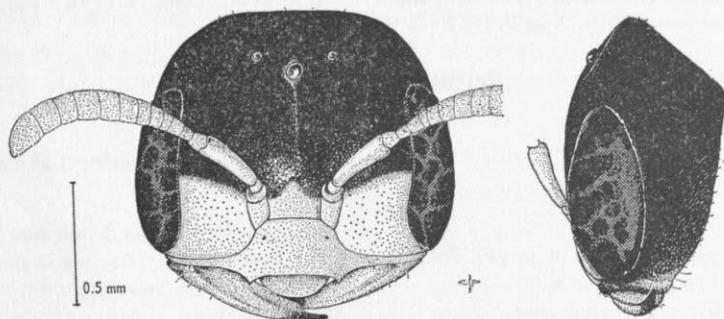


Fig. 4. *Perdita carinata*. Frontal and lateral view of head of male.

Holotype male and allotype.—Deep Canyon (Boyd Desert Research Center), Riverside Co., California, on *Eschschotzia minutiflora*, May 10, 1963 (E. I. Schlinger).

Paratypes.—Eleven males, 6 females, taken with types; 2 males, 2 females, Deep Canyon, on *Ferrocactus acanthodes*, April 4, 1963; 1 female, Deep Canyon, on *Eriogonum*, May 17, 1963; 1 male, Coyote Canyon, Santa Rosa Mts., Riverside Co., on *Ferrocactus*, March 20, 1963 (Schlinger); 1 male, Deep Canyon, on *Ferrocactus*, April 10, 1963 (P. D. Hurd, Jr.); and 1 male, Deep Canyon, April 6, 1963 (C. A. Toschi).

Types in collection of the University of California, Riverside; paratypes in the University collections, Riverside and Berkeley.

Perdita mortuaria Timberlake

New records.—ARIZONA. Yuma Co.: 1 male, 2 miles west of Quartzsite, on *Echinocereus engelmanni*, April 5, 1963 (W. H. Ewart). Maricopa Co.: 5 males, 2 females, 29 miles south of Gila Bend, on *Prosopis juliflora*, April 8, 1963 (Timberlake).

Subg. *Heteroperdita* Timberlake

As several new species of *Heteroperdita* have been discovered during the last ten years, a new key has been prepared to replace the one published in 1954 (Univ. Calif. Publ. Entom., 9:306). The key is based on the female sex but works almost equally well for the males.

KEY TO FEMALES OF HETEROPERDITA

1. Abdomen pale yellow, creamy white or pale ferruginous, with longitudinal rows of dark spots, sometimes faint or evanescent2
- Abdomen black or fulvo-ferruginous with white bands, or almost entirely red.....7
2. Thorax entirely dark except on disk of pronotum or tubercles.....3
- Thorax marked with pale yellow or creamy white at least on base or sides of propodeum, or on metapleura5

3. Abdomen pale yellow or creamy white; pronotum usually with light mark on collar or hind margin of disk4
 Abdomen pale ferruginous, with lateral rows of dark spots, but no median spots; pronotum dark, except mark on tubercles; pubescence of face and mesonotum thin; head as broad as long *vesca*, n. sp.
4. Dark markings of abdomen small, faint or evanescent; median spots on tergites 2 to 5 absent; legs entirely yellow *bellula* Timberlake
 Markings of abdomen comparatively large, especially median spots on tergites 2 to 5; legs pale yellow, femora and hind tibiae more or less infuscated..... *maculosa* Timberlake
5. Pale markings of face not extending above level of antennae.....6
 Lateral markings of face extending narrowly to summit of eyes and large yellow mark on each side of frons; pronotum, propodeum except basal area, metapleura, and legs except minor markings yellow *frontalis*, n. sp.
6. Triangular spot on base of propodeum and mark on flanks of propodeum and metapleura pale yellow; pronotum yellow, with dark streak on flanks; face marks restricted to clypeus and small supraclypeal and lateral marks. *arenaria* Timberlake
 Scutellum, pronotum, propodeum and underparts of thorax, except dark mark on each side, pale yellow or creamy white; face pale below level of antennae..... *wasbaueri* Timberlake
7. Abdomen fulvo-ferruginous or black, banded with white.....8
 Abdomen red, often with short subapical white band or streak on tergite 1; clypeus with black mark on each side of disk, isolating median white mark..... *rhodogastra* Timberlake
8. Scutellum or spot at base of propodeum yellow or creamy white.....9
 Thorax dark except pronotal markings10
9. Marks on hind margin of disk of pronotum, tubercles and triangular mark at base of propodeum pale yellow or creamy white; face marks restricted to clypeus and small supraclypeal and lateral marks *coldeniae* Timberlake
 Scutellum, lateral margins of mesoscutum and mark at base of propodeum yellow; lateral face marks prolonged to summits of eye *scutellaris* Timberlake
10. Abdomen black, with five white bands, that on tergite 5 narrow, those on tergites 2 to 4 emarginate on each side in front..... *sexfasciata* Timberlake
 Abdomen black, with a white band on tergites 1 to 4, each emarginate behind on each side *trifasciata* Timberlake

***Perdita vesca*, n. sp.**

(Plate figs. 1199, 1200, 1303)

Nearest *bellula*, but easily distinguished by characters given in the key.

Female.—Head and thorax black with a dark greenish luster by reflected light. Mandibles except red tips, labrum, clypeus, narrowly transverse lateral marks, transverse supraclypeal mark and tubercles yellowish, somewhat tinged with ferruginous. Abdomen pale ferruginous, with a yellowish tinge, marked with longitudinal sublateral row of small circular fuscous spots on each side, the spots situated subapically on tergites 1 to 4; a considerably larger spot at summit of basal declivity of tergite 1 on each side, and a dark spot at basal corners of tergites 2 to 4. Legs concolorous with abdomen, posterior side of front and middle femora and anterior side of hind tibiae somewhat infuscated. Antennae yellow, flagellum slightly infuscated above. Tegulae testaceous hyaline, base yellowish. Wings faintly dusky, nervures pale testaceous brown, subcosta brown.

Head subquadrate, as broad as long; cheeks rounded, less than half as wide as eyes, widest opposite beginning of upper fourth of eyes. Lateral ocelli about their distance apart from nearest eye and but little more than half their distance apart from occipital margin. Facial foveae finely linear, short, at middle of each side of frons, well removed from margin of eyes. Face below antennae strongly convex; disk of clypeus about twice as broad as high, lateral extensions reflexed and not visible in frontal aspect. Mandibles tapering, acute and reaching far margin of fossa. Proboscis moderately long, not exceeding fossa in repose. Pterostigma small, about half as wide as first submarginal cell; marginal cell as long as stigma, parts beneath and beyond

stigma equal; second submarginal cell narrowed two-thirds to radius. Tarsal claws with small inner tooth. Abdomen oval, depressed, about twice as long as wide; pygidial plate somewhat longer than wide, sides converging to ogival apex. Head and thorax very minutely and smoothly tessellate, impunctate, and with moderate luster. Pubescence white, mostly appressed, moderately dense on lower face, cheeks, anterior and posterior border of mesoscutum, and on metanotum and sides of propodeum; frons and disk of mesoscutum bare; undersurface of head with numerous long, fine hairs converging from each side over proboscis fossa; scopal hairs of hind tibiae very sparse and slightly curved. Length: about 2.75 mm.; anterior wing, 1.8 mm.

Male.—Similar to female in color and markings, but dark spots of abdomen larger, more nubilous, and more or less transversely fused by nubilous infuscation. (This condition more developed in allotype than paratypes.) Color of legs, antennae, tegulae, and wings about as in female.

Structural characters in general, sculpture and pubescence as in female, but head more quadrate, with broader cheeks and temples, which are half as wide as eyes, or slightly more than half as wide. Abdomen shaped as usual in *Heteroperdita*, apex strongly recurved ventrad. Apical lobe of tergite 7 about as long as wide, and narrowed to broadly rounded apex. Subgenital plate subquadrangular, about as broad as long, sides converging apically to broadly truncate apex, disk minutely setose on apical half. Genital armature similar to that of *bellula* in some respects; sagittae unusually short, the fused part no more than twice as long as wide but about two-thirds of total length, the apex between slightly projecting lateral rods divided into two rounded lobes by a small median notch (a median notch also present in genital armature of *sexfasciata*). Length: 2–2.25 mm.; anterior wing, 1.7–1.8 mm.

Female holotype and allotype, 2.8 miles west of Wadsworth, Washoe Co., Nevada, on *Coldenia nuttallii*, June 23, 1962 (G. I. Stage).

Paratypes.—Two males, same data as types.

Types in collection of the University of California, Riverside; one paratype in collection of G. I. Stage.

Perdita frontalis, n. sp.

This remarkable species is similar to *arenaria* in many ways but differs from it and all other species of *Heteroperdita* in having a large yellow mark on each side of the frons. The inner orbits are also narrowly yellow to summit of eyes.

Female.—Dark part of head and thorax black, with a greenish tinge. Anterior border of gular region, extending very narrowly on inferior orbits to summit of eyes, mandibles except red tips, labrum and face below level of antennae yellow; lateral marks continued rather broadly for a short distance above level of antennae; then continued very narrowly to and around summit of eyes to unite with similar line on inferior orbits. Each side of frons with a large obliquely quadrate or somewhat pyriform yellow mark, with their lower exterior corner produced more or less thinly to upper end of broad part of lateral marks (thus not only pear-shaped but with a stem!); marks separated by nearly their own width and from the orbital yellow lines by a much narrower space. In one paratype, mark on one side of face joined at its upper outer corner to orbital line, thus enclosing a dark space, which in large part constitutes the facial fovea. Dark part of frons much widened below yellow marks and reaching to antennal sockets. Thorax dark, with pronotum, prosternum, metapleura, and propodeum except large mark in dorsal part of base, yellow. Abdomen yellow, with five rows of fuscous or blackish spots: a marginal row of spots on basal corners of tergites 2 to 5, a sublateral row on tergites 1 to 5 (two spots each side on tergite 1, the anterior one more brownish), and a median row on tergites 2 to 6. Spots oval or circular except at basal corners of tergite 2 and at basal middle of tergites 5 and 6. Legs yellow, with preapical spot above and behind hind femora and anterior side of hind tibiae more or less infuscated. Antennae yellow, three basal joints of flagellum with brown apical rings. Proboscis testaceous yellow. Tegulae yellow, outer half testaceous. Wings slightly dusky, nervures testaceous, subcosta pale ferruginous.

Head slightly longer than wide, facial quadrangle distinctly longer than wide; cheeks half as wide as eyes. Lateral ocelli closer to margin of eyes than their distance apart and about their

own diameter from occipital margin. Facial foveae shallow, indistinct, but presumably on outer margin of dark area between yellow marks of frons and orbital lines. Antennae inserted below middle of face, short, joints of flagellum broader than long. Lower face rather strongly convex; disk of clypeus much less than twice as broad as high, lateral extensions weakly inflexed and visible in frontal aspect. Mandibles small, tapering, acute and not reaching beyond far margin of fossa. Proboscis moderately long, galeae reaching base of stipites, palpi slender and long. Tarsal claws small, bifid at apex. Pterostigma rather small and slender, half as wide as the narrow first submarginal cell; marginal cell slightly more than twice as long as wide, with parts equal beneath and beyond stigma; second submarginal cell narrowed about one-half to radius. Head and thorax moderately shiny, very minutely tessellate, impunctate. Pubescence white, moderately long, rather dense and nearly concealing surface, but yellow parts mostly bare, except parocular areas of face which are densely hairy; undersurface of head with long, suberect hair converging toward fossa. Hair of front coxae rather thin and moderately long, and similar hair on prosternum. Scopal hair of hind tibiae sparse and long, with similar hair on first two joints of hind tarsi. Abdomen oval, about twice as long as wide; pygidial plate about twice as long as wide, narrowed more than half to truncate apex, lateral margins somewhat arcuate. Length: about 3.2-3.5 mm.; anterior wing, 2.1-2.3 mm.

Holotype female.—Sand dunes, 5.7 miles west of Glamis, Imperial Co., California, on *Eriogonum deserticola*, July 25, 1960. (R. C. Dickson).

Paratypes.—Two females, sand dunes, west of Glamis, one on *Eriogonum deserticola*, June 22, 1960, the other on *Coldenia plicata*, July 11, 1960 (Dickson)

Types in collection of the University of California, Riverside.

Perdita arenaria Timberlake

New records.—Eleven females, 12 males, 2.8 miles west of Wardsworth, Washoe Co., Nevada, on *Coldenia nuttallii*, June 23-24, 1962 (G. I. Stage); 3 females, 8 males, 10 miles east of Yuma, Yuma Co., Arizona, on *Coldenia palmeri*, April 8, 1963 (Stage).

Perdita sexfasciata Timberlake

Perdita sexfasciata Timberlake, 1954, Univ. Calif. Publ. Entom., 9:370, ♂.

Perdita optiva Timberlake, 1954, Univ. Calif. Publ. Entom. 9:371, ♀ (Excluding type ♂).

P. sexfasciata was described from one male and its female is now recognized. What was supposed to be the female of *optiva* really belongs with *sexfasciata* and has the abdomen black with five white bands. The true female of *optiva* has not been seen, but probably will prove to have the dark part of the abdomen ferruginous instead of black.

Female.—Head and thorax dark blue green, face and mesonotum black. Base of mandibles, labrum, clypeus and small supraclypeal and lateral marks creamy white. Lateral marks oblique, narrowly transverse, ending higher on orbits than within, where they end nearly level with middle of disk of clypeus. Supraclypeal mark broadly rounded above, three times broader than high. Thorax dark, except for large white mark on tubercles and white line on collar. Abdomen black, with five broad, white preapical bands, notched in front on each side and passing over onto ventral part of segments. Venter testaceous yellow. Pygidial plate rufotestaceous, darker at apex. Legs black, apex of hind coxae, apex of all femora rather broadly, and tarsi of all legs pale yellow, except small joints of hind tarsi fuscous. Antennae pale yellow, pedicel and flagellum brown above. Mandibles shading through testaceous to red at apex. Proboscis testaceous. Tegulae testaceous hyaline, anterior basal spot white. Wings nearly clear hyaline, nervures testaceous, nervures of marginal cell, margins of stigma and subcosta in sequence becoming more infuscated, but not heavily.

Head as broad as long; cheeks slightly more than half as wide as eyes. Lateral ocelli about their distance apart from nearest eye and half as far from occipital margin. Facial foveae rather obscure, concealed by pubescence, not reaching more than halfway from level of antennal sockets

to level of anterior ocellus. Antennae inserted well below middle of face, short, joints of flagellum broader than long. Face below antennae strongly convex; disk of clypeus twice as broad as high, lateral extensions short, strongly inflexed and hardly visible in frontal aspect. Mandibles rather slender, acute, with small inner tooth. Proboscis moderately long. Tarsal claws small, abruptly widened near base. Pterostigma slender, slightly more than one-third as wide as first submarginal cell; marginal cell more than twice as long as wide, about equally long beneath and beyond stigma, metacarpus only slightly longer than apical truncation; second submarginal cell narrowed rather less than half to radius. Head and thorax minutely tessellate, impunctate, moderately shining; frons with microscopic sculpture and satiny luster. Pubescence white, mostly appressed, and rather coarse, concealing surface, but broad bare area across upper part of frons and mesoscutum and scutellum bare except around margins. Apical fimbria of abdomen rather long but not dense. Abdomen elongate-oval; pygidial plate about twice as long as wide, sides converging to acute apex, disk plane. Length: 3.5 mm.; anterior wing, 2.5 mm.

Besides two females recorded under *optiva* from north of Plaster City, Imperial Co., California, additional material as follows:

One female, 2 males, Ligurta, Yuma Co., Arizona, on *Cryptantha*, April 13, 1963 (G. I. Stage).

Perdita trifasciata Timberlake

Previously known from White Sands, New Mexico, and Coahuila, Mexico.

New record.—Two males, Dryden, Terrell Co., Texas, July 7, 1958 (W. F. Bass).

Subg. *Epimacrotera* Timberlake

Three new species are to be added to the list of *Epimacrotera*, and the male of *nanula* has also been discovered. A new key to the males of this group has been prepared.

KEY TO MALES OF EPIMACROTERA

1. Mandibles abruptly narrowed on inner margin before apex, or with small inner tooth 2
Mandible simple 10
2. Abdomen dark with a whitish mark on each side of tergites 2 and 3 (or tergites 1 or 2 to 3 or 4) 3
Abdomen ferruginous or more or less fuscous or blackish, without light markings 4
3. Head and thorax shining dark green, frons, vertex and mesonotum weakly tessellate and obscurely punctured; face white below antennae except supraclypeal area
polycarpae Timberlake
Head and thorax comparatively dull; frons, vertex and mesonotum strongly tessellate and densely punctured; markings similar *williamsi* Timberlake
4. Abdomen clear ferruginous 5
Abdomen dark (sometimes somewhat reddened or brownish in *euphorbiae*) 6
5. Head and thorax comparatively shining; frons tessellate, dullish, mesoscutum delicately tessellate, with rather obscure, fine, sparse punctures; face white below antennae except supraclypeal area. *crassula* Timberlake
Head and thorax dark green; frons dull, mesonotum strongly tessellate, dullish, with sparse fine punctures; clypeus and large quadrate lateral marks white; size large (length about 4.5 mm.) *ainstiei* Crawford
6. Tubercles and scape of antennae dark 7
Tubercles and scape of antennae white 8
7. Head longer than wide; lateral face marks narrowed above but reaching hardly above level of summit of clypeus; mesonotum polished *nigriventris* Timberlake
Head broader than long; lateral marks quadrate, reaching level of antennae; mesonotum tessellate, somewhat dullish *parvula*, n. sp.
8. Head broader than long; mesoscutum more or less sparsely punctured, with thin erect hair 9
Head rotund; mesoscutum tessellate, dullish, with close minute punctures and abundant, fine whitish pubescence; lateral face marks subtriangular, higher than wide
binotata Timberlake

9. Mesoscutum polished, with moderately sparse punctures and moderately thin hair; lateral face marks more or less quadrate and broader than high *euphorbiae* Timberlake
 Mesoscutum minutely tessellate, rather shiny, with remote punctures and very thin hair; lateral marks broad on orbits and narrowed toward clypeus *nanula* Timberlake
10. Clypeus and lateral face marks white 11
 Anterior border only of clypeus white, or face entirely dark 13
11. Cheeks rounded, not angulate anteriorly; clypeus not dentately produced on each side of labrum 12
 Cheeks moderately broad, angulate and slightly dentate anteriorly; disk of clypeus acutely produced on each side of labrum; clypeus, except upper border of disk, and transverse lateral marks white *dissimulans* Timberlake
12. Head somewhat broader than long; clypeus, except upper border of disk, transverse lateral marks, and tubercles, white; abdomen ferruginous, with two nubilous yellowish marks on disk of tergite 2 *namatophila* Timberlake
 Head slightly longer than wide, cheeks broader than eyes; antennae inserted below middle of face; lateral marks quadrate, nearly reaching level of antennae; head and thorax dark blue, disk of mesoscutum and scutellum black; apical margin of tergites 2 to 4 and the apical segment rufotestaceous *nigrocaerulea* Timberlake
13. Anterior half of disk of clypeus yellowish white; head and thorax dark blue green, moderately shining; mesoscutum closely punctured; abdomen black, minutely and densely punctured *peculiaris* Timberlake
 Face entirely dark; head and thorax dull blue; mesoscutum strongly tessellate, with moderately sparse obscure punctures; abdomen minutely lineolate *diversa* Timberlake

***Perdita parvula*, n. sp.¹**

(Plate figs. 1201, 1202, 1304)

Very similar to the other little species of *Epimacrotera* on *Euphorbia*, but scape of antennae and tubercles dark, and the mesonotum tessellate and dullish.

Male.—Head and thorax dark blue green. Mandibles except reddish apices, labrum, clypeus and quadrate lateral marks, reaching level of antennae, white. Thorax entirely dark. Abdomen black, without markings. Legs blackish, anterior side of front tibiae and all tarsi testaceous yellow; tibial spurs whitish. Antennae dark, flagellum tinged with brown above, and broadly brown beneath. Tegulae testaceous hyaline. Wings strongly dusky hyaline, nervures brown, margins of stigma and subcosta fuscous.

Head much broader than long; cheeks about two-thirds as wide as eyes and evenly rounded. Posterior ocelli their own distance apart from occipital margin and much farther from nearest eye. Facial foveae faint and close to margin of eyes. Face below antennae only slightly and evenly convex; disk of clypeus twice as broad as high, lateral extensions weakly inflexed and visible in frontal aspect. Mandibles strongly bidentate, almost parallel-sided to apex of inner tooth. Proboscis of moderate length, galeae not reaching base of stipites. Pterostigma sublanceolate, about three times longer than wide and nearly half as wide as first submarginal cell; marginal cell nearly as long as first submarginal, considerably narrowed toward apex and shorter beneath than beyond stigma, with metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed one-half above. Frons and vertex tessellate, dull, obscurely punctured, punctures distinct only close to anterior ocellus on frons. Mesonotum tessellate, moderately shining, with fine, well-separated punctures. Pubescence whitish, fine, erect, rather short and thin, becoming longer on anterior border of mesoscutum and underparts of thorax. Abdomen ovate, convex, widest at apex of tergite 2. Subgenital plate as broad across base as long and narrowed toward slightly emarginate apex. Genital armature of usual form in *Epimacrotera*; parameral lobes appearing almost uniformly slender in dorsal view, but submarginate on dorsal margin before widest part, moderately narrow on apical half with a short, very thinly acuminate apex;

¹ The species *parvula* is now known to be a synonym of *P. biguttata* Timberlake (Univ. Calif. Publ. Entom. 28: 95, female), but the male has been previously unknown.

sagittae very thickly fusiform in lateral view, with a few hairs beneath acute apex. Length: nearly 3 mm.; anterior wing, 2.3 mm.

Female.—Head and thorax dark bluish green, labrum and clypeus blackish. Thorax entirely dark, but face with white spot at anterior corners, not reaching on orbits above level of summit of clypeus. Abdomen missing but presumably black and unmarked. Legs blackish, tarsi hardly paler, but a small whitish spot at base of front tibiae. Antennae blackish, flagellum brownish beneath. Mandibles piceous on basal third, testaceous red at middle and darker red on apical third. Tegulae testaceous, darker at base. Wings dusky hyaline, nervures brownish, margins of stigma and subcosta fuscous.

Head broader than long, cheeks evenly rounded and two-thirds as wide as eyes. Posterior ocelli somewhat more distant from nearest eye than their distance apart and closer to occipital margin. Facial foveae but little impressed, close to margin of eyes, linear, and reaching from slightly above level of antennal sockets about two-thirds of distance to level of anterior ocellus. Lower face evenly convex; disk of clypeus considerably broader than high, lateral extensions moderately inflexed and partly visible in frontal aspect. Mandibles as in male but more robust. Proboscis moderately short. Pterostigma and venation as in male. Face and mesonotum tessellate and moderately dull, mesoscutum more shining than frons. Face distinctly punctured, punctures moderately close below level of antennae and rather coarse and shallow on clypeus; frons with rather close fine punctures across middle; punctures of mesonotum fine and well separated. Pubescence pale ochreous or whitish, moderately abundant, erect and slightly coarse, short and moderately dense on face, and thin on mesonotum. Length (estimated): 3.2 mm.; anterior wing, 2.5 mm.

Holotype male and allotype.—Thirteen miles southwest of Apache, Cochise Co., Arizona, on *Euphorbia*, Aug. 19, 1964 (C. D. Michener).

Types in collection of the University of Kansas, Lawrence.

Perdita nanula Timberlake

(Plate figs. 1203, 1204, 1305)

Perdita nanula Timberlake, 1960, Univ. Calif. Publ. Entom., 17:129, ♀.

The recently discovered male is similar to *euphorbiae*, but has the lateral face marks more transversely triangular and the mesoscutum slightly dullish from a delicate tessellation.

Male.—Head and thorax dark blue green. Mandibles, except red tips, labrum, clypeus and lateral marks, white. Lateral marks about as broad as high, subtriangular, narrowed to broadly rounded point within and reaching level of antennae on orbits. Thorax dark except for small white spot on tubercles. Abdomen black. Legs blackish, front tibiae except behind, small spot at base of middle and hind tibiae, and all tarsi whitish. Antennae fuscous, black on scape and pedicel, underside of scape narrowly white, and flagellum dingy yellowish beneath. Proboscis fuscous with a reddish tinge. Tegulae testaceous subhyaline, base white. Wings dusky hyaline, nervures dark testaceous, margins of stigma and subcosta fuscous.

Head slightly broader than long, oral margin truncate. Cheeks evenly rounded, half as wide as eyes. Lateral ocelli about their distance apart from occipital margin and considerably more distant from nearest eye. Facial foveae faint, subpunctiform. Antennae inserted below middle of face and middle of eyes. Face below antennae gently and evenly convex; disk of clypeus evenly rounded above, nearly twice as broad as high; lateral extensions short, strongly inflexed and about half visible in frontal aspect. Mandibles moderately thick, with distinct inner tooth, and reaching slightly beyond far margin of fossa. Pterostigma lanceolate, about half as wide as first submarginal cell; marginal cell nearly as long as first submarginal, parts beneath and beyond stigma about equal, metacarpus somewhat longer than apical truncation. Frons and vertex minutely tessellate, moderately dull; frons with almost dense minute punctures and fine, short subappressed hair. Mesoscutum shining, distinctly although rather weakly tessellate, with minute, remote punctures, and fine erect whitish hair. Hair of face short and rather dense across frons, that of cheeks and underside of thorax rather thin and moderately long. Abdomen

ovate, moderately convex above. Tergite 7 triangular, with sides converging to narrowly obtuse apex. Subgenital plate broader than long, narrowed to broadly truncate apex, disk with a few very minute setae. Genital armature with usual form of the *Epimacrotera* group; parameral lobes as seen from side long and gradually attenuate, in dorsal view retaining about same width to apical fifth, then becoming very thinly acute; underside of sagittal rods and parameral lobes with no vestiture of hair. Length: 3 mm.; anterior wing, 1.8 mm.

New record.—Two females, 1 male, Douglas, Cochise Co., Arizona, Aug. 26, 1964 (J. G. Rozen, Jr.).

Perdita euphorbiae Timberlake

New record.—One male, 9 miles northeast of Vicam, Sonora, Mexico, Aug. 11, 1960 (Arnaud, Ross and Rentz).

Perdita biguttata Timberlake

New record.—One female, 13 miles west of Apache, Cochise Co., Arizona, on *Euphorbia*, Aug. 19–20, 1964 (J. G. Rozen, Jr.).

Perdita hidalgoensis, n. sp.

This new species and *tristissima* agree in general with the characters of *Epimacrotera*, but without the male their position is a little uncertain, and they may possibly belong in the *sphaeralceae* group of the typical subgenus. The somewhat thickened hairs on outer margin of the hind tibiae in *hidalgoensis* may be indicative of that position. In the key to the *sphaeralceae* group (Univ. Calif. Publ. Entom., 28:126–158), the female runs best to *lipovskyi* and *marginata*, but differs in the more shining and punctured mesonotum and the pale stigma. To distinguish it from members of *Epimacrotera* consult following key (p. 19).

Female.—Head and thorax dark blue; labrum, clypeus, supraclypeal area, disk of mesoscutum, scutellum and metanotum black. Abdomen blackish, apical depression of tergites more brownish. No light markings on head, thorax and abdomen. Legs entirely blackish. Antennae black, flagellum more fuscous and broadly brown beneath. Mandibles piceous, apex dark red. Tegulae testaceous, darker at base and slightly more hyaline on outer margins. Wings faintly dusky, nervures and margins of stigma testaceous brown, subcosta fuscous.

Head as broad as long, somewhat quadrate; cheeks moderately receding, about two-thirds as wide as eyes. Posterior ocelli a little closer to nearest eye than distance apart and about same distance from occipital margin. Facial foveae linear, their own width from margin of eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae strongly convex; disk of clypeus nearly twice as broad as high, lateral extensions strongly inflexed and hardly visible in frontal aspect. Mandibles reaching far margin of labrum and abruptly narrowed on inner margin before apex. Proboscis moderately long, galeae reaching base of stipites, maxillary palpi about three-fourths as long as galeae. Tarsal claws large, with strong inner tooth. Pterostigma small, slender, more than three times longer than wide and more than half as wide as first submarginal cell; marginal cell as long as stigma, part beyond stigma nearly twice as long as part beneath, metacarpus much longer than apical truncation; second marginal cell narrowed about one-half to radius; first recurrent nervure received by first submarginal cell close to apex. Head and thorax tessellate, moderately dullish, mesonotum shining in some lights, frons and vertex duller; mesonotum with very fine, but distinct, well-separated punctures, becoming a little more widely spaced on posterior middle of mesoscutum. Frons, especially in area between foveae and antennae with similar but indistinct punctures. Lower face, except parocular and subantennal areas smooth and shining; supraclypeal area with close, fine, shallow punctures, and clypeus with coarser shallow punctures, separated more or less by low longitudinal wrinkles. Pubescence fine, erect, moderately long, rather abundant, longest on sides of thorax and propodeum, somewhat thinner on mesoscutum and rather dense across middle of face. Abdomen oval, twice as long as wide, minutely

lineolate and dullish, apical depression of tergites smoother and more shining. Pygidial plate concealed in type, except narrowly obtuse apex. Length: about 5 mm.; anterior wing, 3.8 mm.

One female (holotype), 5 miles north of Zimapan, Hidalgo, Mexico, Nov. 21, 1946 (E. S. Ross). Type in collection of the California Academy of Sciences, San Francisco.

Perdita tristissima, n. sp.

In the key to the females of *Epimacrotera* this bee runs to *diversa* and is distinguished in the supplementary key that follows this description. It may possibly belong in the *sphaeralceae* group and in the key to that group it runs to *dispar*, but differs in the dusky wings, narrower pterostigma, and more shining mesonotum with fine erect whitish pubescence, although having the same general appearance and size.

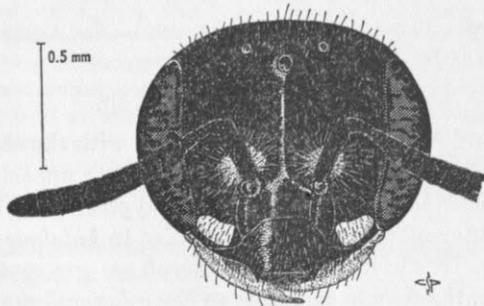


Fig. 5. *Perdita tristissima*. Frontal view of head of female.

Female.—Head and thorax dark blue green, clypeus, disk of mesoscutum and scutellum blackish, the black of scutum and scutellum separated by a narrow blue-green sutural band. Thorax entirely dark, but a small transverse white mark on each side of face between clypeus and eyes, with extreme anterior corner of face black. Abdomen fuscous, tinged with brown on first three tergites; pygidium testaceous brown. Legs fuscous, flagellum broadly brown beneath except at base. Tegulae testaceous. Wings strongly dusky, nervures fuscous, subcosta blackish, stigma with a slender central pale streak.

Head somewhat broader than long; check about half as wide as eyes. Lateral ocelli about their distance apart from nearest eye and much closer to occipital margin. Facial foveae linear, slightly narrower than space between them and eyes and reaching from upper level of antennal sockets slightly more than halfway to level of anterior ocellus. Mandibles thick, curved, subacute and with a small blunt inner tooth. Proboscis rather short, galeae about three-fourths as long as stipites. Wings rather small, extending only slightly beyond first three segments of abdomen; pterostigma slender, shorter than first submarginal cell and rather less than half as wide as the cell; marginal cell as long as stigma, with part beyond stigma longer than part beneath, metacarpus nearly twice as long as apical truncation; second submarginal cell receiving first recurrent nervure close to base and narrowed more than half to nearly two-thirds to radius. Head and thorax minutely tessellate, dullish, but moderately shiny in some aspects; clypeus more shining, with fine distinct punctures, those of frons minute, numerous, but well separated and those of mesoscutum very sparse and obscure. Pubescence fine, erect, whitish and moderately abundant, but hair of mesoscutum very thin. Abdomen oval, depressed, about twice as long as wide; pygidial plate triangular, plane, narrowly rounded at apex. Length: about 4.8 mm.; anterior wing, 2.8–2.9 mm.

Holotype female, 9 miles south of Fresnillo, Zacatecas, Mexico, Aug. 26, 1956 (J. W. MacSwain).

Paratype.—One female, same data as type.

Types in collection of the University of California, holotype at Riverside, paratype at Berkeley.

To distinguish *tristissima* and *hidalgoensis* couplet 7 in the key to *Epimacrotera* (Univ. Calif. Publ. Entom. 28:93, 1962) is revised as follows:

- 7. Mesoscutum more or less strongly tessellate and dull, minutely and usually more or less obscurely punctured; thorax and abdomen entirely dark, disk of mesoscutum and scutellum sometimes blackish 7a
- Mesoscutum more weakly tessellate, more shining and more distinctly punctured; tubercles usually light at apex, or if not the frons and mesoscutum distinctly punctured and mesonotum not blackened 8
- 7a. Disk of mesoscutum and scutellum rather distinctly blackened 7b
- Head and thorax uniformly dark blue green, clypeus black; no light markings; pubescence of head and thorax rather abundant, fine erect, and moderately long. *diversa* Timberlake
- 7b. A small transverse whitish mark between clypeus and eyes; pubescence similar to that of *diversa*, but thin on disk of mesoscutum; length, about 4.8 mm. *tristissima*, n. sp.
- Head, thorax and abdomen entirely dark; mesoscutum with numerous, but well-separated minute punctures, and fine erect whitish hair; length, about 6 mm. *hidalgoensis*, n. sp.

Subg. *Cockerellia* Ashmead

In the key to the species of *Cockerellia* (Univ. Calif. Publ. Entom. 9:386-391) the female of a new species runs to couplet 6 which has been revised as follows:

- 6. Mesoscutum shining with well-separated, fine punctures and thin, erect fine pubescence... 6a
- Mesoscutum closely punctured, with close-set, short, coarse and mosslike hair; thorax dark, with pronotum mainly yellow and sometimes marks on mesoscutum; abdomen yellow, with dark bands at juncture of segments *beata signata* Timberlake
- 6a. Face yellow below level of antennae, except sometimes two dark streaks on disk of clypeus; pronotum mainly yellow, large yellow mark on each side of propodeum and a small yellow spot on metanotum; tergites 1 to 5 with broad yellow bands. *propodealis* Timberlake
- Face nearly all white below level of antennae, supraclypeal mark broader than high; thorax dark, except for white marks on tubercles and disk of pronotum; abdomen with broad white band on tergites 2 to 5, interrupted medially except on tergite 4 and emarginate behind on each side except on tergite 2 *luculenta*, n. sp.

Perdita luculenta, n. sp.

Female.—Head and thorax dark green. Line on inferior orbits to middle of eyes, mandibles except reddish tips, labrum and most of face below level of antennae, creamy white; lateral, supraclypeal and subantennal marks partly separated by dark sutural intervals; lateral marks acute above and reaching anterior end of foveae; subantennal marks oval, with acuminate anterior end and touching lateral marks on part of outer margin; supraclypeal mark about twice as broad as high. Collar of pronotum, mark on anterior margin of flanks of pronotum, large mark on each side of hind border of disk, nearly confluent medially and narrowly separated from large mark on tubercles, white. Abdomen black, lateral margins of tergite 1 and broad band on tergites 2 to 5, white; all bands, except on tergite 2 emarginate behind on each side closer to lateral margins than to median line and interrupted medially except on tergite 4, which has band broadened medially and with median triangular notch on anterior side. Apical depression of tergites, including reflexed parts on ventral surface whitish subhyaline; venter otherwise dark. Legs black, trochanters in large part, apex of femora (on front pair mark extending triangularly to middle of anterior margin), tibiae and tarsi, except apical half of hind tibiae, white. Antennae white, flagellum tinged with fulvous beneath except on basal joint, the apex of scape, pedicel and flagellum above narrowly fuscous, becoming more brownish toward apex, with apical half of terminal joint entirely pale. Proboscis fuscous, more brownish apically. Tegulae hyaline, base white. Wings milky hyaline, nervures concolorous, except margins of stigma and subcoxae yellowish.

Head as broad as long, cheeks broad and rounded. Posterior ocelli about their distance apart from nearest eye and occipital margin. Facial foveae close to margin of eyes and reaching from

upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below level of antennae strongly convex, disk of clypeus large, about as broad as high, strongly reflexed on each side, with lateral extensions narrowly visible to base of mandibles in frontal aspect. Mandibles strongly curved, with broad tips as usual in *Cockerellia*. Proboscis elongate, extended in type, probably nearly reaching front coxae in repose. Pterostigma hardly more than half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, narrowed toward apex. Metacarpus nearly three times as long as apical truncations; second submarginal cell narrowed two-thirds to radius. Head and thorax polished and shining, with only metanotum and apex of scutellum roughened by punctures; punctures of frons and mesopleura extremely minute, those of mesoscutum more distinct and moderately close. Pubescence of head and thorax white, erect, rather long, mosslike and rather abundant, becoming longer and denser on cheeks and underside of thorax. Scopa of hind legs whitish, very long and dense for a *Perdita*. Apical fimbria of abdomen well developed. Pygidial plate large, broad, with rounded apex. Length: 7.4 mm.; anterior wing, 4.6 mm.

One female (holotype), 29 miles east of Calexico, Imperial Co., California, June 12, 1961 (V. D. Roth).

Type in collection of the University of California, Riverside.

Perdita utahensis Cockerell

New record.—One female, 4.8 miles north of Rodeo, Hidalgo Co., New Mexico, on *Tidestromia*, Sept. 4, 1961 (Timberlake). New to New Mexico.

Perdita albipennis Cresson

In 1960 I suggested that four subspecies of *albipennis* could be recognized, including the typical form, *lacteipennis*, *pallidipennis*, and *canadensis*. However, the types of *albipennis* and *lacteipennis* are practically identical and from the same general region. It is better, therefore, to consider *lacteipennis* a synonym of *albipennis* (new synonymy) and recognized *heliophila* as a subspecies.

Perdita albipennis albipennis Cresson

New record.—NORTH DAKOTA. Slope Co.: 2 females, 2 males, Logging Camp Ranch, on *Helianthus annuus*, July 2, 1949 (O. A. Stevens).

Perdita albipennis heliophila Cockerell

Perdita heliophila Timberlake, 1954, Univ. Calif. Publ. Entom. 9:397; Timberlake, 1958 t.c. 14:382 (status discussed); Timberlake, 1960, t.c. 17:131 (status discussed).

P. heliophila like *canadensis* differs from *albipennis* in the reduction of markings; it differs from *canadensis* in smaller size (length, about 6 to 8 mm. instead of 9 or almost 10 mm.), scape of antennae usually all dark, pronotum tending to be entirely dark, yellow bands of abdomen more or less abbreviated, interrupted and frequently absent, and pubescence of mesonotum shorter.

New record.—UTAH. Kane Co.: 9 females, 16 miles east of Kanab, on *Helianthus annuus*, Sept. 23, 1964 (Timberlake).

Perdita coreopsidis kansensis Timberlake

New record.—NEW MEXICO. Roosevelt Co.: 4 females, Arch, July 5, 1961 (D. C. Heninger); 1 male, 4 females, Milnesand, June 14, 1961 (Heninger). UTAH. Iron Co.: 1 female, Coal Creek, June 27 (collector unknown).

The Utah specimen has the clypeus and abdomen entirely yellow, except for the dark lateral foveae of tergite 2; the New Mexico females have the usual dark mark

on each side of the summit of clypeus, a dark spot on each side of basal declivity of tergite 1 and a small, faint subapical spot on each side of the disk of the same segment.

***Perdita imbellis*, n. sp.**

(Plate figs. 1205, 1206, 1306)

The male of *imbellis* falls next to *beata* in couplet 31 of the key to species of *Cockerellia* (Univ. Calif. Publ. Entom. 9:189), where *beata* is called *perpulchra* in error, but differs in having the face mostly creamy white instead of light yellow below level of antennae, the legs much darker and the frons dull and obscurely punctured, instead of shining and finely punctured.

Male.—Head and thorax dark blue green. Spot on cheeks at anterior end of eyes, mandibles except for red on apical third, labrum, clypeus, lateral and subantennal marks, creamy white. Lateral marks quadrate, broader than high, touching only lower half of subantennal marks and reaching on orbits to level of antennae. Supraclypeal area dark. Collar of pronotum, spot on posterior corners of disk and tubercles pale yellow. Abdomen black, with narrow preapical whiteish bands, becoming broader on segments toward apex, and deeply, squarely emarginate on each side in front. Tergite 7 entirely white, and apical depression of tergites whitish subhyaline. Venter whitish, with black bands across middle of segments, the first two mainly dark. Legs black, apical fifth of femora, tibiae and tarsi white or pale yellow (front tibiae more yellowish than light parts of body), the tibiae infuscated behind but hind pair only on apical two-thirds. Antennae black above, gradually become more brownish toward apex of flagellum, scape white beneath, following four joints broadly yellowish white and subsequent joints orange yellow beneath. Proboscis fuscous, galeae testaceous. Tegulae testaceous hyaline, base white. Wings milky hyaline, nervures entirely pallid.

Head quadrate, as broad as long; cheeks almost uniformly as wide as eyes and angulate anteriorly. Posterior ocelli approximately their distance apart from nearest eye and occipital margin. Facial foveae small, oval, indistinct. Face below antennae moderately convex; disk of clypeus less than twice as broad as high, lateral extensions narrow and visible in frontal aspect to base of mandibles. Mandibles reaching base of each other, thick at base, attenuate on apical third and very acute at apex. Proboscis long (extended in type, probably exceeding fossa in repose). Head and thorax shining, mesonotum polished, with fine moderately close punctures, but frons opaque, duller than vertex, the cheeks and anterior half of frons with minute rather obscure punctures. Pubescence white, moderately long, erect and abundant but not dense; shorter on anterior part of face, very long on underside of head and subappressed on cheeks. Abdomen ovate, convex above, widest at apex of tergite 2; tergite 7 broadly ogival at apex; subgenital plate and genital armature similar to same parts in *lepachidis*. Length: 5.5 mm.; anterior wing, 4.4 mm.

One male, holotype, 24 miles north of Cameron, Coconino Co., Arizona, May 28, 1954 (F. Werner).

Type at Riverside, but will ultimately go to the California Academy of Sciences, on indefinite loan from the University of Arizona.

***Perdita hilaris*, n. sp.**

(Plate figs. 1207, 1208, 1307)

The male of *hilaris* runs near *verbesinae*, on account of the rather dull frons, but it resembles *perpulchra* in the rather extensive whitish face marks.

Male.—Head and thorax dark blue green. Short line on inferior orbits at anterior end of eyes, mandibles except reddish on apical third, clypeus, and lateral marks, creamy white. Lateral marks transverse, covering sides of face to level of summit of clypeus but with orbital extension to level of antennae. Small transverse mark at posterior corners of disk of pronotum and tubercles white. Abdomen blackish, the reflexed ventral part of tergites white, the white extend-

ing besad from each side as rather broad preapical bands on tergites 2 to 6, but with broad deep emargination on each side, constricting the white to thin curved lines; bands on tergites 2 to 4 interrupted medially, the lines remaining thin at inner ends on tergite 2 but broadening out on tergites 3 and 4. Tergite 7 white, tinged with testaceous subapically and with large fuscous marks on each side of basal half. Legs black, apex of femora, tibiae except behind, and tarsi, yellowish white. Antennae fuscous, scape and base of flagellum white beneath, remainder of flagellum yellowish brown beneath. Proboscis fuscous. Tegulae hyaline, base white. Wings milky hyaline, nervures pallid.

Head somewhat broader than long; cheeks as broad as eyes and abruptly narrowed anteriorly. Distance between posterior ocelli about equal to distance to nearest eye and to occipital margin. Inner orbits of eyes slightly divergent above. Face below level of antennae moderately convex; disk of clypeus broader than high, broadly rounded above, and anteriorly strongly produced around sides of labrum, with extensions to base of mandibles visible in frontal aspect. Mandibles strongly curved, tapering, very acute and reaching base of each other. Proboscis exceeding fossa in repose. Flanks of pronotum impressed and posterior corners of disk prominent to degree usual in *Cockerellia*. Pterostigma four times longer than wide and hardly more than half as wide as first submarginal cell; marginal cell as long as stigma, slightly longer beyond than beneath it, metacarpus twice as long as apical truncation; second submarginal cell narrowed one-half to radius. Head and thorax shining, polished or nearly so on most parts, except frons and vertex strongly tessellate and dull, but not opaque; punctures of mesonotum fine and moderately close, those of face obscure. Pubescence abundant, long, erect and fine, becoming very long on vertex, occiput and sides of thorax. Abdomen ovate, broadest at apex of tergite 2; tergite 7 narrowed into apical lobe with rounded apex. Subgenital plate as in *imbellis* but more pointed at apex. Genital armature similar to the parts of *imbellis*, but parameral lobes broader at apex with the crest on inner surface at the inner margin instead of considerably inward from the margin. Length: 5.5 mm.; anterior wing, 4.4 mm.

One male, holotype, Dixie State Park, Utah, June 13, 1961 (G. E. Bohart).

Type in collection of the University of California, Riverside.

This species and *imbellis* are more closely allied to each other than to any other species of *Cockerellia* and seem to be distinct by the markings and genital armature.

Subg. *Procockerellia* Timberlake

Perdita excellens Timberlake

New record.—One female, The Gap, Coconino Co., Arizona, on *Cleome lutea*, Sept. 25, 1960 (G. E. Bohart).

Perdita albonotata Timberlake

New records.—Three males, Cornish, Cache Co., Utah, on *Stephanomeria*, Aug. 4, 1959 (G. E. Bohart); 1 male, 10 miles south of Caborca, Sonora, Mexico, June 11, 1962 (D. H. Janzen).

Subg. *Xeromacrotera* Timberlake

Perdita cephalotes (Cresson)

New record.—One male, Freeman Gulch, northeast of Ricardo, Kern Co., California, on *Chrysothamnus*, Oct. 14, 1958 (J. A. Chemsak).

As far as is known, this is the fourth specimen of this bee ever collected, which was described in 1878. The female remains unknown.

Subg. *Pentaperdita* Cockerell

Although the type species of this group, *P. albovittata* Cockerell, is a common and widely distributed bee, some of the other species are so rare that only one or

two specimens have been collected since Cockerell first began collecting and studying *Perdita* about 1895. *P. chrysophila* Cockerell, described in 1896, has only recently been collected in numbers and its female recognized, which proves to be *P. nigrifacies* Timberlake. A new key to the females of this group has been prepared.

KEY TO FEMALES OF PENTAPERDITA

1. Light bands of abdomen broad, usually not interrupted except on tergite 2; if interrupted on tergites 2 and 3 or 4, lateral face marks large, reaching level of antennae, marks on disk of pronotum and tubercles white, and mandibles broadly dilated, with short incurved tip. 2
 Light bands of abdomen narrow and generally interrupted medially; if band on tergite 3 entire lateral face marks transverse, not reaching above level of summit of clypeus, or face, and pronotum dark 3
2. Abdominal bands usually entire, except on tergite 2, and curved backward at outer ends; supraclypeal area dark *albovittata* Cockerell
 Abdominal bands usually less broad and sometimes interrupted on tergites 3 and 4; lateral face marks large and a transverse supraclypeal mark present; mandibles broad with short incurved tip *mandibularis* Timberlake
3. Clypeal and lateral marks white 4
 Face and thorax dark, except collar of pronotum narrowly white; light bands of abdomen typically interrupted and abbreviated, reduced to lateral marks on tergite 2; mesoscutum sparsely punctured, especially on posterior part of disk. *chrysophila* Cockerell
4. Wings more or less whitish or milky hyaline, nervures mostly pallid. 5
 Wings slightly dusky, nervures almost uniformly testaceous brown; lateral face marks transverse; collar of pronotum and tubercles white; bands on tergites 2 to 4 interrupted, that on tergite 2 narrow and broadly interrupted. *amoena* Timberlake
5. Band on tergite 2 even when broadly interrupted abruptly bent backwards at outer ends. 6
 Band on tergite 2 reduced to short transverse mark far to each side; bands on tergites 3 and 4 successively less interrupted and oblique at outer ends; clypeus with two broad dark stripes on disk; frons distinctly tessellate and dullish; pygidial plate narrowly rounded at apex *annexa* Timberlake
6. Lateral face marks more or less transverse or at least somewhat broader than high if more or less triangular; disk of clypeus often with two dark stripes. 7
 Lateral marks comparatively large, triangular, their inner margin continuous with inner margin of marks on sides of clypeus, disk of clypeus broadly black to summit; bands on tergites 2 and 3 narrow, not broadly interrupted, that on tergite 4 somewhat broader, abbreviated and entire *nigroviridis* Timberlake
7. Pygidial plate narrowed to rounded apex; wings less whitened, subcosta brown, margins of stigma and nervures of marginal cell sometimes more or less brownish 8
 Pygidial plate very narrowly rounded at apex or almost acute; wings more whitened, nervures more pallid, only subcosta generally brownish 10
8. Abdomen dullish, more evidently punctured and sericeous 9
 Abdomen more shining; appressed, sericeous pubescence nearly lacking on disk of tergites 2 to 4; abdominal bands more or less broadly interrupted and sometimes abbreviated *melanochlora* Cockerell
9. Bands on tergites 2 to 4 white and narrowly interrupted; minute sericeous pubescence of tergites 3 and 4 moderately developed. *idahoensis* Timberlake
 Bands on tergites 2 to 4 yellowish; minute sericeous pubescence of abdomen nearly as dense as in *albovittata*; head less broad, lateral face marks subquadrate, not going above level of summit of clypeus *micans*, n. sp.
10. Frons polished, rather closely punctured; band on tergite 2 rather broadly interrupted, those on tergites 3 and 4 successively less interrupted, each mark on tergite 4 ovaly expanded within *bradleyana* Timberlake

Vertex and upper part of frons tessellate and slightly dullish; abdominal bands narrowly interrupted *coahuilensis* Timberlake

Perdita albovittata Cockerell

Perdita laticeps Cockerell, 1896, Proc. Acad. Sci., Phila., 48:98, ♂ (synonymy confirmed).

P. laticeps has been considered a synonym of *albovittata* with but little doubt; I have now examined the type of *laticeps* and can confirm the synonymy.

New record.—One female, Cornish, Cache Co., Utah, on *Stephanomeria*, Aug. 5, 1959 (G. E. Bohart and R. M. Nielsen).

Perdita amoena Timberlake

New records.—One female, 15 miles west of Santa Clara, Washington Co., Utah, Sept. 2, 1964 (C. W. O'Brien). One male, Cochise Stronghold, Cochise Co., Arizona, Sept. 12, 1964 (O'Brien). One female, 1 male, 20 miles south of Estacion Llano, Sonora, Mexico, Aug. 17, 1964 (M. E. Irwin).

Perdita annexa Timberlake

Perdita annexa Timberlake, 1960, Univ. Calif. Publ. Entom., 17:133, ♂.

It seems to be reasonably certain that a male and female of *Pentaperdita* collected at Santa Fe, New Mexico, near the middle of July belong together, although taken in different years. More material is needed, however, to prove that the female belongs with *annexa* without any doubt.

Female.—Head and thorax dark blue-green; dark part of clypeus, supraclypeal area, disk of mesoscutum, scutellum and metanotum black; clypeus and lateral marks white; two broad dark stripes on disk of clypeus, uniting on anterior border and enclosing a narrow light T-mark; lateral marks moderately large, transverse and rounded within but with slender extension on orbits nearly to level of antennae. Collar of pronotum and small spot at apex of tubercles whitish. Abdomen fuscous, tinged with brown, with narrow white band on tergites 2 to 4; band on tergite 2 reduced to narrow, transverse, and slightly oblique mark on each side, almost touching lateral foveae at or behind their middle; other two becoming successively broader and less interrupted, that on tergite 3 almost reaching lateral margin and that on tergite 4 much abbreviated. Pygidial plate ferruginous. Legs brownish fuscous, front and middle knees very narrowly whitish. Antennae fuscous, flagellum dark brown beneath. Mandibles fuscous, reddened on apical half. Tegulae testaceous hyaline, base brownish. Wings whitish hyaline, nervures pale testaceous, margin of stigma and subcosta testaceous brown.

Head as broad as long; cheeks strongly receding and rounded. Facial foveae well impressed, wider than narrow interval between them and eyes, and reaching from upper level of antennal sockets somewhat more than halfway to level of anterior ocellus. Mandibles moderately dilated within and incurved at apex. Proboscis moderately long, galeae reaching base of stipites; maxillary palpi about half as long as galeae, with five subequal joints. Pterostigma rather small, about half a wide as first submarginal cell; marginal cell as long as stigma, distinctly shorter beneath than beyond it, metacarpus nearly twice as long as apical truncation; second submarginal narrowed one-half to radius and receiving first recurrent nervure close to base. Head and thorax shining, mesonotum polished, frons and vertex finely tessellate, the frons rather dull. Punctures of face fine, distinct and rather sparse, those of mesoscutum similar and widely spaced on disk. Pubescence whitish, moderately long, erect and rather thin; hair of front coxae short and thin; scopal hair of hind tibiae long, moderately dense and rather coarse. Abdomen oval, subdepressed, shining; tergites 3 and 4 with shallow punctures; pygidial plate triangular, rather narrow and rounded at apex; disk plane. Length: about 5 mm.; anterior wing, 3.8 mm.

One male, Santa Fe, Santa Fe Co., New Mexico, July 14, 1934 (F. E. Lutz); 1 female, Santa Fe, July 18, 1938 (E. L. Bell).

Perdita bradleyana Timberlake

New record.—One male, Eagle Pass, Maverick Co., Texas, May 25, 1952 (Cazier, Gertsch and Schrammel).

Perdita micans, n. sp.

Similar to *idahoensis* but bands of abdomen yellowish and the minute appressed hair of tergites 3 and 4 nearly as dense as in *albovittata*.

Female.—Head and thorax blue green, disk of mesoscutum and scutellum black. Clypeus, except for two narrow, dark oblong spots, close together in middle of disk, and subquadrate lateral marks, not reaching above level of summit of clypeus, white. Collar of pronotum testaceous, cuneate mark on each side of hind margin of disk, and tubercles white. Abdomen black, tergites 2 to 4 each with pale yellow band, abbreviated and almost entire on tergite 4, linearly interrupted and curved backward at outer ends on tergite 3, and more distinctly interrupted and abruptly bent backward on each side on tergite 2. Pygidial plate rufotestaceous. Legs black, small spot at base of front and middle tibiae whitish. Scape and pedicel of antennae black, flagellum brown, somewhat infuscated above toward base. Anterior margin of disk of clypeus and labrum testaceous. Mandibles rufotestaceous shading into pale yellow at base and dark red at apex. Proboscis fuscous, galeae testaceous brown. Tegulae testaceous hyaline, darker at base. Wings whitish hyaline, nervures testaceous, subcosta brownish.

Head slightly broader than long; cheeks about three-fourths as broad as eyes. Posterior ocelli somewhat closer together than distance to nearest eye or occipital margin. Facial foveae shallow, close to margin of eyes and extending from slightly above level of antennal sockets more than halfway to level of anterior ocellus. Face below antennae strongly convex; disk of clypeus large, not much higher than wide, lateral extensions broad, moderately inflexed and mostly visible in frontal aspect. Mandibles strongly curved, broadly dilated on inner margin and acute at apex. Proboscis moderately long. Pterostigma half as wide as first submarginal cell; marginal cell shorter beneath than beyond stigma, with metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed one-half to radius. Head and thorax shining, polished on frons and mesonotum. Punctures fine, rather close on frons near antennal sockets but sparser above, and sparse on mesoscutum, becoming widely separated on posterior middle of disk; punctures of vertex coarser and shallow except close to eyes. Pubescence white, coarse, moderately long and mostly erect, but thin and somewhat shorter on mesonotum; hair of front coxae fine and rather short. Abdomen oval, moderately convex; pygidial plate longer than wide, sides converging to moderately narrow and rounded apex; disk plane. Tergite 1 polished, following segments increasingly lineolate and dullish; tergites 3 and 4 with very fine, short, sericeous pubescence. Apical fimbria coarse, long and dense. Length: about 5 mm.; anterior wing, 3.3 mm.

One female, holotype, 13 miles east of Cuauhtemoc, 6,600 feet, Chihuahua, Mexico, on *Baileya multiradiata*, July 11, 1964 (J. Powell).

Type in collection of the University of California, Riverside.

Perdita chrysophila chrysophila Cockerell (new status)

Perdita nigrifacies Timberlake, 1954, Univ. Calif. Publ. Entom., 9:406, ♀ (new synonymy).

A series of *Pentaperdita* from Hidalgo, Mexico, includes both sexes and indicates that *nigrifacies* is the female of *chrysophila*. The series shows considerable variation in the abdominal markings of the females. The light bands are narrow and sometimes narrowly interrupted, although less narrowly on tergite 2, and almost reach the lateral margins, with that on tergite 3 evenly curved backward on each side. Other specimens have the bands more or less abbreviated, like or approaching the condition in the type of *nigrifacies*.

New records.—TEXAS: 1 female, 8.6 miles south of state line, Highway 180, Culbertson Co., on *Thelesperma longipes*, Oct. 2, 1962 (Timberlake). MEXICO, HIDALGO: 1 female, 9 miles northwest of Actopan, 6,400 feet, Sept. 1, 1962; and 25 females, 16 males, 7.5 miles southeast of Ixmiquilpan, 6,700 feet, on *Flourensia* sp., Sept. 1 (Univ. Kans. Mex. Exped.). SAN LUIS POTOSI: 1 female, El Huizache, 4,500 feet, Aug. 22, 1954 (J. G. Chillcott).

***Perdita chrysophila quadricincta*, n. subsp.**

Females of *chrysophila* from Nuevo Leon, Mexico, have four entire or nearly entire bands on the abdomen and resemble *albovittata* in this respect, but differ in the dark face and thorax, and the coarser and sparser pubescence on tergites 3 and 4.

Female.—Like type of *nigrifacies* in almost every respect, except in having abdominal bands broader, less interrupted and present on tergites 2 to 5 instead of 2 to 4. Band on tergite 2 narrowly interrupted medially, and that on tergite 3 sometimes with a finely linear interruption or a median notch behind. Bands on tergites 4 and 5 broader than on preceding segments, that on tergite 4 almost reaching lateral margins, and that on tergite 5 much abbreviated. Reflexed ventral part of tergites 3 to 5 densely white pubescent as in typical form. Wings clearer than in type of *nigrifacies* and slightly whitened, but no more so than in Hidalgo females.

Male.—Not distinguishable from Hidalgo specimens of *chrysophila*.

Holotype female and allotype.—Forty-one miles south of Saltillo, 6,200 feet, Nuevo Leon, Mexico, Sept. 7, 1962 (Univ. Kans. Mex. Exped.).

Paratypes.—Two females, 3 males, same dates as types.

Types in collection of the University of Kansas, Lawrence; 2 paratypes in collection of the University of California, Riverside.

Perdita nigroviridis Timberlake

New record.—Five females, San Antonio, Bexar Co., Texas, on *Helianthus annuus*, July 14, 1962 (A. H. Alex).

Subg. *Hexaperdita* Timberlake

Three new forms are here referred to *Hexaperdita*, although two of them, known only in the female sex, have some resemblance to *Cockerellia*. The third is definitely a typical form of *Hexaperdita*, closely allied to *P. boltoniae* Robertson.

***Perdita alexi*, n. sp.**

The female of *alexi* has the facies of a species of *Cockerellia*, and is provisionally placed in *Hexaperdita*, where it stands next to *P. pratti* Cockerell. It differs from *pratti* in the moderately dilated mandibles, abruptly narrowed before the incurved tips, and dull, tessellate mesoscutum, with short, erect, mosslike hair.

Female.—Head and thorax dark blue green. Mandibles except red apical third, labrum, clypeus, large triangular lateral marks reaching upper level of antennal sockets, large mark on each side of hind border of disk of pronotum and tubercles yellow. Abdomen fuscous with yellow basal band on tergites 2 to 4, that on tergite 2 widened at outer ends where touching lateral foveae, and those on tergites 3 and 4 abbreviated, narrowed medially or somewhat emarginate behind, thus appearing subangulately bent at middle. Subapical spots on lateral margins of tergites 2 to 4 narrowly yellowish, these marks on tergite 2 confluent with outer ends of basal band. Pygidial plate rufotestaceous. Legs fuscous, front tibiae except behind, streak on anterior side of middle tibiae and all tarsi yellow. Antennae yellow, spot at apex of scape, pedicel and flagellum narrowly fuscous above, the infuscation fading out toward apex. Proboscis testaceous yellow. Tegulae testaceous hyaline, pale yellowish at base. Wings milky hyaline, nervures pallid, margins of stigma and subcosta pale yellowish.

Head as long as wide; cheeks nearly as wide as eyes and evenly rounded. Posterior ocelli with distance apart and distance to occipital margin subequal, and slightly less to nearest eye. Facial foveae rather narrow, moderately impressed and reaching about two-thirds of distance from upper level of antennal sockets to level of anterior ocellus. Clypeus strongly convex and well produced in front of eyes, lateral extensions mostly concealed in frontal aspect. Proboscis moderately long, included within fossa in repose. Pterostigma nearly as long and about three-fourths as wide as first submarginal cell; marginal cell nearly as long beneath as beyond stigma, with metacarpus somewhat longer than apical truncation. Tarsal claws tapering, acute. Pygidial plate longer than wide at base, narrowed more than half to truncate and slightly retuse apex. Face shining, frons with numerous minute punctures, face below antennae more polished, with indistinct punctures. Mesonotum strongly tessellate, rather dull, and with close minute punctures bearing whitish, short, erect mosslike hairs. Pubescence of face similar but more depressed and that of cheeks and underside of thorax longer. Apical fimbria of abdomen dense and plumose. Length (head thrust forward): 6 mm.; anterior wing, 3.8 mm.

Paratype.—Similar, except abdomen subferruginous brown, more fuscous at base, with bands on tergites 1 to 3 well developed and a broken band on tergite 4; apical depressions of tergites more testaceous than in type, the yellow subapical spots less contrasting with ground color, less distinct.

One female, holotype, College Station, Brazos Co., Texas, on *Heterotheca subaxillaris*, Oct. 29, 1957 (A. H. Alex).

Paratype.—One female, 2 miles south of Aetna, Barber Co., Kansas, on *Helianthus petiolaris*, July 12, 1955 (W. L. LaBerge).

Type in collection of the University of California, Riverside; paratype in collection of the University of Kansas, Lawrence.

Perdita asteris Cockerell

Perdita crassiceps Cockerell, 1896, Proc. Acad. Sci., Phila., 48:97, fig. 25, ♂ (new synonymy).

Perdita vagans Cockerell, 1896, Proc. Acad. Sci., Phila., 48:101, ♂ (new synonymy).

Perdita vespertilio Cockerell, 1896, Proc. Acad. Sci., Phila., 48:95, ♂ (new synonymy).

Perdita mellina Cockerell, 1900, Entomologist, 33:62, ♂ (new synonymy).

Since writing on *asteris* in 1956, I have been able to examine the types of *crassiceps*, *vagans* and *vespertilio* and conclude that they, together with *mellina*, are all forms of the male of *asteris*. The female recorded under *mellina* in 1938 (Univ. Calif. Publ. Entom., 14:390) possibly may be a ferruginate form of *asteris*.

New records.—ARIZONA. Cochise Co.: 1 female, Willcox, Aug. 14, 1958 (R. M. Bohart); 1 female, Willcox, Sept. 6, 1961 (P. M. Marsh); 28 females, 24 males, 1 mile south of Willcox, Aug. 23, 1961 (Bequaert and Werner). NEW MEXICO. Santa Fe Co.: 2 females, 10 miles north of Santa Fe, Aug. 17, 1962 (J. G. and B. L. Rozen).

Perdita boltoniae calens, n. subsp.

The female of *calens* runs to *boltoniae* in the key to the species of *Hexaperdita* (Univ. Calif. Publ. Entom., 11:247-252, 1958), and the male to *bishoppi planorum*. The female is distinguished from *boltoniae* by the broad and interrupted bands on tergites 2 to 4 and sometimes two spots on tergite 1, and by the lateral face marks broader than high and not reaching above level of summit of clypeus. The male has lateral face marks filling space between sides of clypeus and margin of eyes, but differs from either *bishoppi* or *ignota* in having mandibles as in typical *boltoniae*.

Female.—Head and thorax dark green. Clypeus and lateral marks pale yellow or yellowish white; lateral marks about one and one-half times broader than high, and narrowed within; supra-clypeal area blackish. Collar of pronotum, spot on posterior corners of disk and tubercles

pale yellow. Abdomen fuscous, with an interrupted band on tergites 2 to 4 and usually two submedian spots on tergite 1 pale yellow or whitish; band on tergite 2 touching or nearly touching lateral foveae, and those on tergites 3 and 4 more abbreviated. Pygidial plate testaceous brown. Venter of abdomen dark, tinged with brown. Legs fuscous, more brownish on basitarsi, small joints of tarsi testaceous. Antennae black, flagellum broadly brown beneath and at apex. Mandibles shading through testaceous to red at apex, a small spot at base whitish. Tegulae testaceous hyaline, base yellowish. Wings slightly dusky hyaline, nervures testaceous, margins of stigma and subcosta pale ferruginous brown.

Head rotund, slightly broader than long; cheeks strongly receding and narrower than eyes. Posterior ocelli somewhat closer to nearest eye and to occipital margin than their distance apart.

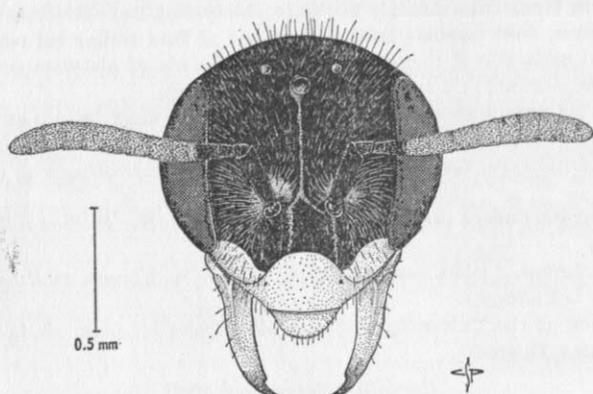


Fig. 6. *Perdita boltoniae calens*. Frontal view of head of female.

Facial foveae broader than interval between them and eyes and reaching from upper level of antennal sockets about three-fourth of distance to level of anterior ocellus. Face below antennae strongly convex; disk of clypeus less than twice as broad as high and evenly rounded above level of pair of dark dots; lateral extensions strongly inflexed, inner ends only visible in frontal aspect. Mandibles slender, inner margin abruptly narrowed about one-fifth length of shaft before apex. Proboscis moderately long, not exceeding fossa in repose, galeae reaching base of stipites; maxillary palpi hardly more than one-third as long as galeae. Pterostigma three times as long as wide and nearly as wide as first submarginal cell; marginal cell nearly equally long beneath and beyond stigma, metacarpus somewhat longer than apical truncation; second submarginal narrowed more than half to radius. Pygidial plate about as long as wide at base and narrowed one-half to slightly rounded or truncate apex. Head and thorax tessellate, mesonotum much duller than moderately shining frons and vertex; face below antennae smooth, shining, and almost impunctate; punctures of frons, vertex, and mesonotum minute, obscure and moderately close. Pubescence whitish, rather dense, moderately long, erect and rather coarse; about equally long on vertex, cheeks and mesonotum and shorter on face; hair of front coxae much shorter than usual, but dense, Scopul hair of hind tibiae rather dense and minutely plumose, the branches very short and close-set. Apical fimbria of abdomen short and coarse. Length: 4-5 mm.; anterior wing, 2.8-3 mm.

Male.—Colored and marked much as in female, except tubercles and abdomen dark. Apical tergite of abdomen and venter testaceous or testaceous brown. Legs dark, apex of front femora, anterior side of front tibiae, streak on middle tibiae and tarsi pale yellow. Scape of antennae broadly pale yellow beneath, blackish above; pedicel and next two or three joints blackish, remainder of flagellum ferruginous brown above and wholly of same color beneath. Mandibles testaceous, with apex red and basal expansion mostly yellowish. Tegulae as in female. Wings almost milky hyaline, nervures pale testaceous, margins of stigma and subcosta brown.

Head quadrate, slightly broader than long; cheeks as broad as eyes, with a large, blunt anterior process. Ocelli about as in female. Facial foveae faint, twice as long as wide. Disk of

clypeus much smaller than in female, width at level of dark dots equal to width of lateral face marks or about one-third of space between eyes. Mandibles reaching to base of each other, and slender, except for quadrate basal expansion on outer margin and a low rounded expansion before middle on inner margin, beyond which attenuate to apex. Flanks of pronotum deeply impressed, posterior corners of disk ridged and acute. Sculpture and pubescence much as in female. Abdomen ovate, broadest across apex of second segment; tergite 7 triangularly narrowed, with apex narrowly rounded and slightly turned upward. Subgenital plate and genital armature not differing materially from typical *boltoniae*.

Holotype female and allotype, 14 miles southeast of Veracruz, Veracruz, Mexico, June 16, 1958 (J. C. Schaffner).

Paratypes.—Five females, 5 males, same data as types.

Types in collection of the University of Nebraska, Lincoln; two paratypes in collection of the University of California, Riverside.

Perdita cambarella cambarella Cockerell

New record.—One female, 7 miles east of Comanche, Comanche Co., Texas, June 28, 1963 (Rozen, Oliver, Moldenke and Woods).

This specimen differs from females from Lamar and Cherokee Counties in having the underside of antennal scapes and tubercles pale yellow.

Perdita foveata persimilis Timberlake

New record.—Sixteen females, 7 males, 7 miles east of Comanche, Comanche Co., Texas, June 28, 1963 (Rozen, Oliver, Moldenke and Woods).

The majority of these females have narrow, interrupted bands on abdomen, but six specimens have the abdomen entirely, or almost entirely, dark and agree better with the subspecies *brachycephala*.

Perdita nubila Timberlake

New record.—ARKANSAS: 1 female, 2 males, Franklin Co., June 21, 1964 (E. P. Rouse and L. Chandler); 1 female, Washington Co., June 23 (Rouse and Chandler). KANSAS: 2 females, 1 male, 2 miles north and 3 miles east of Independence, Montgomery Co., June 3, 1963 (N. & B. Marston).

Perdita propodealis Timberlake

New record.—One female, road to La Pastora, 5.5 miles northwest of Todos Santos, Baja California, Mexico, on *Encelia*, Jan. 13, 1959 (H. B. Leach).

Perdita rossi Timberlake

New records.—BAJA CALIFORNIA, MEXICO: 4 females, 65 miles south of San Felipe, April 10, 1960 (R. D. Gehring); 1 male, 10 miles northwest of La Paz, Oct. 6, 1941 (Ross and Bohart); 2 females, road to La Pastora, 5.5 miles northwest of Todos Santos, Jan. 13, 1959 (H. B. Leach).

Perdita xanthisma Cockerell

Perdita xanthismae Cockerell, 1905, Entom. News, 16:331, ♀; Timberlake, 1956, Univ. Calif. Publ. Entom., 11:258, ♂.

As the original spelling for this species is a solecism, it seems best to delete the offending "e." The name of the plant genus is in the neuter instead of the feminine gender assumed by Cockerell.

New records.—WYOMING. Johnson Co.: 27 females, 5 males, 5 miles south of Kaycee, on *Grindelia*, Aug. 4, 1963 (Bohart and Torchio). NEBRASKA. Sioux Co.: 2 females, 7 miles north

of Harrison, Aug. 13, 1962 (Rozen). KANSAS. Kingman Co.: 13 females, 9 males, Kingman State Park, on *Aplopappus divaricatus*, July 15, 1962 (W. B. Kerfoot); 30 females, 7 males, same place and flower, Aug. 4, 1962 (Kerfoot and Michener). TEXAS. Wichita Co.: 13 females, 1 male, Wichita Falls, on *Grindelia*, Sept. 5, 1963 (G. E. Bohart); Lipscomb Co.: 1 female, 1 male, Stillwater, Sept. 4, 1905 (J. C. Crawford); Leon Co.: 1 female, Eunice, on *Aplopappus subruginosus*, Sept. 27, 1905 (Bishopp); Tarrant Co.: 1 female, Handley, on *Aplopappus divaricatus*, Aug. 3, 1905 (Crawford); Comanche Co.: 26 females, 5 males, 7 miles east of Comanche, June 28, 1963 (Rozen, Oliver, Moldenke, and Woods). NEW MEXICO. Roosevelt Co.: 2 females, Rogers, June 10, 1961 (D. C. Heninger); 5 females, 3 males, Arch, June 5, 1961 (Heninger); 2 females, Portales, May 17 and 25, 1961 (Heninger); 3 females, 1 male, Milnesand, June 16, 1961 (Heninger). ARIZONA. Yavapai Co.: 1 female, Rock Springs, on *Gutierrezia*, Sept. 25, 1960 (Bohart).

subg. *Perditella* Cockerell

Perdita cladothricis Cockerell

New records.—One female, Chandler, Maricopa Co., Arizona, swept from alfalfa, Aug. 26, 1955 (O. L. Barnes); 1 female, El Huisache, San Luis Potosi, Mexico, 4,500 feet, Aug. 22, 1954 (Univ. Kans. Mex. Exped.).

subg. *Alloperdita* Viereck

Perdita gertschi Timberlake

Perdita gertschi Timberlake, 1958, Univ. Calif. Publ. Entom., 14:393, ♂.

The female is new and the species now has been found north of the Mexican border. In the key to the species of *Alloperdita* the female falls with *obscurata* Cresson (*carolina* Timberlake) by the shape of the head, but differs in the black mesonotum and the elongate lateral face marks.

Female.—Head and thorax almost black, a bluish luster on most of head and sides of thorax, but dark part of face below antennae, disk of mesoscutum, scutellum, metanotum, and propodeum black. Basal half of mandibles, quadrate mark on outer margins of disk of clypeus, small median spot on anterior half of disk, and elongate lateral marks, about four times higher than wide and reaching a little above level of antennae, white. Collar of pronotum, large cuneate marks on hind margin of disk and tubercles white. Abdomen blackish, with moderately wide and even, yellowish-white band at base of tergites 2 to 4, almost reaching lateral margins; apical segment ferruginous above and beneath. Legs blackish, apex of front and middle femora, posterior side of front femora nearly to middle, front tibiae and tarsi and anterior side of middle tibiae pale yellow; hind knees and middle and hind tarsi ferruginous. Antennae brown, flagellum more yellowish beneath, scape yellow except on apical fourth of dorsal side. Labrum piceous, much reddened in middle. Apical half of mandibles dark red. Proboscis black. Tegulae testaceous hyaline, base white. Wings hyaline, nervures pale testaceous, margins of stigma and subcosta brown.

Head as wide as long; cheeks evenly rounded and nearly as wide as eyes. Posterior ocelli their distance apart from occipital margin and somewhat closer to nearest eye. Facial foveae linear, close to margin of eyes and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted at middle of face, subclavate, joints of flagellum mostly as long as wide. Face below antennae strongly convex, disk of clypeus about as high as width of apical truncation, lateral extensions broadly inflexed and mostly concealed in frontal aspect. Mandibles thick, blunt at apex, without inner tooth and nearly reaching far margin of labrum. Proboscis rather short, galeae in repose reaching little more than halfway to base of stipites. Wings ample; pterostigma large, about as long as and slightly wider than first submarginal cell; marginal cell shorter than stigma, with part beyond stigma about as long as wide and a little shorter than part beneath; supernumerary cell receiving first recurrent nervure and reaching halfway or more to radius. Tarsal claws large, with strong inner tooth. Head and

thorax smooth and shining, sides of thorax minutely tessellate, propodeum more strongly tessellate and somewhat dull; face and mesonotum with minute sparse punctures and with short, fine, erect hair. Pubescence somewhat longer on cheeks and sides of thorax and rather dense on lateral ridges of propodeum. Hair on underside of front coxae long and fine, and scapal hair of hind tibiae long and moderately thin, with hairs on lower edge of anterior side coarse and more curved. Abdomen twice as long as broad, depressed; pygidial plate small, broad at base, sides concavely arcuate and converging to acute apex. Fimbria of abdomen short and thin; compressed sides of tergite 7 with short, plumose hair on each side of pygidial plate. Length: 5 mm.; anterior wing, 4 mm.

One female, mouth of Marravillas Canyon, Brewster Co., Texas, on *Prosopis juliflora*, April 1, 1961 (J. E. Gillaspay).

***Perdita townesi*, n. sp.**

(Plate figs. 1209, 1210, 1308)

Perdita obscurata Timberlake, 1956, Univ. Calif. Publ. Entom., 11:274, in part (not Cresson).
Perdita bradleyi Timberlake, 1960, Univ. Calif. Publ. Entom., 17:134, in part; Mitchell, 1960, Bees of the Eastern United States, 1:310, in part.

This bee has been confused heretofore with *bradleyi*, but the male is distinct in the markings and genital armature. The face of the male is more completely yellow below level of antennae and the mesospectus has a yellow T-mark which is absent in *bradleyi*. The females, perhaps, are not certainly distinguishable, but those with well-developed face marks presumably belong with *townesi*.

Male.—Head and thorax dark green. Anterior margin of gular region and anterior part of inferior orbits very narrowly, mandibles except red tips, labrum and face below level of antennae clear lemon yellow. Lateral marks oblique from outer upper part of antennal sockets to margin of eye at anterior end of foveae (sockets encircled with yellow except on posterior margin). Hind margin of pronotum except broadly across middle of disk and narrowly above tubercles, exposed part of prosternum, and T-mark on mesospectus yellow. Abdomen blackish above, but yellow beneath; narrow basal yellow bands on tergites 2 to 5 or 6, sometimes notched at outer ends so that they seem to end a short distance from lateral margins, and those on tergites 2 to 3 or 4, with median notch; apical margin of tergites, especially tergites 5 and 6, testaceous subhyaline, and tergite 7 testaceous yellow. Legs including coxae yellow, a large spot at apex of hind femora above, and outer side of hind tibiae fuscous or blackish. Antennae yellow, a small spot at apex of scape, pedicel, and flagellum rather broadly above fuscous. Tegulae hyaline, yellow spot at base. Wings hyaline, nervures pale testaceous, margins of stigma and subcosta fuscous.

Head distinctly broader than long. Face below level of antennae gently convex; disk of clypeus twice as broad as high, rounded above, with lateral extensions partly visible in frontal aspect. Facial foveae oval, nearly three times longer than wide. Mandibles with strong inner tooth and reaching far margin of labrum. Proboscis short, the short galeae and palpi as in *bradleyi*. Pterostigma large, nearly as long and as broad as first submarginal cell; marginal cell with parts beneath and beyond stigma about equal, metacarpus nearly twice as long as apical truncation. Head and thorax shining, mesonotum polished, frons vertex and temples very minutely tessellate and dull; face virtually impunctate, mesonotum with sparse minute punctures. Pubescence whitish, fine, long, and erect, becoming shorter and thinner on face and mesonotum. Abdomen elongate oval, nearly three times as long as wide, but recurved at apex. Apex of tergite 7 broadly ogival. Subgenital plate much broader than long, truncate at apex, with about eight coarse marginal setae (in *bradleyi* apex with broad rounded emargination). Genital armature similar to same parts of *bradleyi*, but parameral lobes less broad, with process on inner margin small and not showing in lateral view, and sagittae more slender. Length: about 5–5.5 mm.; anterior wing, 3.7–3.9 mm.

Female.—Head and thorax dark green, propodeum more tinged with blue. Mandibles except red tips, three marks on clypeus, and lateral marks bright lemon yellow. Labrum and dark part of clypeus black or more or less brownish, submedian dark strips of clypeus as broad or broader

than median yellow stripe. Lateral marks triangular, higher than wide, acute above and intruding between anterior end of foveae and margin of eyes. Transverse mark on each side of hind margin of disk of pronotum and tubercles usually yellow. Abdomen black, with yellow band, sometimes interrupted, at base of tergites 2 to 5, and abbreviated band, or two spot, across distal part of basal declivity of tergite 1 (marks on tergite 1 absent in female from McClellanville, which has yellow markings reduced and perhaps belongs with *bradleyi* although taken with males of *townesi*). Legs black; apex of front and middle femora, front and middle tibia except behind, and their tarsi yellow. Antennae fuscous, scape yellow except for dark stripe above, nearly reaching base, and flagellum brownish beneath. Tegulae and legs as in male. (Female of *bradleyi* has median stripe on clypeus and lateral marks yellow, tubercles dark and yellow bands of abdomen more or less broadly interrupted, abbreviated and restricted to tergites 2 to 4).

Head somewhat broader than long. Face below antennae evenly convex; disk of clypeus much broader than high, lateral extensions broad and well exposed in frontal aspect. Facial foveae broad, well impressed, narrowly separated from margin of eyes and reaching from level of middle of antennal sockets about halfway to level of anterior ocellus. Mandibles with strong inner tooth and reaching far margin of labrum. Proboscis short, as in *bradleyi*. Venation as in male, with second submarginal cell narrowed about one-half to radius, supernumerary cell not always present. Sculpture and pubescence much as in male, but punctures and hair of mesonotum somewhat denser. Abdomen about twice as long as wide; pygidial plate large, triangular, about as long as wide at base, rather depressed and obtuse at apex. Length: 5-6 mm.; anterior wing, 4.1-4.3 mm.

Holotype male and allotype, Highlands Hammock State Park, Florida, on *Ilex*, April 5, 1959 (T. B. Mitchell).

Paratypes.—FLORIDA, type locality: 1 male taken with types; 4 males, 9 females, on *Ilex*, April 7, 1955 (H. V. Weems, Jr.); 1 male, 1 female, on *Nyssa sylvatica*, April 7, 1955 (Mitchell). Orange Co.: 2 males, Orlando, March, 1944 (R. and G. Bohart). Valusia Co.: 3 males, 2 females, Cassadaga, on *Ceanothus microphyllus*, March 30, 1962 (Weems). GEORGIA: 1 male, 1 female, labeled "Ga." from Cresson collection without further data, the female with a male abdomen glued on. Richmond Co.: 3 males, 1 female, Fort Gordon, on *Diospyros virginiana*, May 18, 1958 (R. R. Snelling). SOUTH CAROLINA. Charleston Co.: 5 males, 1 female, McClellanville, May 10, 1944 (H. K. Townes). NORTH CAROLINA. Wayne Co.: 3 males, on *Batodendron*, May 7, 1954 (Mitchell). Sampson Co.: 1 male, on *Batodendron*, May 18, 1950 (Mitchell); 1 male, Taylor's Bridge, May 24, 1951 (Townes).

Types in United States National Museum; paratypes in collections of Messrs. Mitchell, Weems, and Snelling, and in collections of the University of California, Riverside, and the Philadelphia Academy of Sciences.

One imperfect male specimen in the American Museum is from Jacksonville, Florida (Ashmead).

Subg. *Pygoperdita* Timberlake

Several new forms, many new records and some changes of status need to be noted for this interesting western group.

Perdita associata, n. sp.

The female of *associata* runs to *malacothricis* in the key to the species of *Pygoperdita*, but differs in having the yellow bands of abdomen rather widely interrupted and without oval emarginations behind on each side.

Female.—Head and thorax dark green. Mandibles except red tips, clypeus and small lateral marks yellow. Disk of clypeus with two arcuate blackish stripes, converging above and enclosing median yellow mark (which on left side at summit narrowly breaks through to yellow on lateral part of disk). Anterior margin of clypeus also narrowly dark. Thorax entirely dark. Abdomen blackish, tergite 1 with greenish luster; small spot on lateral margins of tergite 1 and moderately well-interrupted band on tergites 2 to 5 yellow; band on tergite 2 the narrowest and that

on tergite 5 broadest, all bent backward at outer ends, reaching lateral margins and not distinctly emarginate behind on each side. Venter dark, marked only by extension of dorsal bands onto ventral part of tergites. Legs dark, apex of front femora, anterior side of front tibiae, front tarsi, and small spot on middle knees yellow. Antennae dark, flagellum dark ferruginous beneath. Labrum and proboscis dark reddish brown. Tegulae subhyaline, base fuscous. Wings dusky hyaline, nervures dark testaceous, margins of stigma pale brown, subcosta fuscous except at base.

Head broader than long. Lateral ocelli their own distance apart from occipital margin and somewhat more distant from nearest eye. Facial foveae moderately impressed, narrow, their own width from margin of eyes and reaching from lower level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae gently convex; disk of clypeus much broader than high, appearing dentate on each side of labrum, with lateral extensions broad within and visible in frontal aspect. Mandibles stout, rather blunt at apex, and abruptly narrowed on inner margin. Proboscis of moderate length. Face below antennae shining, punctures of clypeus coarse and restricted to dark submedian stripes; frons and vertex tessellate, dull, frons with fine, rather close fine punctures. Anterior third of mesoscutum tessellate, dullish, with rather close fine punctures, remainder of disk smooth, polished on middle of disk, with sparse punctures; scutellum shining, sparsely punctured. Pubescence whitish, erect, moderately abundant and short, but sparse on polished part of scutum; hair of front coxae short, but dense and finely plumose. Abdomen oval, subdepressed; pygidial plate much longer than wide, apex subacute, disk convex. Length: 5.5 mm.; anterior wing, 4 mm.

Holotype female, 5 miles southwest of Idria, San Benito Co., California, May 29, 1960 (C. E. Wemmer), received from R. R. Snelling.

Type in collection of the University of California, Riverside.

Perdita aureovittata Cockerell

The type of *aureovittata* from Claremont, California, has not been seen. It has four yellow marks on anterior border of the face. It is probably intermediate between material from Herkey Creek in the San Jacinto Mountains and the material from north of the San Gabriel Mountains in Los Angeles and Ventura counties. It seems best to treat all material collected south of the San Gabriel Mountains as the typical subspecies of *aureovittata*. Material from just north of the mountains was described as a separate species under the name of *soluta* but here reduced to a subspecies.

Perdita aureovittata soluta Timberlake (new status)

Perdita soluta Timberlake, 1958, Univ. Calif. Publ. Entom., 14:394, ♂.

Perdita aureovittata maderensis Timberlake, 1956, Univ. Calif. Publ. Entom., 11:286, in part.

The type locality of *soluta* is Valyermo, Los Angeles County. I now believe that material from Santa Barbara and Kern counties, formerly included in the subspecies *maderensis*, together with additional material from Ventura County, should go in the subspecies *soluta*. Material from Madera and San Benito counties will remain respectively in the subspecies *maderensis* and *stenozona*.

Perdita californica inopina, n. subsp.

This form from Inyo County agrees closely with *californica* in almost all characters, except that the mesonotum is uniformly tessellate and comparatively dull, with the pubescence slightly longer and perhaps a little denser. It is placed as a form of *californica* rather than *tularensis*, because it agrees with the former in the

sparser puncturation and longer pubescence of the mesonotum. The distribution of *californica*, however, seems to be strictly coastal from the bay region of California to Baja California and a form of it from Inyo County is surprising.

Female.—Head and thorax dark green, disk of mesoscutum, scutellum and metanotum blackish. Base of mandibles, clypeus and lateral marks, hardly going above level of summit of clypeus, yellowish white. Thorax entirely dark. Abdomen fuscous, with intersegmental region of basal segments (apical depression and part of the following segment before the gradulus) ferruginous, and a very narrow ferruginous streak behind the gradulus on tergites 2 and 3. Legs dark, apex of front femora and anterior side of front tibiae testaceous yellow. Antennae fuscous, scape testaceous yellow and flagellum brownish yellow beneath. Mandibles shading through testaceous to dark red at apex. Proboscis dark and shining, galeae more tinged with red. Tegulae testaceous hyaline, base testaceous. Wings more fulvous-tinted than in *californica*, nervures testaceous, margins of stigma and subcosta fuscous.

Structural characters, sculpture and pubescence as in *californica*, except mesonotum uniformly and finely tessellate and moderately dull, with close fine punctures and moderately erect hair. Length: 8 mm.; anterior wing, 5.1 mm.

Holotype female, Inyo Co., California, July 30, 1962 (T. Talbot).

Type in collection of the University of California, Riverside.

Perdita digressa, n. sp.

(Plate figs. 1211, 1212, 1309, 1354)

Both sexes of *digressa* run to *leucostoma* in the key to the species of *Pygoperdita*. In the male the two apical processes of the median lobe of tergite 7 are less deeply divided, less divergent and much narrower than in *leucostoma*. The female is similar to *leucostoma*, but has the head no broader than long, clypeus with a large black mark, wings not whitened and nervures darker.

Male.—Dark blue green, thorax entirely dark. Mandibles except red tips, labrum and nearly all of face below level of antennae white. Lateral marks quadrate, but somewhat narrowed above, upper margin slightly oblique, meeting middle of outer margin of subantennal plates; supra-clypeal mark transverse. Sutures of anterior facial plates narrowly black. Abdomen black, disk of tergite 1 with bluish luster, tergite 7 somewhat brownish ferruginous, and apical depression of tergites, especially of tergites 5 and 6, whitish subhyaline. Tergites 2 to 4 each with broadly interrupted white basal band (that on tergite 4 almost evanescent in Arizona paratype) and with transverse subapical mark on each side, extending onto reflexed ventral part of segments, and confluent with basal band on tergite 3 in same paratype and nearly confluent on tergites 2 to 4 in holotype. Also a preapical white band across middle of tergites 5 and 6 just in front of apical depression, better developed in holotype than in paratype. Legs blackish, apex of femora on anterior side, anterior side of front tibiae, half of anterior side of middle tibiae, streak on underside of hind tibiae, and tarsi pale yellow, but small joints of hind tarsi pale brownish in holotype. Antennae blackish above, more brownish on flagellum, pedicel entirely dark, scape white beneath and flagellum broadly dull yellow beneath. Tegulae subhyaline, fuscous at base. Wings almost clear hyaline, nervures testaceous, margins of stigma pale brown, subcosta brown.

Head broader than long; cheeks evenly rounded and somewhat narrower than eyes. Posterior ocelli about their distance apart from occipital margin and distinctly more distant from nearest eye. Face below antennae strongly convex; disk of clypeus broader than high, broadly inflexed on each side but lateral extensions visible in frontal aspect. Mandibles thick, acute at apex and not reaching beyond far margin of labrum. Proboscis of moderate length. Pterostigma four times longer than wide, hardly more than half as wide as first submarginal cell; marginal cell shorter beneath than beyond stigma, with apical truncation shorter than metacarpus; second submarginal cell narrowed less than one-half to radius. Head and thorax shining, but frons and vertex strongly tessellate and dull; anterior border of mesoscutum dullish, middle of disk polished. Punctures of mesoscutum fine and rather close but becoming sparser on middle of disk and

on scutellum; punctures of face fine, shallow, obscure, but close on anterior half of frons. Pubescence white, fine, rather long and erect, nearly equally abundant on face, cheeks, mesonotum, and underside of thorax, becoming somewhat shorter on face. Abdomen oval, depressed, shining, impunctate. Tergite 7 deeply emarginate on each side of two vertical, opposed median lobes, longer than wide, rounded at apex, slightly divergent, and joined across dorsal surface for somewhat less than half their length in a common median lobe. Subgenital plate triangular, convex, and medially ridged on apical half of ventral surface. Genital armature of usual form in *Pygoperdita*; parameral lobes in dorsal view appearing nearly of same width from base to apex and strongly curved, and showing strong emargination in apical half and oblique apex in lateral view; sagittae thinly fusiform, with rods separated apically, parallel, and finely attenuate. Length: 4.5 mm.; anterior wing, 3.1-3.3 mm.

Female.—Head and thorax dark green, propodeum and sides of thorax more bluish; middle of disk of mesoscutum and scutellum black. Supraclypeal area, large mark on disk of clypeus, and its anterior margin black; sides of clypeus as far inward as usual, pair of dots and transverse lateral marks pale yellow, or probably creamy white in life; slender intrusion of dark color between pale part of clypeus and sides of face. Thorax entirely dark. Abdomen blackish, tergite 1 dark blue except on apical depression; apex of abdomen ferruginous, with apex of tergite 5 reddened, but pygidial plate infuscated on apical part. Tergites 2 to 4 with interrupted, pale yellow basal bands, those on tergites 3 and 4 curved backward at outer ends and reaching lateral margins; also small yellowish spot far to each side on tergite 5. Legs dark, small spot at apex of front femora, anterior side of front tibiae yellow and front tarsi yellowish. Antennae dark, flagellum ferruginous beneath. Tegulae and wings as in male.

Head about as long as wide. Facial foveae linear, close to margin of eyes and reaching from level of middle of antennal sockets two-thirds of distance to level of anterior ocellus. Face below antennae strongly convex; disk of clypeus about twice as broad as high, obtusely inflexed on each side of labrum, with lateral extensions visible in frontal aspect. Mandibles stout, narrowed abruptly on inner margin before apex. Proboscis and wings as in male. Pygidial plate much longer than wide, sides converging to narrowly obtuse apex, disk slightly recurved and narrow on apical part. Head and thorax shining, frons and vertex tessellate and moderately dull, lower part of face polished, middle of disk of mesoscutum and scutellum almost polished; broad anterior border of scutum tessellate, dullish, with fine close punctures. Punctures on middle of scutum sparse, but close on scutellum, and those of face fine and close, becoming more distinct but sparse below level of antennae. Pubescence whitish, fine, erect, moderately long and abundant, becoming longer on sides and underparts of thorax. Length: 5.5 mm.; anterior wing, 3.8 mm.

Holotype male and allotype, Ord Mountain, Mohave Desert, San Bernardino Co., California, on *Yucca schidigera*, April 19, 1960 (J. Powell).

Paratypes.—One male, Tucson, Arizona, on *Baileya multiradiata*, April 8, 1955 (G. D. Butler); 2 males, 1 female, near northeast end of Granite Mts., about 15 miles south of Kelso, San Bernardino Co., California, on *Chaenactis*, April 30, 1966 (George Salt).

Types in collection of the University of California, Riverside; one paratype in collection of the University of Arizona.

Perdita eriogoni Cockerell

An example from Colorado agrees with *eriogoni* in all characters except color and markings and is certainly conspecific.

Male.—Face yellow to middle of frons, with extensions on orbits nearly to summit of eyes and enclosing dark foveae; dark color of frons in median line projects below general level of the yellow halfway to level of antennae. Underside of head anteriorly, mandibles except red tips and labrum yellow about as in typical *eriogoni*. Yellow of tubercles confluent with yellow on posterior margin of lower part of flanks of pronotum and with yellow mark on posterior corners of disk (tubercles only yellow in typical *eriogoni*). A narrow yellow line across apex of scutellum from base of one hind wing to other. Abdomen fuscous, yellow, and ferruginous instead of bicolored as in typical *eriogoni*. Tergite 1 fuscous, narrowly yellow on lateral margins and dark ferruginous on apical depression. Yellow bands on tergites 2 to 6 narrowly interrupted medially, at

least on tergites 2 to 4, broadened at outer ends and passing over onto reflexed ventral part of segments. Apical depressions on contiguous part of disk ferruginous, meeting the yellow on each side but separated from it across middle by a narrow fuscous or blackish line which widens in middle to form the interruptions. Extreme base of tergites (mostly in front of gradulus) also ferruginous but edged with fuscous especially at basal corners of segments. Tergite 7 entirely ferruginous. Legs yellow, all femora and tibiae marked with black about the same as is typical *erigoni*. Antennae not differing from typical form.

One male, Cedar Point, Dove Creek, Colorado, July 15, 1950 (G. F. Knowlton).

Perdita malacothricis Timberlake

New record.—ARIZONA. Pima Co.: 1 female, 16 miles east of Tucson, on *Baileya multiradiata*, April 17, 1965 (Timberlake).

Perdita montereyensis Timberlake

New record.—CALIFORNIA. San Benito Co.: 1 male, 1 mile south of Hernandez, on *Calochortus splendens*, May 25, 1956 (P. D. Hurd, Jr.).

This specimen differs from typical *montereyensis* in having a well-defined, interrupted yellow band on tergites 2 to 5, not quite reaching the lateral margins.

Perdita micheneri micheneri Timberlake

New record.—MEXICO, BAJA CALIFORNIA: 2 males, 12.1 miles northeast of Ensenada, 360 meters, March 25, 1964 (M. E. Irwin).

This is the first record of *micheneri* from Mexico.

Perdita mohavensis pimana, n. supsp.

This form differs in the greatly reduced abdominal markings of both sexes from typical *mohavensis*.

Female.—Agreeing closely with *mohavensis mohavensis* except in abdominal markings. Abdomen dark, with a very small white spot on lateral margins subapically of tergites 1 to 4, and a slender white basal streak on each side, much closer to lateral margins than to each other, on tergites 2 to 4. In one paratype the basal streaks absent on tergite 2, but subapical lateral spots enlarged on tergites 3 and 4, becoming narrowly confluent with basal streaks on tergite 3.

Male.—Abdomen with basal streak on each side of tergites 2 and 3 and a subapical mark or streak extending shortly inward from lateral margins on tergites 2 to 5. In one paratype the subapical streaks on tergite 3 widened and nearly confluent with basal streaks.

Holotype female, Organ Pipe Cactus National Monument, Pima Co., Arizona, April 18, 1948 (A. L. Melander). Allotype, same locality, April 15, 1948 (J. L. Sperry).

Paratypes.—One female, 1 male, type locality, on *Baileya*, April 14, 1948 (Melander) and 1 male, April 15, 1948 (Sperry).

Types in collection of the University of California, Riverside.

Perdita mucronata Timberlake

Perdita mucronata Timberlake, 1956, Univ. Calif. Publ. Entom., 11:297, ♂.

The female is new and runs best in the key to the species of *Pygoperdita* to *duplonotata*, but if a revision of the key is made, it should be taken out at couplet 27 as the abdomen lacks ferruginous color and the light bands are entire and very narrowly interrupted.

Female.—Head and thorax dark blue or blue green, middle of disk of mesoscutum, scutellum, and metanotum black. Large mark at base of mandibles, clypeus more or less, subtriangular

lateral marks, about as broad as high; and more or less emarginate on inner margin, and transverse supraclypeal mark creamy white. Labrum and two stripes on disk of clypeus black; stripes often widened at middle to envelop lateral dots, or sometimes confluent to form large triangular mark, narrowed above. Thorax entirely dark. Abdomen black, with bluish luster on tergite 1. Small spot on lateral margin of tergite 1 and narrow band on tergites 2 to 5 pale yellow; bands very narrowly interrupted or entire, abruptly bent backward at outer ends and reaching lateral margins. Legs black, spot at apex of front femora, front tibiae broadly on anterior side and anterior streak on middle tibiae pale yellow; front tarsi rather dark brown. Antennae dark, flagellum yellowish brown beneath. Mandibles shading through testaceous to red at apex. Tegulae testaceous subhyaline, base fuscous. Wings slightly dusky hyaline, nervures testaceous brown, margins of stigma and subcosta fuscous.

Head somewhat broader than long; cheeks rounded and about as broad as eyes. Posterior ocelli slightly closer to occipital margin than their distance apart and slightly more remote from nearest eye. Facial foveae well impressed, linear, very close to margin of eyes and reaching from lower level of antennal sockets three-fourths of distance to level of anterior ocellus. Face gently convex below level of antennae; disk of clypeus nearly twice as broad as high, broadly reflexed around sides of labrum, with lateral extensions mostly concealed in frontal aspect. Mandibles stout, abruptly and strongly narrowed on inner margin before blunt apex. Proboscis slightly exceeding fossa in repose. Pterostigma nearly four times longer than wide and three-fourths as wide as first submarginal cell; marginal cell as long as stigma, with part beneath it somewhat shorter than part beyond. Head and thorax shining, disk of mesoscutum polished, frons and vertex tessellate and dullish. Punctures of frons close, sparse on vertex, and distinct and sparse on clypeus; those of mesonotum close and fine, becoming sparser on posterior middle of scutum and moderately close on scutellum. Pubescence whitish, erect, fine and abundant; rather short on face and mesonotum, and moderately long and dense on cheeks and underside of thorax. Abdomen narrowly ovate, subdepressed and shining; pygidial plate longer than wide, apical part somewhat recurved, apex narrowly obtuse. Length: 6.8-7 mm.; anterior wing, 4.5 mm.

New records.—CALIFORNIA. Riverside Co.: 7 females, 1 mile west of Cottonwood Spring, Joshua Tree National Monument, on *Oenothera brevipes*, April 11, 1963 (P. D. Hurd, Jr.); also same place and day, 1 female, 1 male (B. Tamaki), 1 female (C. A. Toschi), 2 males (D. E. Bright); 1 female, 6 miles south of Cottonwood Spring, April 11, 1963 (R. L. Langston); 2 males, Pinyon Flat, 16 miles southwest of Palm Desert, April 12, 1963 (J. Powell).

Perdita obtusa, n. sp.

In the key to the species of *Pygoperdita* the female of *obtusa* falls with *nitens*, but has the face and notum more strongly and closely punctured, mesonotum partly black, tergite 1 with a yellow spot on each side and pygidial plate blunter at apex. If it is run through couplet 24 in the key it runs out near *fieldi* and *mohavensis* but disagrees with both.

Female.—Head and thorax dark blue green, middle of disk of mesoscutum, scutellum and metanotum black. Labrum, dark part of clypeus and supraclypeal area black. Most of basal half of mandibles (anterior margin at extreme base and mark on outer and underside of base black), upper border of disk of clypeus and lateral marks pale yellow or yellowish white (discolored and partly reddened in type). Anterior border of clypeus and large mark on disk almost touching lateral dots but not reaching summit of disk dark, the yellow broadened at outer ends and extending only shortly onto lateral extensions. Lateral marks transverse, rounded at inner ends and broadened on orbits to level of antennae. Thorax entirely dark. Abdomen blackish, pygidial plate dark ferruginous, apex of venter pale ferruginous. Small spot on lateral margins of tergite 1, large mark on each side of tergite 5, and rather narrowly interrupted band on tergites 2 to 4, pale yellow; the bands strongly bent backward and broadened at outer ends to reach lateral margins. Legs blackish, spot on front and middle knees and streak on anterior side of front tibiae, not quite reaching apex, yellow. Antennae black, flagellum brownish toward apex and broadly yellowish brown beneath except at base. Red on apical part of mandibles

shading into the pale yellow of base. Proboscis fuscous, galeae more brownish. Tegulae pale testaceous, base fuscous. Wings dusky hyaline, nervures testaceous, margins of stigma brown, subcosta fuscous.

Head slightly broader than long; cheeks rounded, two-thirds as broad as eyes. Posterior ocelli somewhat more than their distance apart from occipital margin, and more removed from nearest eye. Facial foveae shallowly impressed, their own width from margin of eyes and reaching from level of middle of antennal sockets three-fourths of distance to level of anterior ocellus. Face below level of antennae evenly convex; disk of clypeus about twice as broad as high, obtusely reflexed on each side of labrum, with lateral extensions visible in frontal aspect. Mandibles tapering, subacute and abruptly narrowed on inner margin near apex. Proboscis moderately long, galeae and stipites about equal, maxillary palpi nearly as long as galeae and labial palpi exceeding galeae. Pterostigma rather small, much shorter than first submarginal cell and one-half as wide; marginal cell as long as stigma, part beneath and beyond it nearly equal, metacarpus slightly longer than oblique apical truncation; second submarginal cell narrowed somewhat less than two-thirds to radius. Head and thorax shining, frons and vertex tessellate and moderately dullish, disk of mesoscutum and basal half of scutellum smooth. Punctures of face fine but strong, close on frons, becoming sparse on vertex, those of clypeus coarser and mostly restricted to dark part of disk. Punctures of mesonotum finer than those of frons and vertex, close around margins of scutum, apical half of scutellum and dense on metanotum. Pubescence whitish, fine, erect, rather long, and moderately abundant, but becoming short and thin on mesoscutum. Abdomen narrowly ovate, convex above, shining, with sparse minute punctures on disk of tergites 3 and 4; apical fimbria pale ochreous, moderately long and dense; pygidial plate mostly concealed in type, apparently as long as wide at base, with apex bluntly rounded and disk convex. Length: about 5 mm.; anterior wing, 4 mm.

Holotype female, 9 miles south of Fairview, on Kern River, Tulare Co., California, April 30, 1964 (W. Turner).

Type in collection of the University of California, Riverside.

Perdita pulliventris, n. sp.

This bee is similar in many ways to *nevadensis*, and is possibly a melonistic form of that species, but it seems to be distinct by having the head broader than long, disk of clypeus more transverse with process on each side of base of labrum more spinelike, mesopleura rather strongly tessellate and dullish, thorax entirely dark and abdominal markings reduced to inconspicuous spots on lateral margin of tergites 1 to 3.

Female.—Head and thorax dark green, mesoscutum except anterior border, scutellum and metanotum black. Labrum and large part of clypeus black; streak along upper half of lateral extensions of clypeus as far inward as position of lateral dots, small mark on anterior middle of disk, and rather small, subtriangular lateral marks yellowish white. Lateral marks broader than high but reach level of anterior margin of antennal sockets, and almost touch anterior end of foveae. Thorax entirely dark. Abdomen black; very small yellowish white spot on lateral margins of tergites 1 to 3; those on tergite 2 very small and pass inside and behind posterior end of lateral foveae; pygidial plate dark reddish. Legs blackish, streak on anterior side of front tibiae and short streak on middle tibiae pale yellow. Antenna black, flagellum yellowish brown beneath. Mandibles rufotestaceous at middle, piceous at base, and dark red on apical third. Proboscis dark. Tegulae testaceous, base almost black. Wings strongly dusky hyaline, nervures dark testaceous, subcosta fuscous.

Head broader than long; cheeks rounded and almost as wide as eyes. Posterior ocelli more distant from occipital margin than their distance apart and somewhat closer to nearest eye. Facial foveae about twice as wide as interval between them and eyes and reaching from level of middle of antennal sockets two-thirds of distance to level of anterior ocellus. Disk of clypeus much broader than high, with spinelike process on each side of base of labrum; lateral extensions visible in frontal aspect. Mandibles stout, tapering and abruptly narrowed on inner margin

before apex. Proboscis rather short, maxillary palpi reaching apex of galeae. Pterostigma nearly four times longer than wide and three-fourths as wide as first submarginal cell; marginal cell nearly as long as first submarginal, parts beneath and beyond stigma subequal, and metacarpus a little longer than oblique apical truncation. Head and thorax moderately shining, disk of mesoscutum and scutellum polished, frons and vertex strongly tessellate and rather dull, anterior border of mesoscutum and mesopleura also tessellate and dullish. Punctures of clypeus fine and sparse; those of frons rather close and restricted to space between foveae and antennal sockets; those of mesoscutum sparse and mostly restricted to anterior border and those of scutellum very sparse. Pubescence whitish, rather short and erect; abundant on face, cheeks and margin of occiput and sparse on mesonotum. Abdomen oval, subdepressed; pygidial plate longer than wide, apex narrowly acuminate. Length: 5.5 mm.; anterior wing, 4 mm.

Holotype female, 8 miles southwest of Dardanelle, Tuolumne Co., California, Aug. 16, 1962 (S. Rosenthal).

Type in collection of the University of California, Riverside.

Perdita quadrisignata Timberlake

Perdita quadrisignata Timberlake, 1956, Univ. Calif. Publ. Entom., ♀.

Since 1956 when this species was described much more material has been accumulated, including male specimens. In the key to species of *Pygoperdita* the male falls next to *micheneri* and is distinguished for the most part only by the weaker tessellate sculpture of the mesonotum. The two forms probably will prove to intergrade when material from intervening territory is available.

Male.—Head and thorax dark bluish green. Basal half of mandibles, labrum, clypeus, rather small lateral marks, and sometimes a small transverse supraclypeal mark creamy white. Lateral marks more or less transversely triangular and at most only slightly surpassing summit of clypeus. Thorax entirely dark, abdomen black with creamy-white markings restricted mostly to small transverse subapical streak on lateral margins of only tergites 2 and 3 for the most part, extending more or less on reflexed ventral part of segments, and confluent or not with short transverse basal streak on outer thirds of segments. Occasionally basal part of markings developed also on tergites 4 and 5. Legs black, anterior side of front and middle tibiae, sometimes also small spot on anterior side of apex of femora and inner margin of hind tibiae yellow; tarsi dusky yellowish, paler beneath. Antennae black, flagellum yellowish brown beneath except at base and apex. Tegulae testaceous hyaline, base fuscous. Wings distinctly dusky, nervures testaceous brown, subcosta fuscous.

Head somewhat broader than long; cheeks evenly rounded, about two-thirds as wide as eyes. Lower face evenly convex; disk of clypeus broader than high, rounded above, lateral extensions visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis rather short, galeae much shorter than stipites. Head and thorax moderately shining, frons and vertex strongly tessellate and dull, mesonotum weakly and uniformly tessellate. Face almost impunctate, and mesonotum very sparsely and obscurely punctured. Pubescence whitish, rather thin, moderately long and erect. Abdomen ovate, shining; form of tergite 7, ventral plate and genital armature essentially as in *micheneri*. Length: about 3.5–4 mm.; anterior wing, 3–3.3 mm.

New records.—CALIFORNIA. Eldorado Co.: 2 males, Shingle, May 22, 1955 (G. J. Burdick). Stanislaus Co.: 1 female, Del Puerto Canyon, April 5, 1960 (S. M. Fullerton). San Luis Obispo Co.: 14 females, 25 males at nesting site and at flower of *Cryptantha*, and 10 females bringing yellow pollen to nests in ground, La Pansa Camp, April 29, 1962 (Timberlake); also same place and day, 2 males on *Eriophyllum confertiflorum* collected by P. D. Hurd, Jr., 1 male (J. K. Drew), 1 male (R. L. Langston), 1 female, 2 males (C. A. Toschi) and 1 female, 7 males on *Cryptantha* (J. Powell); 2 females, Pozo, April 29 (Hurd); 1 female, 3 miles east of Pozo, on *Layia platyglossa*, May 1 (Timberlake); 1 female, Black Mountain, 3,300–3,600 feet, 6 miles northeast of Pozo, on *Eschscholtzia californica*, May 1 (Powell), and 1 female, 1 male, same place and day (Toschi and Langston); 2 males, 5 miles northeast of Santa Margarita, May 4 (Hurd and Toschi), and 1 male on *Clarkia*, May 5 (Powell). Solano Co.: 1 female,

Dixon, on *Layia platyglossa*, May 5, 1947 (G. E. Bohart). Tulare Co.: 2 females, 16 males, 2 miles east of Johnsondale, on *Prunus subcordata*, April 27, 1964 (Toschi, Powell and Langston). Kern Co.: 1 female, 3 miles west of Woffard Heights, on *Coreopsis bigelovii*, April 29, 1964 (Powell), and 4 females, 13 males, same place and day on *Plagiobothrys nothifolius* (Powell, P. Rude, and Langston).

Perdita wyomingensis Cockerell

Perdita wyomingensis Cockerell, 1922, Amer. Mus. Novitates, 33:13, ♀.

The type of *wyomingensis* has been examined and it has proved to be conspecific with *sculleni* to which it runs in the key to the species of *Pygoperdita*. Both *sculleni* and *segona* should be placed as subspecies of *wyomingensis*, although ultimately it may be necessary to synonymize *segona*. The three forms in new status may be separated as follows:

1. Wings more whitish hyaline; mesonotum dark green, polished and finely, sparsely punctured 2
 Wings more fulvous tinted; mesonotum sometimes weakly tessellate and slightly blackish on
 disk; clypeus except two arcuate, submedian fuscous stripes. lateral marks reaching level
 of antennae, supraclypeal mark, sometimes divided, and sometimes small subantennal marks
 pale yellow*wyomingensis sculleni* Timberlake
 2. Supraclypeal and subantennal marks usually developed; mesoscutum slightly more closely
 and more strongly punctured; pygidial plate slightly recurved and flatter on disk
wyomingensis segona Timberlake
- Supraclypeal and subantennal marks absent; mesoscutum with very fine and sparse punctures;
 pygidial plate recurved, with disk convex*wyomingensis wyomingensis* Cockerell

Perdita wyomingensis wyomingensis Cockerell

Type female.—Head and thorax dark bluish green. Clypeus and lateral marks yellowish white. Clypeus with two blackish stripes on disk, very narrow above and wide below, but abbreviated and not reaching anterior margin. Lateral marks evenly oblique on inner margin, about twice as high as wide and reaching level of middle of antennal sockets. Frons tessellate, dull and finely, rather obscurely punctured. Mesonotum polished, the punctures very fine and sparse. Abdomen colored and marked about as in the type of *sculleni*, the band on tergite 3 more narrowly interrupted than other bands, the interruption about equal to width of apical depression at median line of segment. Labrum testaceous. Mandibles yellowish white at base, shading through testaceous to red at apex, and with a small inner tooth. Proboscis rather short, galeae about two-thirds as long as stipites. Length: about 5 mm.; anterior wing, 3.9 mm.

Type female, Jackson, Teton Co., Wyoming, July 13-17, 1920 (Lutz), in the American Museum of Natural History.

Subg. *Perdita* F. Smith

ZONALIS GROUP

In addition to the keys to this group published previously (Univ. Calif. Publ. Entom., 14:304-315, 1958, and 28:97-98, 1962), a supplementary key has been prepared to help in the identification of the new forms described herewith. The species of this group are among the most difficult to distinguish of the entire genus and many of them are subject to variations in color and markings in response to the local environment. The *zebrata* subgroup has now been removed to the *sphaeralceae* group, and the species *P. cleomellae* Cockerell and *B. thelypodii* Timberlake also are more naturally placed in that group.

SUPPLEMENTARY KEY TO SPECIES

1. Females	2
Males	17

2. Mesonotum more or less, but sometimes only delicately, tessellate 3
 Mesonotum highly polished 5
3. Mandibles abruptly narrowed within near apex; flank of pronotum strongly impressed;
 yellow bands of abdomen broad and even, legs almost entirely yellow 4
 Mandibles subdilated within and gradually narrowed before apex; flanks of pronotum not
 impressed; yellow bands on tergites 2 and 3 broad but narrowed and bent backward at
 outer ends as in *zebrata*; legs yellow, except front and middle coxae and hind tibiae and
 tarsi; mesoscutum tessellate, but shining, with thin, fine erect hair *depressa*, n. sp.
4. Mesoscutum dullish, with close fine punctures and close-set, short, erect hair; pronotum
 yellow, lower part of flanks and deeply impressed part above level of tubercles dark;
 abdomen yellow with four dark bands, and legs mainly yellow *vestita* Timberlake
 Mesoscutum delicately tessellate, shining, and with rather sparse punctures and hair; dark
 part of pronotum extended as band across disk *subvestita*, n. sp.
5. Frons smoothly or more delicately tessellate and shining 6
 Frons more strongly tessellate and more or less dull 7
6. Dark green with almost orange-yellow markings; pronotum pale except for small dark spot
 on lower part of flanks; only hind tibiae and tarsi fuscous; abdomen yellow, with narrow
 fuscous band at apex of tergites 1 to 4, not quite reaching lateral margins, and suppl-
 mented by dark spot at basal corners of tergites 2 to 4; wings with slight fulvous tinge,
 nervures pale testaceous yellow; punctures of frons fine and close on each side below;
 length: 5.5 mm. *toschiae*, n. sp.
 Similar but only about 4 mm. long; head not much broader than long; supraclypeal mark
 less than twice as broad as high, rounded above; dark mark on flanks of pronotum moder-
 ately large; wings clearer and whiter, nervures pale testaceous, margins of stigma and
 subcosta more yellowish. *similis* Timberlake
7. Hair of mesoscutum whitish, erect, more or less fine; if somewhat coarser than usual it is
 longer than diameter of ocelli 8
 Hair of mesoscutum pale ochreous, coarse and about as long as diameter of ocelli; pronotum
 entirely yellow; legs yellow, streak on middle tibiae, hind tibiae and tarsi, except base of
 first joint, fuscous; abdomen yellow, with four narrow dark bands and a spot on each
 side of tergite 1 *crassihirta*, n. sp.
8. Punctures of mesoscutum moderately sparse and well spaced on middle of disk 9
 Punctures of mesoscutum moderately close and nearly uniformly spaced over disk; frons
 rather closely punctured even across middle; supraclypeal mark, small subantennal spots
 and pronotum except small spot on flanks pale yellow; legs yellow, with little more than
 apical half of hind tibiae infuscated; abdomen almost creamy white, with narrow fuscous
 band at junctures of tergites 1-2 to 3-4 *oregonensis* Timberlake
9. Tubercles and other parts of pronotum yellow; light bands of abdomen not unusually broad
 and interrupted 10
 Tubercles dark, only hind margin of pronotal disk narrowly white; labrum except small spot,
 broad dorsal margin of clypeus, supraclypeal area and scape of antennae black; abdomen
 black, tergites 1 to 5 each with broad white band, interrupted in middle and narrowed at
 outer ends except on tergite 5 to touch lateral margins *melanderi*, n. sp.
10. Pronotum yellow, sometimes with dark band across disk 11
 Pronotum dark, only collar, mark on posterior corners of disk and tubercles yellow 14
11. Mandibles dilated within, and obliquely or more or less gradually narrowed before blunt
 apex; pubescence of mesoscutum fine, sometimes with prescutellar band of antrorse hair 12
 Mandibles abruptly narrowed before apex; hair of mesoscutum pale ochreous, rather coarse
 but longer than diameter of ocelli; face with large supraclypeal mark; pronotum yellow,
 large mark on flanks and sometimes band across disk dark; abdomen yellow with four broad
 black bands and a spot on each side of tergite 1 *zonalis zonalis* Cresson
12. Rather large, about 6.5 mm. long; punctures of mesoscutum fine and sparse (only one row
 of punctures between parapsidal line and lateral margin); markings white or creamy
 white, supraclypeal mark large, with shallow median notch; dark bands at junction of ter-

- gites 1-2 to 4-5 broad, equaling width of pale interval on tergites 2 and 3 *socia*, n. sp.
 Smaller, about 5-6 mm. long; mesoscutum more strongly and closely punctured 13
13. Punctures of frons rather fine; supraclypeal mark if present transverse with rounded median notch; abdomen yellow, tergite 1 dark except for preapical band, and band at junction of tergites 1-2 to 4-5 dark; legs yellow, front and middle tibiae with dark streak behind; scape of antennae with large dark mark at apex above. *aemula aemula* Timberlake
 Similar but punctures of frons coarser; markings creamy white; supraclypeal mark well developed, strongly rounded above, with deep median notch (or divided into two spots); pronotum pale with large dark blotch on flanks; tergite 1 entirely pale, except for dark apical band, or sometimes a small spot on lateral margins; legs yellow, hind tibiae and tarsi dark and sometimes a streak on middle tibiae behind; scape of antennae almost entirely yellow *aemula quadrifasciata*, n. subsp.
14. Frons closely and rather strongly punctured 15
 Frons more finely and sparsely punctured (punctures widely spaced toward ocelli) 16
15. Mandibles strongly curved, moderately dilated within, with distinct tooth before subacute apex; pygidial plate as long as wide, sides slightly arcuate and converging to rounded and distinctly notched apex; broad band across anterior half of clypeus and lateral marks creamy white; tergite 1 dark, and broad band at junction of tergites 2-3 to 4-5 fuscous; punctures widely spaced on disk of mesoscutum *placida* Timberlake
 Mandibles dilated within and gradually narrowed to blunt apex; pygidial plate slightly longer than wide, sides converging to rather narrow and weakly notched apex; clypeus dark, or with median yellow mark; lateral marks more or less emarginate on inner margin or thickly L-shaped; abdomen marked much as in *placida* but with band more developed at junction of tergites 5-6 *craterognatha*, n. sp.
16. Mandibles broadly dilated within, narrowed gradually to blunt apex; head and thorax dark blue green, clypeus and supraclypeal area black; lateral marks white, rather small, narrowly subtriangular, not covering anterior corners of face but reaching narrowly to foveae; legs black, anterior side of front and middle tibiae white *basinicola*, n. sp.
 Mandibles rather long, strongly curved, moderately dilated within and obliquely narrowed to subacute apex; clypeus and lateral marks creamy white; supraclypeal mark absent or represented by two small spots; abdomen creamy white with five dark bands including base of tergite 1; light band on tergite 1 interrupted medially and sometimes on each side; legs pale yellowish, hind tibiae and tarsi, large blotch behind on front femora and middle tibiae brown or fuscous *parilis* Timberlake
17. Mesopectus with a yellow mark on each side behind front coxae, but more or less concealed by dense white pubescence 18
 Mesopectus entirely dark 20
18. Face entirely yellow below level of antennae, the yellow enclosing or almost enclosing antennal sockets; flanks of pronotum strongly impressed; yellow bands of abdomen even; legs entirely yellow 19
 Green of frons intruding between subantennal and lateral marks sometimes to level of clypeus; flanks of pronotum not impressed; yellow bands of tergites 2 and 3 bent backward at outer ends; dark marks of legs variable, at least with brown streak on hind tibiae and sometimes on front and hind femora; flanks of propodeum sometimes partly yellow
depressa, n. sp.
19. Pronotum yellow, deeply impressed on flanks and across disk, sometimes with a dark band in trough across disk; anterior half of underside of head and cheeks yellow; mesoscutum more or less strongly tessellate, densely punctured and hairy *vestita* Timberlake
 Pronotum less deeply impressed, at least across disk, and with a dark band across disk onto flanks; median part of undersurface of head and cheeks with about one-half less yellow than in *vestita*; mesoscutum polished or delicately tessellate, with sparse fine punctures and thin hair *subvestita*, n. sp.
20. Face with yellow subantennal marks; pronotum not entirely dark except for tubercles 21
 Face with lateral and supraclypeal marks yellow, but subantennal plates dark; pronotum

- dark; except for large mark on tubercles; abdomen blackish, with narrow, slightly interrupted yellow band at base of tergites 2 to 5; apex of tergite 7 broadly testaceous and venter mainly yellowish; legs dark, anterior side of front and middle femora and tibiae yellow; wings dusky hyaline (Douglas Co., Nevada).....*rivalis* Timberlake, var.
21. Pronotum mainly dark except anterior margin, marks on posterior corners of disk and tubercles 22
 Pronotum yellow, with dark band across disk, narrowed on flanks; abdomen yellow, base of tergite 1 and narrow band at junction of tergites 1-2 to 4-5 fuscous; legs yellow, streak on front femora and middle tibiae and outer side of hind tibiae fuscous; pubescence of mesoscutum rather coarse, with prescutellar band of antrorse hair*ciliata* Timberlake
22. Legs marked with fuscous on front femora and middle tibiae 23
 Legs yellow, except for hind tibiae and tarsi; abdomen yellow, with five broad dark bands, including base of tergite 1; face almost entirely yellow below level of antennae; punctures of mesoscutum widely spaced and hair fine, rather long and erect*socia*, n. sp.
23. Wings clear or slightly whitish hyaline; middle and hind femora almost or entirely yellow 24
 Wings more or less perceptibly dusky 25
24. Abdomen yellow, with tergite 1 dark and a black band at junction of tergites 1-2 to 4-5; tergite 7 not darkened, the yellow band on tergite 2 sometimes enclosed; a narrow yellow line on inferior orbits to middle of eyes*parilis* Timberlake
 Abdomen black, with broad yellow band on tergites 2 to 5; middle and hind femora yellow, but dark markings presumably present on front femora and on all the tibiae; anterior end of subantennal plates dark; head and thorax yellowish green and more hairy than in *zebrata**dubia* Cockerell
25. Markings bright yellow; abdominal yellow bands broad and even 26
 Markings creamy white; abdomen with white band on tergites 2 to 3, or 4, curved backward at outer ends; pronotum dark except for spot on posterior corners of disk and tubercles; subantennal plates light except for anterior half or margin or sometimes entirely dark
basinicola, n. sp.
26. Frons minutely granular tessellate, rather opaque with obscure fine punctures; pronotum dark, except for collar, spot on posterior corner of disk, mark on tubercles and often line on anterior margin of flanks; mesoscutum remotely punctured and with thin erect whitish hair; yellow and dark bands of abdomen about equal, tergite 1 dark or with interrupted or broken yellow line across summit of basal declivity.*zonalis* Cresson
 Frons less dull, with close distinct punctures and fine erect hair; mesoscutum minutely punctured and less thinly hairy than in *zonalis*; yellow spot on posterior corners of disk of pronotum sometimes confluent with mark on tubercles, and flanks of pronotum sometimes entirely or almost entirely dark except for tubercles; yellow bands of abdomen broad, more or less emarginate behind on each side, especially on tergites 3 to 5....*craterognatha*, n. sp.

Perdita aemula quadrifasciata, n. subsp.

Female.—Head and thorax dark green; base of mandibles, labrum, clypeus, lateral and supra-clypeal marks creamy white. Lateral marks triangular, much higher than wide and intruding between foveae and margins of eyes. Green of frons extending broadly on each side to margin of clypeus. Supraclypeal mark broadly rounded above, with large median notch and sometimes divided into two spots. Pronotum white, flanks except tubercles mainly dark. Abdomen creamy white, with narrow fuscous band at junction of tergites 1-2 to 4-5; sometimes (in less than half of specimens) a small dark spot on lateral margins of tergite 1. Legs pale yellowish, with middle tibiae behind, hind tibiae except basal fourth and hind tarsi dilute fuscous; more rarely small dark blotch on front femora and tibiae. Scape almost entirely pale yellow, antennae otherwise dark fuscous above and dull yellowish beneath. Tegulae subhyaline, base white. Wings slightly dusky hyaline, less clear than in *aemula*, nervures testaceous, subcosta pale brown.

In structural characters, including sculpture and pubescence, substantially as in *aemula*, but punctures of frons slightly stronger. Mandibles stout, dilated on inner margin and obliquely narrowed to apex without formation of inner tooth. Pygidial plate approximately as long as wide

at base and narrowed to rounded and slightly notched apex. Length: about 5.5 mm.; anterior wing, 3.5-3.8 mm.

Male.—Head and thorax dark blue green; line on inferior nearly to middle of eyes, mandibles except red tips, labrum, and most of face below level of antennae pale yellow. Anterior margin of subantennal plates more or less broadly black and rarely outer margin also. Lateral marks ending obliquely from upper part of outer margin of subantennal plates to margin of eyes just above their middle. Collar of pronotum narrowly, mark at posterior corners of disk continuous with mark on tubercles, pale yellow. Abdomen pale yellow, with six dark bands; light band on tergite 1 narrow and interrupted medially; dark band on tergite 4 with anterior bulge on each side, bulges of bands on preceding segments broader and less distinct; dark band on tergite 5 usually pale brown and restricted to apical depression; tergite 6 sometimes also pale fuscous on apical depression. Legs pale yellow; streak on posterior side of front and middle femora and tibiae and outer side of hind tibiae dilute fuscous or brown. Antennae fuscous above, scape pale yellow, with dark mark above sometimes nearly reaching base, flagellum yellowish brown beneath.

Otherwise similar to male of *aemula*. Tergite 7 evenly and broadly rounded at apex as normal in *zonalis* group. Subgenital plate and genital armature essentially as in *aemula* (subgenital plate of *aemula* somewhat more rounded at apex than indicated in figure 482). Length: 4.7-5 mm.; anterior wing, 3.2-3.5 mm.

Holotype female and allotype.—Pickel Meadow, Mono Co., California, on *Chrysothamnus*, Aug. 16, 1960 (J. W. MacSwain).

Paratypes.—Fifteen females, 6 males (MacSwain), 6 females, 2 males (E. Jesson), and 1 female (G. W. Colliver) taken with types.

Types in collection of the University of California, Riverside, and paratypes in collection of the University at Berkeley.

Perdita baccharidis Cockerell

The material recorded below differs from typical *baccharidis* in having the subantennal plates much broader or approaching the width of supraclypeal mark, frons less granular tessellate and more shining, facial foveae broader, and pygidial plate more convexly arcuate on lateral margins.

New records.—Two females, 1 male, Tucson, Arizona, on *Baccharis*, Oct. 14, 1955 (G. D. Butler); 2 females, 1207 E. Speedway, Tucson, on *Baccharis sarothroides*, Oct. 23, 1962 (Bequaert).

Perdita basinicola, n. sp.

(Plate figs. 1213, 1214, 1310)

This species is a close ally of *zonalis* but differs in the white facial and abdominal markings of the male. The female is similar to *placida* and *accepta* but has the face marks almost restricted to lateral marks and the mandibles more dilated on inner margin and less abruptly narrowed at apex. The abdomen is lacking in the only female at hand.

Male.—Head and thorax dark green; inferior orbits narrowly for more than anterior third of eyes, mandibles except red tips, labrum and most of face below level of antennae creamy white (more tinged with yellow in one paratype). Lateral marks triangular, ending acutely well above level of antennae; supraclypeal mark rounded above, with small median notch; subantennal marks covering plate except on anterior margin or absent in one paratype. Pronotum with transverse mark on each side of posterior margin of disk and tubercles white. Abdomen fuscous, sometimes with tergites 2 to 6 more brownish apically or subapically; tergite 1 dark or with small white spot on lateral margins; broad white bands on tergites 2 to 6, reaching lateral margins and on tergites 2 and 3 curved backward at outer ends; tergite 7 pale testaceous, brownish on each side and at base. Legs white or yellowish white, at least basal half of coxae, posterior side of front and middle femora, spot on anterior side of middle femora at base, underside of front

tibiae, posterior side of middle tibiae, hind femora except beneath and broadly at base and apex, hind tibiae except beneath and hind tarsi fuscous or brownish; small joints of middle tarsi pale brownish. Antennae fuscous, scape white or pale yellowish beneath, flagellum dull yellowish beneath. Tegulae pale testaceous, fuscous at base. Wings dusky hyaline, nervures and margins of stigma testaceous brown, subcosta darker brown.

Head slightly broader than long; cheeks rounded and about two-thirds as wide as eyes. Lateral ocelli slightly closer to nearest eye than their distance apart and still closer to occipital margin. Facial foveae faint, about twice as long as wide. Face below antennae strongly convex, disk of clypeus nearly twice as broad as high, lateral extensions visible in frontal aspect. Mandibles tapering, acute and reaching slightly beyond far margin of fossa. Proboscis moderately long, galeae not quite reaching base of stipites. Flanks of pronotum not impressed. Tarsal claws strongly bifid. Pterostigma shorter than first submarginal cell and about two-thirds as wide; marginal cell distinctly longer beyond than beneath stigma; second submarginal cell narrowed about one-half to radius. Frons and vertex opaque and obscurely punctured; punctures of clypeus minute; mesonotum shining, with sparse fine punctures. Pubescence whitish, fine and erect; long and abundant on cheeks, short and thinner on mesonotum. Abdomen twice as long as wide; tergite 7 broadly rounded at apex. Subgenital plate about twice as long as wide, somewhat expanded at rounded apex, disk minutely setose. Genital armature short and broad, the parameral lobes very broad and almost evenly rounded at apex in lateral view; sagittae short, fusiform rather broad and subangulate in dorsal view. Length: 4-5 mm.; anterior wing, 3.2-3.6 mm.

Female.—Head and thorax dark olive green, sides of thorax and propodeum bluish-green; nearly all of clypeus, subclypeal area and anterior corners of face black; labrum and anterior margin of clypeus brown. Small mark on base of mandibles, small spot on anterior middle of clypeus, and small lateral marks much higher than wide, not descending below level of middle of clypeus and intruding slightly between foveae and eyes, creamy white. Band on posterior margin of disk of pronotum, interrupted medially and dilated at outer ends, and apex of tubercles white. Abdomen presumably with white bands. Legs blackish, apex of front and middle femora, anterior side of front and middle tibiae and front basitarsi yellowish white; front and middle tibiae and tarsi otherwise brown. Antennae black, flagellum brown beneath. Mandibles testaceous, becoming reddish at apex. Proboscis fuscous, apical half brown. Tegulae and wings as in male.

Head large, somewhat broader than long, facial quadrangle distinctly broader than long; cheeks about two-thirds as broad as eyes. Posterior ocelli about the same distance from eyes and occipital margin as in male. Antennae hardly clavate, middle joints of flagellum longer than thick. Facial foveae strongly impressed, about twice as wide as interval between them and eyes, and reaching from level of middle of antennal sockets somewhat more than halfway to level of anterior ocellus. Face below antennae moderately convex, disk of clypeus somewhat broader than high, lateral extension well inflexed but visible in frontal aspect. Mandibles stout, strongly dilated on inner margin, narrowed on apical fifth, without formation of inner tooth. Proboscis as in male, maxillary palpi nearly four-fifths as long as galeae. Venation as in male. Head and thorax shining; frons and vertex finely tessellate and moderately dull; mesonotum polished. Punctures of face moderately close, those of mesonotum slightly sparser, those of frons and mesonotum minute and those of clypeus comparatively strong. Pubescence whitish, erect and fine, rather dense on underside of head and thorax and rather thin on mesonotum. Estimated length; about 5.5 mm.; anterior wing, 3.8 mm.

Holotype male and allotype.—Eastgate, Churchill Co., Nevada, Aug 24, 1962 (R. M. Bohart).

Paratypes.—Two males taken with types; 1 male, Westgard Pass, Inyo Co., California, Sept. 10, 1956 (P. D. Hurd, Jr.), which differs in having pronotum except tubercles and cheeks nearly all dark.

Types in collection of the University of California, Riverside, and paratypes at Davis and Berkeley.

Perdita ciliata Timberlake (new status)

Perdita interserta ciliata Timberlake, 1958, Univ. Calif. Publ. Entom., 14:334, ♀, ♂.

I have been inclined to regard *ciliata* as a distinct species in recent years. There

is as yet no evidence of intergradation, although it must be admitted that no material has been seen from any locality between the known ranges of the two forms.

New record.—Six males, Adrian, Malheur Co., Oregon, Sept. 7, 1959 (P. F. Torchio). The males from Adrian differ from typical *ciliata* in having only four dark bands on abdomen, which are very narrow and abbreviated, with yellow band on tergite 1 broad and entire.

***Perdita crassihirta*, n. sp.**

The female runs in the key (1958) to *ciliata* but differs in the more closely punctured mesoscutum, with coarser, shorter hair, the entirely yellow pronotum, and the four narrow, slightly abbreviated dark bands of the abdomen.

Female.—Head and thorax dark green; mandibles except red tips, labrum, clypeus, lateral and supraclypeal marks yellow (the yellow much discolored, probably by cyanide). In paratype upper corner of subantennal plates with small yellow streak. Lateral marks broad enough above to encompass anterior end of foveae and intrude for short distance between them and eyes. Supraclypeal mark large, much broader than high and moderately rounded above. Pronotum entirely yellow except for a transverse dark streak across tubercles. Abdomen yellow, narrow band at junction of tergites 1-2 to 4-5 fuscous and not quite reaching lateral margins; pygidial plate testaceous. Legs yellow, narrow streak on posterior side of middle tibiae, hind tibiae and basitarsi, except broadly beneath, and small joints of hind tarsi fuscous. Scape of antennae yellow, pedicel and flagellum broadly fuscous above, flagellum brownish yellow beneath. Tegulae yellow, outer margin subhyaline. Wings nearly clear hyaline, nervures testaceous.

Head slightly broader than long; cheeks receding and moderately broad. Posterior ocelli about their distance apart from occipital margin and somewhat closer to nearest eye. Facial foveae much broader than interval between them and eyes, and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Face below antennae convex, disk of clypeus much broader than high, lateral extensions broadly inflexed and narrowly visible in frontal aspect. Mandibles not dilated on inner margin, but with distinct inner tooth. Proboscis moderately long. Pterostigma about four times longer than wide and four-fifths as wide as first submarginal cell; marginal cell moderately narrowed to oblique apex, equally long beneath and beyond stigma, with metacarpus somewhat longer than apical truncation; second submarginal cell narrowed more than two-thirds to radius. Pygidial plate broader across base than long, broadly rounded at apex, with small median notch. Head and thorax shining, mesonotum polished; frons and vertex strongly tessellate and dull. Punctures of frons close opposite foveae and sparse above; punctures of mesoscutum moderately close. Pubescence pale ochreous, moderately long and erect; hair of mesonotum rather coarse and about as long as diameter of ocelli; hair of vertex, cheeks and occiput longer and moderately dense. Length: 5 mm.; anterior wing, 3.5 mm.

Holotype female.—Wenatchee, Chelan Co., Washington, Aug. 21, 1941 (Joe Roberds).

Paratypes.—One female, same date.

Type in collection of the Los Angeles County Museum; paratype in collection of the University of California, Riverside.

***Perdita craterognatha*, n. sp.**

(Plate figs. 1215, 1216, 1311)

In the dilated mandibles of the female this species is similar to *dicksoni* and *adjuncta* but has the frons duller and more strongly punctured. By the sculpture of the frons it falls in the key (1958) with *punctifrons* and *nigrocincta*, but differs in having face mainly dark with a small median mark on clypeus and rather small lateral marks.

Female.—Head and thorax dark green; clypeus in large part, supraclypeal area and subantennal plates black. Small mark on anterior middle of clypeus (or median stripe) and lateral

marks pale yellow; lateral marks with transverse anterior part between eye and clypeus, and moderately wide extension along orbits to anterior end of foveae, and thus elbowed or concave on inner margin. Band on posterior margin of disk of pronotum, interrupted medially, and mark on tubercles yellow. Abdomen brownish fuscous, pygidial plate testaceous; tergites 2 to 5 each with somewhat arcuate yellow band and tergite 1 dark or with narrow interrupted band in paratype. Band on tergite 2 moderately wide and almost touching lateral margins; following bands successively broader, that on tergite 5 more irregular and abbreviated. Legs blackish, apex of front and middle femora, front tibiae except beneath and anterior side of middle tibiae yellow; front tarsi yellow with small joints pale brown above, middle tarsi pale brown. Antennae fuscous, scape blacker and narrowly yellow beneath, flagellum dull yellowish beneath. Mandibles yellow at base, otherwise rufotestaceous, redder at apex. Labrum brownish testaceous. Proboscis fuscous, galeae testaceous. Tegulae testaceous hyaline, base brown. Wings slightly dusky hyaline, nervures testaceous, subcosta pale brownish except on basal half.

Head as broad as long; cheeks evenly rounded, about half as wide as eyes. Lateral ocelli about twice their own diameter from occipital margin and their distance apart from nearest eye. Facial foveae well impressed, close to margin of eyes and reaching from level of middle of antennal sockets somewhat more than halfway to level of anterior ocellus. Face below antennae gently convex, with disk of clypeus broader than high. Mandibles stout, broadly dilated on inner margin and narrowed before the blunt apex. Proboscis moderately long. Pterostigma three times longer than wide and half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed nearly two-thirds to radius. Abdomen oval, depressed; pygidial plate as long as wide at base, and narrowed to slightly retuse apex. Head and thorax shining, mostly polished, but frons and vertex tessellate and dull. Punctures of frons strong, about a puncture width apart, becoming well separated above and on vertex; punctures of clypeus and supraclypeal area well separated, those of mesonotum finer and moderately close, becoming well separated on posterior middle of scutum. Pubescence whitish, fine, rather long, erect and moderately thin, but denser on cheeks; hair of front coxae long and rather dense; apical fimbria of abdomen long and thin. Length: about 5.5 mm.; anterior wing, 3.6 mm.

Male.—Head and thorax dark blue green; light markings apparently rather bright yellow, but somewhat discolored by cyanide and exact shade uncertain. Narrow inferior orbits almost to middle of eyes, mandibles except red tips, labrum and nearly all of face below level of antennae yellow. Lower edge of subantennal plates black, and green of frons intruding between lateral and subantennal marks; lateral marks about twice as high as wide and ending obliquely from upper margin of subantennal plates to orbits slightly above middle of eyes. Collar of pronotum narrowly, mark on posterior corners of disk, almost or quite confluent with mark on tubercles, yellow. Abdomen yellow; tergite 1, except for interrupted band, and band at junction of tergites 2-3 to 6-7 fuscous; yellow bands about as wide as dark intervals and broadly emarginate behind on each side, especially on tergites 3 to 5; yellow band on tergite 6 very broad, with apical dark band weakly developed. Legs yellow, front and middle femora blackish behind; line or blotch on underside of front tibiae and posterior side of middle tibiae, posterior side of hind tibiae and small joints of hind tarsi fuscous. Antennae fuscous above, scape otherwise yellow and flagellum pale yellowish brown beneath. Tegulae subhyaline, base pale yellow. Wings slightly dusky hyaline, nervures dark testaceous, margins of stigma and subcosta brownish fuscous.

Head slightly broader than long; cheeks rounded, receding and about three-fourths as wide as eyes. Lateral ocelli somewhat less than their distance apart from occipital margin and nearest eye. Face below antennae evenly convex; disk of clypeus less than twice as broad as high, lateral extensions broadly inflexed and about half visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis moderately long, galeae reaching base of stipites. Flanks of pronotum not impressed. Pterostigma a little more than three times longer than wide and about two-thirds as wide as first submarginal cell; marginal cell equal to stigma in length, part beyond distinctly longer than part beneath stigma, metacarpus nearly twice as long as apical truncation. Head and thorax shining, mesonotum polished, frons and vertex tessellate and dull. Punctures of frons fine, obscure, but more distinct than in most species of group, numerous but well separated over most of surface, those of mesoscutum sparser and widely separated on

middle of disk. Pubescence whitish, fine, long and erect; dense on cheeks and rather thin on mesonotum. Abdomen convex above, moderately recurved at apex; tergite 7 with broadly rounded apex. Subgenital plate nearly twice as long as wide, rounded at apex, disk with short fine setae. Submedian dorsal lobes of caulis squarely truncate at apex; parameral lobes almost as long on dorsal side as beneath, and about as broad as long and broadly rounded at apex in lateral view; sagittae short and depressed as usual in group and angulate before apex as seen from above. Length: about 5 mm.; anterior wing, 3.1-3.3 mm.

Holotype female and allotype.—Bodie, Mono Co., California, Aug. 17, 1960 (C. Sartwell, Jr.).

Paratypes.—One female, 1 male, same date as types.

Types in collection of the University of California, Riverside.

Perdita depressa, n. sp.

(Plate figs. 1217, 1218, 1312)

This species is not likely to be confused with any other except *zebrata*, and like *zebrata* it visits the flowers of *Cleome*. It differs in having the mesonotum delicately tessellate and in the design of the yellow markings of both sexes. The mandibles of the female are moderately dilated on inner margin instead of tapering to acute apex as in *zebrata*, and on that account I have been perplexed whether to place *depressa* in the *zonalis* group or next to *zebrata*; the genital armature of the male, however, is of the *zonalis* type.

Female.—Head and thorax dark green. Base of mandibles, clypeus, lateral and supraclypeal marks yellow; narrow anterior margin of clypeus and lateral extensions piceous; lateral marks more than twice as high as wide and intruding between foveae and margin of eyes; supraclypeal mark rounded above. Pronotum yellow, with large fuscous mark on flanks reaching slightly above upper level of tubercles. Abdomen yellow, tergite 1, except for narrow band across disk, base of tergites 2 to 4 and apical band on same segments fuscous; basal dark bands extended backward on lateral margins (enclosing yellow band on tergites 2 and 3 in paratype), and apical dark bands not reaching lateral margins but with a small median lobe extending forward on tergites 2 and 3, the lobe on tergite 2 broad and rounded. Legs yellow, front and middle coxae except behind, and hind tibiae and tarsi fuscous. Scape of antennae yellow, with small spot at apex, pedicel and flagellum above fuscous, and beneath broadly yellow. Proboscis fuscous, galeae pale brown. Tegulae subhyaline, base broadly yellow. Wings hyaline, nervures testaceous yellow, margins of stigma and subcosta deeper yellow.

Head about as broad as long; cheeks rounded, strongly receding and hardly more than half as wide as eyes. Posterior ocelli a little less than their distance apart from nearest eye and closer to occipital margin. Facial foveae nearly twice as wide as interval between them and eyes and reaching from upper level of antennal sockets slightly more than halfway to level of anterior ocellus. Face more depressed than usual. Disk of clypeus large, somewhat broader than high, lateral extensions broadly inflexed and partly visible in frontal aspect. Mandibles moderately dilated within, then narrowed to blunt apex. Proboscis moderately long, galeae reaching base of stipites. Pterostigma large, nearly four times as long as wide, and two-thirds as wide as first submarginal cell; marginal cell nearly equally long beneath and beyond stigma, metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed about two-thirds to radius. Head and thorax shining, mesonotum delicately tessellate, but only slightly dullish and with minute, widely spaced punctures; frons and vertex smoothly tessellate, with minute, rather sparse punctures on lower part of frons; punctures of clypeus more distinct, but sparse. Pubescence whitish, thin, moderately long and erect; short on middle of disk of mesoscutum, with narrow band of antrorse hair in front of scutellum. Abdomen ovate, depressed; pygidial plate about as long as wide at base, sides converging to rather narrow and notched apex, with tooth on each side of notch rounded and about as wide as notch. Length: 5 mm.; anterior wing, 3.1 mm.

Male.—Head and thorax dark green. Anterior half or more of gular region, inferior orbits to middle of eyes, mandibles except red tips, labrum and nearly all of face below level of antennae

clear pale yellow. Lateral marks narrowed above middle of subantennal plates and ending acutely on orbits halfway between level of antennal sockets and anterior ocellus; green of frons descending on outer margin of subantennal plates to their middle or lower end. Supraclypeal mark slightly broader than high. Pronotum yellow, with broad green band across disk, more or less extended to posterior margin in median line and prolonged narrowly and obliquely onto flanks, connecting at lower end with horizontal subhyaline streak from lower half of tubercles. Mark on anterior border each side of mesopectus, and a variable mark, large, small or absent, on anterior border of flanks of propodeum yellow. Abdomen yellow; tergite 1 fuscous except on reflexed ventral margin, or with two small submedian yellow spots on disk; base of tergite 2 and band at junction of tergites 2-3 and 3-4 fuscous, with dark area at apex of segments abbrevi-

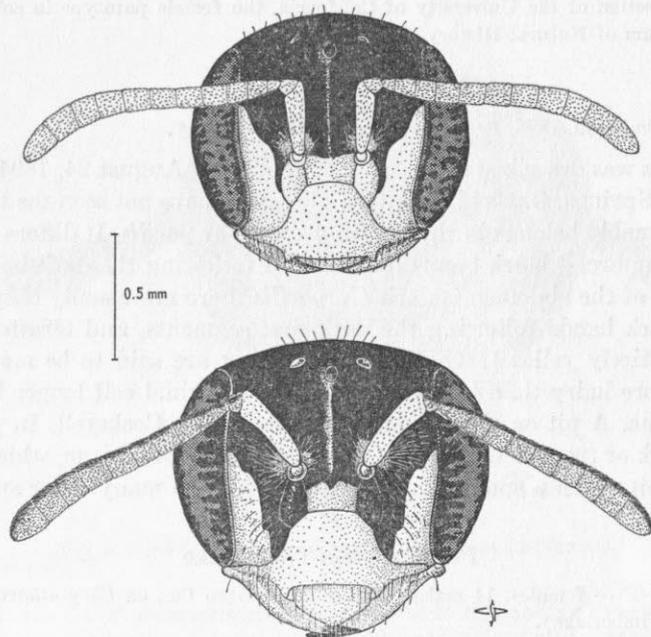


Fig. 7. *Perdita depressa*. Frontal view of head of male and female.

ated, undulate on anterior margin, and the yellow intervals broad, curved backward at outer ends and reaching lateral margins. Segments beyond basal band on tergite 4 mainly yellow, with a dark band faintly developed at apex of tergite 4, or sometimes represented by a small transverse brown spot on each side. Legs yellow, at least with narrow pale brown streak on slightly more than apical half of hind tibiae, and at most with brown streak behind on front femora and middle tibiae, on outer margin of hind femora and outer side of hind tibiae and tarsi. Antennae yellow, flagellum more brownish yellow, small spot at apex of scape, pedicel and flagellum above fuscous. Eyes reddish. Proboscis, tegulae and wings about as in female.

Head as broad as long; cheeks evenly rounded, but little more than half as wide as eyes. Posterior ocelli somewhat closer to nearest eye than their distance apart and about half as far from occipital margin. Facial foveae punctiform. Face below level of antennae only slightly convex; disk of clypeus large, but not much broader than high, lateral extensions broadly inflexed and partly visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum or fossa. Flanks of pronotum not impressed. Proboscis and venation about as in female. Head and thorax shining, frons and vertex strongly tessellate and dull, meso- and metanotum delicately tessellate and slightly dullish. Face virtually impunctate, mesonotum with fine and very sparse punctures. Pubescence whitish, thin, erect, and longer and denser on cheeks than elsewhere. Abdomen oval, subdepressed, moderately recurved at apex. Tergite 7 broadly rounded at apex,

with large orifice for genital armature exposed. Subgenital plate nearly twice as long as wide, slightly rounded at apex, disk with fine short pubescence. Caulis of armature with blunt submedian dorsal lobes; parameral lobes strongly convoluted, much shorter on dorsal side, ventral margin with short dense fringe of hair; sagittae moderately wide, angulated subapically and acute at apex, and thinly fusiform in lateral view. Length: about 4.5 mm.; anterior wing, 3.4 mm.

Holotype female and allotype.—Monument Valley, San Juan Co., Utah, on *Cleome jonesii*, July 28, 1963 (R. C. Dickson).

Paratypes.—Three males taken with the types; 1 female, Supai, 3,500 feet, Havasu Canyon, Grand Canyon National Park, Coconino Co., Arizona, Aug. 2, 1934 (F. C. Lutz).

Types in collection of the University of California, the female paratype in collection of the American Museum of Natural History.

Perdita dubia Cockerell

Perdita dubia Cockerell, 1896, Proc. Acad. Sci., Phila., 48:75 ♂.

This species was described from one male, collected August 24, 1894, by Gillette in Glenwood Springs, Garfield County, Colorado. I have not seen the type, but the species presumably belongs in the *zonalis* group near *parilis*. It differs from *parilis* in having four broad black bands on abdomen following the dark basal segment, and the apex of the abdomen is dark (in *parilis* there are usually only three well-developed dark bands following the dark first segments, and tergites 5 to 7 are mainly or entirely yellow). The head and thorax are said to be more yellowish green and more hairy than in *zebrata*, and the marginal cell longer beyond than beneath stigma. A pit on the labrum is mentioned by Cockerell. In *parilis* there is a small dark or translucent spot on the basal middle of labrum, which sometimes looks like a pit. Such a spot is more or less evident in many other species with a pale labrum.

Perdita foleyi Timberlake

New record.—Five females, 14 males, Walker Pass, Kern Co., on *Chrysothamnus nauseosus*, Oct. 8, 1957 (Timberlake).

Perdita lepidosparti lepidosparti Timberlake

New records.—Three females, 1 male, Antelope Springs, Inyo Co., on *Eriogonum*, July 1, 1961 (Stage and Powell); 1 female, 6 males, 2.8 miles west of Wadsworth, Washoe Co., Nevada, on *Tetradymia comosa*, June 23–24, 1962, and 11 females, 27 males, same place and flower, July 3, 1963 (G. I. Stage); 1 female, 2 miles north of Nixon, Washoe Co., Nevada, on *Tetradymia*, July 3 (Stage).

Perdita melanderi, n. sp.

The position of *melanderi* without the male is somewhat uncertain, but the polished mesonotum, the strongly curved mandibles with blunt inner tooth, the very broad and notched pygidial plate, and long scopal hair of hind tibiae indicate the *zonalis* group. It differs from all other members of the group in the peculiar face marks, dark tubercles and the broad, interrupted white bands of abdomen.

Female.—Head and thorax dark blue green. Basal half of mandibles, small spot on labrum, large triangular mark on disk of clypeus and narrowly triangular lateral marks yellowish white; labrum except spot, broad dorsal margin of clypeus and narrow anterior margin and supraclypeal area black; white mark of clypeus more or less broken by evanescent, dark submedian streaks. Thorax dark except hind margin of pronotal disk with white line narrowly interrupted in middle.

Abdomen blackish, tergites 1 to 5 each with broad white band, interrupted medially (more broadly on tergites 1 and 5), and all except that on tergite 5, narrowed behind at outer ends to touch lateral margins. Venter dark, more tinged with brown, with nubilous paler area on each side of first two segments. Pygidial plate rufotestaceous. Legs brownish fuscous, apex of front and middle femora, dorsal margin and anterior side of front tibiae and anterior side of middle tibiae pale yellow. Antennae fuscous, scape black, flagellum beneath dull yellow. Mandibles mostly red on apical half. Proboscis fuscous, galeae brownish. Tegulae testaceous hyaline, base fuscous. Wings dusky hyaline, nervures testaceous, margins of stigma slightly darker, subcosta pale ferruginous.

Head slightly broader than long; cheeks moderately receding, three-fourths as wide as eyes.

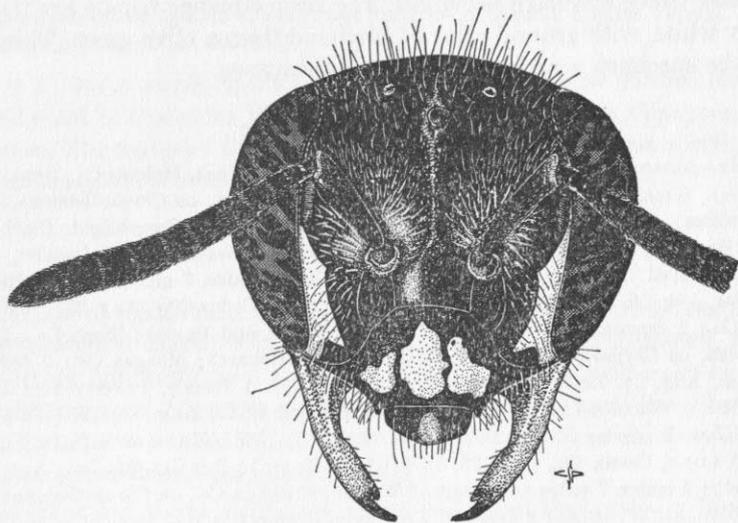


Fig. 8. *Perdita melanderi*. Frontal view of head of female.

Posterior ocelli about their distance apart from occipital margin and nearest eye. Facial foveae well impressed, much wider than interval between them and eyes, curved inward at anterior end, and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Face below antennae strongly and evenly convex; disk of clypeus large, nearly twice as broad as high, lateral extensions broadly inflexed and partly visible in frontal aspect. Mandibles stout, reaching slightly beyond far margin of fossa and abruptly narrowed before apex to form a blunt inner tooth. Proboscis moderately long, galeae reaching base of stipites, and maxillary palpi almost as long as galeae. Pterostigma nearly three times as long as wide, and three-fourths as wide as first submarginal cell; marginal cell slightly longer beyond than beneath stigma, with metacarpus about twice as long as apical truncation; second submarginal cell narrowed two-thirds to radius. Tarsal claws with strong inner tooth. Head and thorax shining, face below antennae and mesonotum polished, frons and vertex strongly tessellate and dull. Punctures of face fine; close on each side of frons opposite foveae, sparser on parocular areas of lower face and very sparse on supraclypeal area and clypeus; punctures of vertex coarser than elsewhere and rather close; those of mesonotum fine, numerous, but well separated. Pubescence whitish, erect, moderately long and fine; denser on cheeks, occiput and sides of propodeum and slightly coarser on mesonotum. Hair of front coxae moderately long and dense. Scopal hair of hind tibiae long, fine and straight. Abdomen depressed; pygidial plates slightly broader than long, lateral margins convexly arcuate, apex broadly rounded with distinct median notch; disk of plate plane, minutely tessellate; disk of tergite 6 in front of plate with large polished area delimited on each side by area of short setae set in punctures. Fimbria of tergite 5 moderately long and dense. Length: 6 mm.; anterior wing, 3.9 mm.

Holotype female.—Sand dunes, Morro Bay, San Luis Obispo Co., California, Sept. 6, 1945 (A. L. Melander).

Type in collection of the University of California, Riverside.

Perdita oregonensis oregonensis Timberlake

New records.—One female, north side of Prosser Creek, 2 miles south of Hobert Mills, Nevada Co., California, on *Chrysothamnus*, Aug. 23, 1956 (E. G. Linsley); 1 female, 1 male, Bodie, Mono Co., Aug. 17, 1960 (C. Sartwell, Jr.); 1 female, Deep Springs, Inyo Co., on *Chrysothamnus*, Sept. 10, 1958 (P. D. Hurd, Jr.).

The Prosser Creek specimen is typical. The Deep Springs female has the markings creamy white, with ground color of head and thorax olive green. This coloration gives the specimen a rather distinctive appearance.

Perdita parilis Timberlake

New records.—ARIZONA: 49 females, 35 males, Hualapai Mt. Park, Mohave Co., Sept. 12, 1961 (J. S. Buckett); 9 males, 15 miles east of Flagstaff, Coconino Co., on *Chrysothamnus*, Sept. 27, 1964 (Timberlake). NEVADA: 1 female, 4 males, 16 miles west of Searchlight, Clark Co., on *Aplopappus*, Sept. 20, 1964 (Timberlake and Papp). UTAH. Beaver Co.: 2 females, 4 males, Beaver, Aug. 14, 1961 (Knowlton and Davis); 2 females, 3 males, 7 miles north of Beaver, on *Chrysothamnus*, Aug. 28, 1962 (Knowlton); Iron Co.: 1 male, Cedar City, Aug. 25, 1960 (Knowlton); Kane Co.: 1 female, Kanab, Aug. 6, 1954 (Knowlton and Davis); Moab Co.: 1 female, 3 males, Eureka, on *Chrysothamnus*, Aug. 6, 1958 (G. E. Bohart); Morgan Co.: 2 females, 10 males, Morgan, Aug. 24, 1962 (Knowlton); San Juan Co.: 1 female, Poverty Flat, June 16, 1950 (Knowlton); Summit Co.: 1 female, 4 males, Devil Slide, Aug. 24, 1962 (Knowlton). COLORADO: 1 female, Cedar Point, Dove Creek, July 15, 1960 (Knowlton). IDAHO: 2 males, Elba Pass, at summit, Cassia Co., Aug. 25, 1959 (J. E. Henry); 2 males, Mackay, Aug. 4, 1961 (R. M. Bohart); 3 males, 7 miles northwest of Weston, Franklin Co., on *Chrysothamnus*, Aug. 3, 1958 (A. R. Gittins). WYOMING: 6 females, 7 males on *Gutierrezia*, and 16 females and 21 males on *Eriogonum*, 10 miles south of Lander, Franklin Co., Aug. 9, 1963 (Bohart and Torchio).

Perdita proxima Timberlake

New records.—Three females, 10 males, Olancha, Inyo Co., on *Chrysothamnus*, Sept. 9, 1956 (Linsley and Hurd); 10 females, 10 males, Deep Springs, Inyo Co., on same flower, Aug. 10, 1956 (Linsley and Hurd).

The males from Inyo County differ from typical material in having the yellow spot on each side of anterior part of mesopectus sometimes evanescent or absent, and the outer margin of hind tibiae infuscated.

Perdita rivalis Timberlake

New records.—Seven males, Bucks Lake, Plumas Co., California, on *Gayophytum heterozygus* and *G. nuttallii*, Aug. 13, 1963 (MacSwain and Thorp); 1 male, summit, Daggett Pass, Douglas Co., Nevada, Sept. 5, 1958 (E. I. Schlinger).

The males from Bucks Lake differ from typical *rivalis* in having a well-developed yellow band on tergite 1 (six yellow bands instead of usual five), and the band on tergite 2 broad and usually entire, or the last one to become interrupted. The male from Daggett Pass has the abdomen darker than usual with only four narrow, abbreviated and narrowly interrupted yellow bands, and the pronotum dark except tubercles.

Perdita scotti Timberlake

New records, all on *Chrysothamnus nauseosus*.—CALIFORNIA. Inyo Co.: 1 female, Deep Springs, Sept. 10, 1952 (P. D. Hurd, Jr.); 1 female, Fish Springs, 5 miles south of Big Pine, Oct. 13, 1962 (R. C. Dickson); Kern Co.: 9 females, 35 males, Walker Pass, Oct. 8, 1957 (Timberlake). Los Angeles Co.: 2 females, 28 miles northwest of Lancaster (Highway 138), Oct. 11, 1960 (Timberlake); 2 males, 25 miles northwest of Lancaster, Oct. 19, 1960 (Dickson).

Perdita similis Timberlake

New records.—Twelve females, 34 males, 10 miles east of Farson, Sweetwater Co., Wyoming, on *Chrysothamnus*, Aug. 9, 1963 (Bohart and Torchio); 1 female, 6 males, Adrian, Malheur Co., Oregon, Sept. 8, 1959 (P. F. Torchio).

This is a very common species in northern parts of New Mexico and Arizona, and northward in Utah and Wyoming, on *Chrysothamnus*, *Aplopappus* and other Compositae. The material from Adrian was determined with some difficulty but it seems best to regard it as a variety of *similis*.

Perdita scocia, n. sp.

(Plate figs. 1219, 1220, 1313)

The female of *scocia* falls near *scotti* in the key (1958) but differs in having a large supraclypeal mark, only four broad dark bands on abdomen, mesonotum more sparsely punctured and frons less dull. It is larger and more closely punctured than *proxima*. It agrees with *accepta* in shape of mandibles, but is larger, with the frons more punctured, and from *placida* it differs in the more shining, less closely punctured frons and in the markings.

Female.—Head and thorax dark green, subantennal plates black. Basal half of mandibles, labrum, clypeus, lateral and supraclypeal marks white. Mandibles shading through rufotestaceous to red at apex. Labrum tinged with testaceous. Lateral marks narrowed gradually above and intruding strongly between foveae and eyes, or sometimes dilated at anterior end of foveae. Pronotum pale yellow, except for large dark mark on flanks. Abdomen creamy white, with broad fuscous band at junction of tergites 1-2 to 4-5; third and fourth bands not quite reaching lateral margin of segments. Legs pale yellow, middle tibiae slightly infuscated on apical half behind, hind tibiae except at base and hind tarsi fuscous. Antennae fuscous, pedicel beneath and scape yellow, flagellum dull yellowish beneath. Proboscis fuscous, more brownish on galeae. Tegulae testaceous hyaline, base white. Wings nearly clear hyaline, nervures testaceous yellow, margins of stigma and subcosta pale ferruginous.

Head as broad as long; cheeks rounded, two-thirds as broad as eyes. Posterior ocelli their distance apart from occipital margin and somewhat closer to nearest eye. Facial foveae moderately wide, rather pointed at each end, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae convex; disk of clypeus about twice as broad as high, lateral extensions strongly inflexed but partly visible in frontal aspect. Mandibles dilated on inner margin, abruptly narrowed before apex without forming inner tooth. Proboscis moderately long. Pterostigma hardly more than three times longer than wide and two-thirds as wide as first submarginal cell; marginal cell distinctly longer beyond than beneath stigma, metacarpus about twice as long as apical truncation; second submarginal cell narrowed two-thirds to radius. Head and thorax shining, mesonotum polished, frons and vertex strongly tessellate and moderately dull. Punctures of frons strong and close between foveae, sparse above level of foveae and arranged more or less in rows. Punctures of mesoscutum fine and moderately close, with some of the interspaces broad. Pubescence white, rather fine, moderately long and erect; hair of occiput and cheeks rather dense; hair of mesonotum thin but

prescutellar band dense. Pygidial plate of abdomen about as long as wide at base, sides converging to moderately narrow apex. Length: 6.5 mm.; anterior wing, 4 mm.

Male.—Head and thorax blue green. Anterior border of gular region of head, inferior orbits narrowly almost to middle of eyes, mandibles except red tips, labrum and face below level of antennae sulphur yellow. Lateral marks extending halfway to level of anterior ocellus above antennae, the green intruding slightly between them and subantennal marks. Supraclypeal mark quadrate, extending halfway between antennal sockets. Green band on pronotum broad, the margins yellow all around, except on posterior middle of disk, the yellow on anterior margins of flanks very narrow. Abdomen yellow with five fuscous bands, and a trace of a band, apparently located mostly on base of tergite 6. Yellow and dark bands on tergites 2 and 3 about equal, the yellow band on tergite 1 narrow and narrowly interrupted. Dark bands at junction of tergites 3-4 and 4-5 ending short distance from lateral margins. Legs yellow, line on outer margin of hind tibiae and basitarsi, and small joints of hind tarsi brownish fuscous. Antennae brownish fuscous above, scape entirely and pedicel beneath yellow, flagellum brownish yellow beneath. Base of proboscis fuscous, apical half almost yellow. Tegulae testaceous hyaline, base yellow. Wings nearly clear hyaline, nervures testaceous brown, margins of stigma and subcosta brown.

Head slightly broader than long; cheeks rounded, half as wide as eyes. Posterior ocelli slightly closer to occipital margin than to each other and still closer to nearest eye. Face below antennae strongly convex; disk of clypeus somewhat broader than high, lateral extensions strongly inflexed and not much visible in frontal aspect. Mandibles tapering, acute, barely reaching far margin of labrum. Proboscis moderately long, galeae slightly exceeding base of stipites. Venation similar to that of female. Head and thorax shining, mesonotum polished but frons and vertex dull and almost opaque. Punctures of frons obscure, those of mesonotum fine, distinct and mostly widely spaced. Pubescence whitish, fine, erect and moderately long; thin on mesonotum and much denser on cheeks and underside of thorax. Abdomen oval, broader than thorax; tergite 7 broadly rounded at apex. Subgenital plate about one-half longer again than wide, apex rounded and disk minutely setose. Submedian dorsal lobes of caulis acute; parameral lobes short and very broad, almost truncate at apex in lateral view; sagittae with the short usual form of group, angulate before apex in dorsal view. Length: 5.5 mm.; anterior wing, 3.7 mm.

Holotype female and allotype, Olancha, Inyo Co., California, Oct. 6, 1957 (J. W. MacSwain).

Paratype.—One female, same date.

Types in collection of the University of California, Riverside.

Perdita stottleri Cockerell

Perdita stottleri flavida Swenk and Cockerell, 1907, Ent. News, 18:58, ♀, ♂ (new synonymy).

Because of the small and fluctuating characters distinguishing *flavida*, it has been placed in synonymy.

New records.—CALIFORNIA: 2 females, Bodie, Mono Co., Aug. 17, 1960 (C. Sartwell, Jr.). NEVADA: 2 males (fragmentary specimens), Ely, White Pine Co., Aug. 13, 1940 (R. H. Beamer). ARIZONA: 1 male, Tuba City, Coconino Co., on *Chrysothamnus*, Sept. 21, 1964; 5 females, 6 males, 18 miles southwest of Concho, Apache Co., on *Gutierrezia*, Sept. 25, 1964; and 1 male, 15 miles east of Flagstaff, Coconino Co., on *Chrysothamnus*, Sept. 27, 1964 (Timberlake). NEW MEXICO: 1 female, 42 males, 24 miles west of Corrizozo, Lincoln Co., on *Gutierrezia*, Sept. 12, 1961 (Timberlake and Hurd); 1 male, 3 miles west of Bingham, Socorro Co., on *Gutierrezia*, Sept. 12, 1961 (Timberlake). UTAH: 1 female, 5 males, Manila, Daggett Co., on *Chrysothamnus*, Aug. 15, 1902 (G. F. Knowlton). COLORADO: 4 males, Gypsum, 6,300 feet, Eagle Co., on blue *Aster*, Aug. 28, 1959 (E. Ordway); 2 males, 23 miles south of Meeker, Rio Blanco Co., Aug. 20, 1962 (R. M. Bohart). WYOMING. Sweetwater Co.: 1 female, 10 miles east of Farson, on *Chrysothamnus*, Aug. 9, 1963 (Bohart and Torchio); 1 female, 3 males, Baratfork, on *Chrysothamnus*, Aug. 1962 (Knowlton). CANADA: 1 male, East End, southwestern Saskatchewan, Sept. 10, 1939 (A. R. Brooks).

***Perdita subvestita*, n. sp.**

(Plate figs. 1221, 1222, 1314)

The characters separating this species from *vestita* are given in the accompanying key.

Female.—Head and thorax dark green, subantennal plates blackish. Base of mandibles, labrum, clypeus, lateral and supraclypeal marks, posterior margin of pronotum from tubercle to tubercle, and anterior margin, except on lower part of flanks, yellowish white. Lateral marks triangular, reaching level of antennae; supraclypeal mark sometimes more or less divided. Dark band on pronotum contracted opposite posterior corners of disk and broadened on flanks. Abdomen yellowish white, more yellow on apical segments; band across basal declivity of tergite 1, leaving posterior part of lateral margins pale, and band at junction of tergite 1–2 to 4–5 fuscous or blackish; three distal bands not quite reaching lateral margins, especially in respect to part on apical margin of segments. Light band on tergite 1 interrupted medially by dark line in median crease, somewhat narrowed at outer ends, but broadened just before the narrowed parts. Pygidial plate pale ferruginous. Legs except front coxae entirely light, the color slightly more yellowish than the white of face or abdomen. Antennae fuscous, scape yellowish white, flagellum dull yellowish beneath. Mandibles shading through testaceous to red at apex. Proboscis fuscous, galeae brownish. Tegulae pale testaceous subhyaline, base yellowish white. Wings whitish hyaline, nervures pale testaceous, subcosta slightly more yellowish.

Head broader than long. Posterior ocelli slightly farther apart than distance to nearest eye or occipital margin. Facial foveae strongly impressed, much broader than interval between them and eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae evenly convex; disk of clypeus much broader than high, lateral extensions inflexed but broadly visible in frontal aspect. Mandibles not dilated on inner margin, but abruptly narrowed before apex. Proboscis moderately long, galeae reaching base of stipites. Flanks of pronotum moderately grooved. Pterostigma large, almost as wide as first submarginal cell; maginal cell generally somewhat longer beyond than beneath stigma, metacarpus distinctly longer than apical truncation. Pygidial plate as long as basal width, sides arcuately converging to rounded apex, at most weakly notched. Frons strongly tessellate, dull, with moderately close minute punctures; mesoscutum shining, distinctly but not strongly tessellate and with fine punctures mostly three, or more puncture widths apart. Pubescence whitish, rather coarse, moderately abundant, and with denser prescutellar band of hair. Length: 4.5–5.5 mm.; anterior wing, 3.5–3.9 mm.

Male.—Colored much as in female, but light parts distinctly yellow, including anterior part of gular region, inferior orbits narrowly to middle of eyes, mandibles except red tips, labrum and face below level of antennae. Lateral marks of face terminating obliquely from antennal sockets to margin of eyes at foveae, the sockets sometimes even completely enclosed by the yellow. Pronotum except dark band from flank to flank, prosternum except dark mark on each side, and mark on each side of anterior border of mesopectus yellow. Abdomen yellow, with four dark bands, including one at base of tergite 1; a fifth band faintly developed at junction of tergites 5–6. Legs entirely yellow. Antennae entirely, or almost entirely pale yellow, or sometimes pedicel and flagellum narrowly fuscous above. Proboscis, tegulae and wings as in female.

Head broader than long; cheeks evenly rounded and nearly as broad as eyes. Posterior ocelli positioned about as in female. Facial foveae small, oval. Face below antennae gently convex; clypeus about as in female, with lateral extension mainly visible in frontal aspect. Supraclypeal area slightly broader than high. Mandibles tapering, acute and reaching slightly beyond far margin of fossa (in *vestita* reaching almost to base of each other). Flanks of pronotum moderately grooved, a ridge descending from anterior corners of disk more or less weak or absent (ridge strong in *vestita*). Frons and vertex strongly tessellate, moderately shining, with widely separated fine punctures and fine erect white hair, Mesonotum weakly tessellate, or almost polished, with widely spaced fine punctures and thin, erect, white hair. Abdomen about twice as

long as wide, moderately recurved at apex, and with thin hair on apical segments. Tergite 7 rather broadly rounded at apex and strongly inflexed on each side. Subgenital plate nearly twice as long as wide, with apex truncate and disk minutely setose. Genital armature with caulis broadest in middle, with basal orifice very large, without inflexed margins; dorsal submedian lobes short and rounded; parameral lobes acutely produced beneath as seen in both dorsal and lateral view; sagittae unusually broad and not angulate before apex. Length: 4-5 mm.; anterior wing, 3.2-3.5 mm.

Holotype female and allotype, 23 miles east of Kanab, Kane Co., Utah, on *Chrysothamnus nauseosus*, Sept. 23, 1964 (Timberlake and Papp).

Paratypes.—UTAH. Kane Co.: 21 females, 10 males, taken with types; 1 female, 2 males, 18 miles east of Kanab, on *Gutierrezia microcephala*, Sept. 23 (C. S. Papp). ARIZONA. Coconino Co.: 1 male, 2 miles west of Dennison (15 miles west of Winslow), on *Gutierrezia*, Sept. 27, 1964 (Timberlake); 1 female, 3 miles west of Hyde Park, on *Aplopappus gracilis*, Sept. 28, 1964 (Timberlake). NEW MEXICO. Citron Co.: 1 male, Quemado, on *Chrysothamnus visidiflorus*, Sept. 13, 1961 (P. D. Hurd, Jr.).

Types in collection of University of California, Riverside; one paratype at Berkeley.

Perdita toschiae, n. sp.

The female is similar to *similis* but considerably longer, with markings more orange yellow and mandibles massive (mandibles comparatively slender with inner tooth in *similis*).

Female.—Head and thorax dark green; mandibles except red apical third, labrum, clypeus, large lateral marks, supraclypeal mark and small spot on subantennal plates yellow. Lateral marks abruptly narrowed where touching anterior end of foveae, then intruding between foveae and eyes for short distance. Pronotum yellow, except for small dark spot on flanks opposite tubercles. Abdomen yellow, with narrow fuscous band at junction of tergites 1-2 to 3-4; part of bands at apex of tergites 2 and 3 abbreviated and a band on tergite 4 represented by small spot on each side. Legs yellow, front coxae except at apex, hind tibiae except at base and hind tarsi blackish. Scape entirely yellow, pedicel and flagellum broadly fuscous above and yellowish beneath. Tegulae broadly yellow at base and testaceous hyaline on outer margin. Wings hyaline, slightly tinged with fulvous, nervures testaceous yellow, subcosta only slightly darker.

Head distinctly broader than long; cheeks rounded, half as wide as eyes. Posterior ocelli about their distance apart from occipital margin and slightly closer to nearest eye. Facial foveae close to margin of eyes, broader at anterior end than diameter of antennal sockets, and reaching from level of antennal sockets a little more than halfway to level of anterior ocellus. Face below antennae strongly convex; disk of clypeus large, broader than high, with part of lateral extensions visible in frontal aspect narrowed to a point at base of mandibles. Mandibles massive, strongly arcuate on outer margin, dilated within, with margin somewhat convexly arcuate from basal third to blunt apex. Proboscis moderately long, galeae reaching base of stipites. Pterostigma about two-thirds as wide as first submarginal cell; marginal cell as long as stigma, with parts beneath and beyond stigma about equal; metacarpus slightly longer than apical truncation. Pygidial plate about as broad at base as long, sides converging to rather narrow rounded apex. Head and thorax shining, frons and vertex smoothly tessellate, slightly dullish, mesoscutum polished. Punctures of frons fine and moderately close on each side opposite foveae, sparse above nearly to summit of eyes, with a few below anterior ocellus. Punctures of mesoscutum sparse, mostly widely spaced on disk and closer on anterior border; those of scutellum moderately close. Pubescence fine, erect and whitish; very short and thin on mesonotum, much longer and comparatively dense on cheeks and vertex; hair of front coxae long and moderately dense. Length: about 5.5 mm.; anterior wing, 4 mm.

Holotype female, Genoa, Douglas Co., Nevada, Aug. 20, 1961 (C. A. Toschi).

Type in collection of the University of California, Riverside.

Perdita townsendi Cockerell

New record.—One male, 5 miles north of Concho, Apache Co., Arizona, on *Chrysothamnus*, Sept. 25, 1964 (Timberlake).

Perdita vestita Timberlake

New record.—UTAH. Kane Co.: 1 female, 9 miles east of Kanab, on *Gutierrezia*, Sept. 23, 1964. ARIZONA. Coconino Co.: 1 female, 3 males, 26 miles east of Tuba City, on *Chrysothamnus*, Sept. 24, 1964 (Timberlake).

Perdita zonalis monticola Timberlake

(Plate figs. 1223, 1224, 1315)

New records.—One female, 4 males, Del Puerto Canyon, Stanislaus Co., California, Oct. 3, 1956 (R. R. Snelling); 1 female, 6 males, approximately 1,500 feet above Del Puerto Creek, Oct. 3 (Snelling); 1 male, Salado Creek, Stanislaus Co., Oct. 11, 1956 (Snelling).

The genital armature of Del Puerto specimens agrees closely with parts examined from specimens from Sisters, Oregon; Sierraville, Sierra Co., California; and Missoula, Montana; and differs from parts taken from specimen collected in southern California as follows: dorsal lobes of caulis ending acutely, rather close together, with a ridge running almost perfectly straight along outer margin of apex obliquely across each lobe toward outer border of caulis, and dividing off a rather small, triangular depressed part of the lobe; sagittae also differ in being subangulate or obliquely narrowed to acute apex.

HALICTOIDES GROUP

Since my revision of the *halictoides* group in 1958 (Univ. Calif. Publ. Entom., 14:356-374) several new forms have been discovered. For the recognition of the new forms and to correct a defect in the old key a new one has been prepared.²

The maxillary palpi in this group are very fine and so obscurely articulated that any discrepancy in the number of recorded joints may not be important. The number of joints is always less than six, and there are apparently only one or two in *chamaesarachae* and *halictoides* and three or four in *lenis*.

KEY TO SPECIES

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1. Females | 2 |
| Males | 12 |
| 2. Abdomen dark, usually with light markings (markings small or absent in <i>halictoides</i>) .. | 3 |
| Abdomen ferruginous, without markings | 9 |
| 3. Face entirely dark | 4 |
| Clypeus white with black discal mark; traces of lateral marks sometimes present; abdomen with transverse white marks on tergites 2 and 3, and sometimes 4 | <i>beameri</i> Timberlake |
| 4. Abdomen marked laterally with white or with white bands | 5 |
| Abdomen entirely dark, or with small yellow spot on each side of tergite 3; head and thorax dark bluish-green, almost uniformly tessellate and dullish, the mesonotum blackish | <i>halictoides</i> F. Smith |
| 5. Markings of abdomen on lateral margins of tergites 2 to 4, or 1 to 4, or 5 | 6 |
| Abdomen dark, with basal white band, sometimes narrowly interrupted on tergites 2 to 4, or 5, and with spot on lateral margins of tergite 1; head and thorax bluish-green, mesonotum polished | <i>rozeni</i> , n. sp. |
| 6. Markings of abdomen on tergites 2 to 4, or sometimes 1 to 4..... | 7 |

² One line of manuscript was omitted in couplet 11, page 367, obscuring relationship of *lenis* to *chamaesarachae* and *physalidis*.

Abdomen black, with large quadrate white mark on each side of tergites 2 to 5, and smaller marks on tergite 1; head and thorax blue-green, mesonotum polished

decemnotata Timberlake

7. Markings present only on tergites 2 to 4 8
 Tergites 1 to 4 with white mark on each side; marks on tergites 1 to 3 triangular and pointed within *sexmaculata octonaria* Timberlake
8. Head and thorax blue, mesonotum slightly greenish, polished and sparsely punctured; frons tessellate and moderately dullish; marks on tergites 2 to 4 more or less quadrate or broadly oval; maxillary palpi four-jointed *sexmaculata sexmaculata* Cockerell
 Similar to *sexmaculata*, but maxillary palpi five-jointed *missionis* Timberlake
9. Face markings restricted to clypeus and lateral marks; mesonotum polished 10
 Clypeus with a quadrate mark on each side and a broad median stripe subtending large supraclypeal mark; lateral marks narrow, curved, in alignment with lateral marks of clypeus and reaching to anterior end of foveae; frons and mesonotum tessellate and dullish *fidissima*, n. sp.
10. Head generally as long as wide, or slightly longer than wide; proboscis moderately long, galeae equaling stipites; pygidial plate notched at apex; lateral face marks triangular and reaching level of antennae 11
 Head tending to be somewhat broader than long; pygidial plate entire; proboscis comparatively short, galeae shorter than stipites; clypeus white, with black stripe, or the white reduced to three spots; lateral marks generally more or less small, sometimes not reaching above level of clypeus *lenis* Timberlake
11. Clypeus white, except usual pair of dots; subcosta and margins of stigma hardly darkened; proboscis not exceeding fossa; maxillary palpi one-jointed *chamaesarachae* Cockerell
 Disk of clypeus with broad brown stripe; subcosta and margins of stigma moderately dark; proboscis slightly exceeding fossa; maxillary palpi four-jointed ... *physalidis* Timberlake
12. Abdomen black, with or without light markings; face marks yellow 13
 Abdomen ferruginous, without markings; face marks white; head and thorax shining blue or blue green 17
13. Head and thorax shining dark green or blue green 14
 Head and thorax dark green, rather dull, mesonotum more or less blackish; head broader than long; clypeus, large lateral and supraclypeal marks yellow, subantennal plates dark, but often with small yellow spot; abdomen black, small yellow lateral spots if present usually restricted to tergite 3 *halictoides* F. Smith
14. Face entirely yellow below level of antennae, the markings sometimes going above level of antennae in middle as well as at sides 15
 Face mostly yellow below level of antennae, but sutures of subantennal plates and upper margin of disk of clypeus more or less black; abdomen black, with a narrowly interrupted yellow band on tergites 2 to 5, and spot on each side of tergite 1, or bands more widely interrupted and sometimes abbreviated *rozeni*, n. sp.
15. Markings of face going above level of antennae both in middle and at the sides; abdomen with a white spot on each side of tergites 2 to 4, or 5, and venter sometimes marked with white 16
 Lateral face marks ending broadly short distance above level of antennae, and subrectangular spur of supraclypeal mark going only slightly if at all above level of antennal sockets; abdomen dark with large yellow mark on each side of tergites 1 to 5
- decemnotata* Timberlake
16. Sagittae of genital armature narrowly obtuse at apex; parameral lobes of caulis with slight ridge on inner margin; maxillary palpi four-jointed *sexmaculata* Cockerell
 Similar to *sexmaculata*, but sagittae acute at apex; ridge on inner margin of parameral lobes close to apex; maxillary palpi five-jointed *missionis* Timberlake
17. Face partly dark below level of antennae 18
 Face mainly or almost entirely white below level of antennae 19
18. Clypeus, transversely arcuate lateral marks, subantennal and supraclypeal marks white,

- parocular areas of face mainly dark; abdomen more or less reddish or fulvous, infuscated at base *beameri* Timberlake
- Spot on each side of clypeus, large lateral marks, no higher than wide, and subantennal marks white; disk of clypeus ferruginous, with nubilous, central whitish streak; supraclypeal area and part of subantennal plates black; abdomen ferruginous without markings; mesonotum polished, almost impunctate *levigata*, n. sp.
19. Proboscis comparatively long, galeae as long as stipites; head generally not broader than long 20
- Proboscis rather short, galeae about three-fourths as long as stipites; maxillary palpi with three or four fine obscure joints; head somewhat broader than long; face below level of antennae white, except blue of frons intruding slightly between lateral and subantennal marks *lenis* Timberlake
20. Head about as broad as long; proboscis not exceeding fossa, maxillary palpi one-jointed; face marks much as in *lenis*, but blue of frons often more strongly intruding below antennae *chamaesarachae* Cockerell
- Head tending to be slightly longer than wide; subantennal plates and sometimes supraclypeal area partly dark; proboscis somewhat longer than in *chamaesarachae*; maxillary palpi four-jointed *physalidis* Timberlake

Perdita beameri Timberlake

Perdita beameri Timberlake, 1965, Univ. Calif. Publ. Entom., 28:276, ♀, ♂.

The proboscis was usually retracted in the type specimens of *beameri* and the reduced number of papal joints went unnoticed when the species was described. The maxillary palpi are five-jointed and the bee collects pollen from flowers of *Chamaesaracha* as do some other members of the *halictoides* group.

New records.—TEXAS: 1 male, Del Rio, Val Verde Co., March 26, 1940 (C. D. Michener); 12 females, 5 males, 16 miles northeast of Carta Valley, Edwards Co., on *Chamaesaracha coniodes*, April 13, 1965 (Timberlake).

Perdita fidissima, n. sp.

Allied to *chamaesarachae* but distinct in the peculiar face markings.

Female.—Head and thorax dark green, with white marks on face and pronotum. Clypeus black at outer ends and on two broad submedian stripes, confluent across apical margin of disk and divided above, leaving obliquely quadrate mark on each side and a broad median stripe white. Lateral face marks narrow, much longer than wide, slightly broader at anterior end, somewhat curved to be in alignment with lateral marks of clypeus and ending above at anterior end of foveae, but leaving a small area at anterior corners of face black. Supraclypeal mark white, subtended by median bar of clypeus, broader than high, and rounded above but with strong median notch. Subantennal plates green. Collar of pronotum, mark on each side of posterior margin of disk and large mark on tubercles white. Abdomen dark ferruginous, margins of tergite 1 infuscated. Legs blackish, extreme apex of front femora, anterior side of front tibiae and middle knees pale yellow; front and middle tarsi pale yellowish brown. Antennae fuscous, scape whitish and flagellum brownish beneath. Labrum rufotestaceous, infuscated at base. Mandibles testaceous, more rufous toward apex and whitish at base. Proboscis fuscous, galeae testaceous brown. Tegulae subhyaline, base brown. Wings strongly dusky, tinged with brown, nervures and margins of stigma testaceous brown, subcosta fuscous.

Head as long as wide; cheeks receding, about two-thirds as wide as eyes. Posterior ocelli their distance from nearest eye and more distant from occipital margin. Facial foveae well impressed, about twice as wide as interval between them and eyes, and reaching two-thirds of distance from upper level of antennal sockets to level of anterior ocellus. Antennae rather short, flagellum subclavate, joints except two terminal ones broader than long. Face below antennae gently convex; disk of clypeus much broader than high, lateral margins strongly oblique, and lateral ex-

tensions strongly inflexed and not much visible in frontal aspect. Mandibles tapering to blunt apex but apparently worn in type. Proboscis moderately long, galeae about equaling stipites; maxillary palpi four-jointed. Pterostigma hardly three times longer than wide, shorter than first submarginal cell but nearly as wide; marginal cell as long as stigma, part beyond stigma somewhat longer than part beneath, metacarpus a little longer than oblique apical truncation; second submarginal cell narrowed one-third to radius. Pygidial plate about as long as wide at base, sides converging to moderately narrow, notched apex. Head and thorax moderately dull, strongly tessellate, the frons, vertex and mesonotum, with minute obscure punctures. Lower part of face more delicately tessellate, clypeus with sparse shallow punctures. Pubescence white, short and erect, moderately dense on face and mesonotum, longer but not much denser on cheeks and underside of thorax; hair of front coxae moderately long and dense; scopal hair of hind tibiae thin, strongly curved and about twice as long as widest part of tibia. Length: 4.8 mm.; anterior wing, 3.6 mm.

Holotype female, 18 miles south of Sarita, Kennedy Co., Texas, at flowers of *Parkinsonia*, June 5, 1961 (Univ. Kans. Mex. Exped.), no pollen collected.

Type in collection of the University of Kansas, Lawrence.

Perdita levigata, n. sp.

(Plate figs. 1225, 1226, 1316)

This species is closely allied to *chamaesarachae*, *lenis*, and *physalidis*, but the male differs in having a large dark area on middle of lower part of face, partly on clypeus and partly above it.

Male.—Head and thorax dark blue, thorax entirely dark, the tubercles brownish. Mandibles white on basal half, shading through testaceous to red at apex. Labrum testaceous. Mark of median size on each side of clypeus, large, triangular lateral marks, no higher than wide and reaching level of antennae, and small, more or less circular spot on subantennal plates white. Large triangular area in middle of face between lateral marks, including part of subantennal plates and extending to apex of clypeus, mostly dark ferruginous on disk of clypeus and black above and enclosing white spots on subantennal plates and thin, nubilous whitish streak on clypeus. Abdomen ferruginous, tergite 1 infuscated except on apical part of disk; no pale markings. Legs blackish, apex of front femora and front tibiae dull yellow, more whitish on anterior side, apex of middle femora slightly whitish, middle tibiae yellowish brown on anterior side, and front tarsi yellowish. Antennae fuscous, more brownish on flagellum, scape white and flagellum dull yellowish beneath. Proboscis fuscous, galeae testaceous brown. Tegulae testaceous hyaline, spot at base whitish. Wings almost clear hyaline, nervures and margins of stigma testaceous brown, subcosta a little darker.

Head slightly longer than wide; cheeks rounded, moderately receding, and nearly as wide as eyes. Posterior ocelli about their distance apart from nearest eye and somewhat closer to occipital margin. Facial foveae about three times longer than wide. Face below antennae strongly convex, with clypeus rather prominent; disk of clypeus hardly wider than high, and lateral extensions strongly inflexed, not visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis rather long, surpassing fossa in repose; maxillary palpi concealed in type. Flanks of pronotum normal. Pterostigma hardly three times as long as wide and about as long and almost three-fourths as wide as first submarginal cell; marginal cell as long as stigma, slightly longer beneath than beyond it, with metacarpus slightly shorter than truncation; second submarginal cell narrowed two-thirds to radius. Head and thorax shining, frons and vertex weakly tessellate, mesonotum polished. Punctures of frons and mesonotum extremely minute and obscure. Pubescence white, fine, erect and rather short; hair of face and mesoscutum sparse, mostly confined to parocular areas of face and anterior border of scutum; hair of cheeks moderately dense, and hair of hind tibiae thin and as long as greatest width of tibia. Abdomen oval, depressed, nearly nude, but with very short thin hair at apex. Median lobe of tergite 7 small, triangular and narrowly rounded at apex. Subgenital plate about twice as long as wide, with sides converging to rounded apex, disk finely setose. Parameral lobes of caulis appearing

bifid at apex in dorsal view, but very broad in lateral view, with deep notch close to lower corners; sagittae acute at apex, broadly fusiform in dorsal view and more thinly in lateral view; volsellae prominently exposed in dorsal view. Length: about 4 mm.; anterior wing, 2.8 mm.

Holotype male, Coaldale, Fremont Co., Colorado, 7,800 feet, on *Physalis*, Aug. 4, 1957 (C. D. Michener).

Type in collection of the University of Kansas, Lawrence.

Perdita physalidis Timberlake

New records.—CALIFORNIA. Riverside Co.: 1 female, 2 males, Deep Canyon on *Physalis crassifolia*, Oct. 9, 1963 (E. I. Schlinger); 1 female, 10 miles northwest of Cottonwood Springs, Joshua Tree National Monument, April 11, 1963 (C. A. Toschi). ARIZONA. Pima Co.: 1 female, 1 male, 5 miles east of Continental, on *Physalis*, Aug. 16, 1964 (Timberlake).

Perdita rozeni, n. sp.

(Plate figs. 1227, 1228, 1317)

This species will be recognized easily by the characters given in the preceding key to the species. The maxillary palpi have four thin joints difficult to distinguish, and the second submarginal cell is narrowed almost to a point above. The male has the face mainly yellow below level of antennae and the abdominal markings more reduced than in female. The pollen-collecting habits of the female are uncertain.

Female.—Head and thorax dark bluish green, most of face below level of antennae except subantennal plates and labrum blackish. Face without pale markings but tubercles broadly pale yellow. Abdomen dark fuscous or blackish, banded with creamy white on tergites 1 to 5; band on tergite 1 represented by triangular spot on lateral margins of disk; bands on tergites 2 to 4 often narrowly interrupted medially, curved backward at outer ends and not quite reaching lateral margins, although touching lateral foveae on tergite 2; band on tergite 5 more abbreviated and interrupted and sometimes absent or concealed by preceding segment. Legs fuscous or blackish, front knees, anterior side of front tibiae and usually small spot or streak on outer side of middle tibiae pale yellow. Antennae fuscous, flagellum more brownish and tinged with yellow beneath. Mandibles yellow at base, shading through rufotestaceous to dark red at apex. Proboscis fuscous. Tegulae testaceous hyaline, base brownish. Wings distinctly dusky hyaline, nervures and margins of stigma pale brown, subcosta fuscous.

Head as broad as long; cheeks moderately receding, half as wide as eyes. Posterior ocelli slightly closer to nearest eye than distance apart and still closer to occipital margin. Facial foveae rather narrow, but somewhat wider than interval between them and eyes, and reaching from upper level of antennal sockets two-thirds of distance to level of anterior ocellus. Face below antennae moderately convex; disk of clypeus somewhat broader than high, lateral extensions strongly inflexed but partly visible in frontal aspect. Mandibles simple, tapering and acute. Proboscis moderately long, galeae not quite reaching base of stipites; maxillary palpi obscurely five-jointed. Pterostigma about three times longer than wide and two-thirds as wide as first submarginal cell; marginal cell with parts beneath and beyond stigma subequal, metacarpus distinctly longer than apical truncation; second submarginal cell triangular, narrowed almost to a point on radius. Tarsal claws with small inner tooth. Pygidial plate as long as wide at base, sides converging to narrowly rounded apex. Head and thorax shining, mesonotum polished, frons smoothly or finely tessellate, only slightly dullish, and with minute, moderately close punctures opposite foveae. Punctures of mesonotum minute and widely spaced. Pubescence whitish, fine, moderately long and erect; thin on face and mesonotum and rather dense on cheeks and underside of thorax; hair on front coxae rather long and dense. Length: about 4-4.5 mm.; anterior wing, 2.6-2.8 mm.

Male.—Head and thorax dark blue green. Anterior border of postgenae, band on inferior orbits to middle of eyes, mandibles except red tips, labrum and most of face below level of antennae bright yellow. Yellow of face broken by dark sutural lines of subantennal plates and usually by

narrow band across summit of disk of clypeus between outer margins of subantennal plates, or sometimes subantennal plates entirely dark. Lateral marks broadly truncate at upper level of antennal sockets but with a short orbital extension to foveae. Thorax dark except for large yellow mark on tubercles. Abdomen brownish fuscous or black, marked with pale yellow on tergites 1 to 6; tergite 1 with transverse mark or spot on each side; bands on tergites 2 to 4 curved backward at outer ends, and enlarged exteriorly, especially on tergite 2; bands on tergites 3 or 4 to 6 more or less abbreviated and one or more interrupted medially; bands sometimes widely interrupted in middle especially on first three segments and band on tergite 6 concealed or absent. Tergite 7 testaceous or rufotestaceous, and apical depression of tergite 6 subhyaline. Legs blackish, anterior side of femora (more narrowly on hind pair), front and middle tibiae except on posterior side, hind tibiae and basitarsi except on dorsal margin, yellow. Antennae fuscous, broadly yellow beneath on scape and brownish yellow beneath on flagellum. Tegulae testaceous hyaline, base yellow. Wings as in female.

Head broader than long; cheeks rounded, about as broad as eyes. Posterior ocelli about their distance apart from occipital margin and more remote from nearest eye. Facial foveae about four times longer than wide and nearly reaching level of upper margin of antennal sockets. Face below antennae moderately convex; disk of clypeus somewhat broader than high, lateral extensions inflexed but broadly visible in frontal aspect. Mandibles tapering, acute, and reaching far margin of fossa. Flanks of pronotum not impressed. Head and thorax shining, sculpture and pubescence much as in female, except hair of underside of head very long. Abdomen ovate, convex above; tergite 7 with triangular median lobe, narrowly rounded at apex. Subgenital plate quadrate, slightly longer than wide, truncate-emarginate at apex, with thin marginal fringe of hair. Caulis of genital armature obliquely truncate above on each side of apex; parameral lobes wide and rounded at apex in dorsal view, with tooth on inner margin before middle, and broad subbasally and acute at apex as seen from side; sagittae narrowly fusiform, angulate at middle as seen from above and very slender and curved upward at apex in lateral view; volsellae prominent in dorsal view. Length: 3.5-4.5 mm.; anterior wing, 2.6-3 mm.

Holotype female, Hopkins Well, 18 miles west of Blythe, Riverside Co., California, April 29, 1952 (J. G. Rozen); allotype male, San Felipe, Baja California, Mexico, on *Dalea mollis*, March 23, 1963 (G. I. Stage).

Paratypes.—CALIFORNIA. Riverside Co.: 1 female, type locality, April 29, 1962 (G. A. Marsh). MEXICO, BAJA CALIFORNIA: 1 male, San Felipe, on *Dalea mollis*, March 23, and 1 female, 4 males, April 27, 1963 (Stage). SONORA: 1 female, 1 male, MacDougal Crater, Pinacate Mts., on *Boerhaavia*, Nov. 28, 1959 (G. D. Butler).

Types in collection of the University of California, Riverside; paratypes in collections of the University of California, Berkeley, the University of Arizona and of G. I. Stage.

OCTOMACULATA GROUP

This is a compact group of many species of which sixteen are here described for the first time. The opposite sex of several other species are also made known, and the types of several of Cockerell's species have been seen and studied in detail since the first account of the group was published (Univ. Calif. Publ. Entom., 17:1-121, 1960).

KEY TO NEW AND LITTLE-KNOWN SPECIES

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1. Females | 2 |
| Males | 26 |
| 2. Thorax as well as head and abdomen yellow | 3 |
| Thorax dark except for marks on pronotum and tubercles | 4 |
| 3. Without dark markings; similar to <i>xanthochroa</i> but with comparatively dense pubescence; facial foveae broader than interval between them and eyes and extending two-thirds of distance to level of anterior ocellus; posterior ocelli about their distance apart from occipital margin and closer to nearest eye | <i>beatula</i> Timberlake |
| Large black mark on each side of posterior part of mesopectus; facial foveae their own | |

width from margin of eyes and going but little more than halfway to level of anterior ocellus; distances between posterior ocelli, and to nearest eye and occipital margin subequal; pubescence yellowish, fine, erect, and thin on face and mesonotum

xanthodes Timberlake

- 4. Light bands of abdomen entire on tergites 1 to 3 or 5, or abdomen mainly light. 5
Light bands of abdomen interrupted at least narrowly on one or more segments besides on tergite 1 or 5 19
- 5. Abdomen mainly white or yellow, with dark markings small, or restricted to tergites 1 to 3. 6
Abdomen if mainly light, with dark bands at junction of tergites 1-2 to 4-5 7
- 6. Abdomen creamy white (or changing to yellowish after death); two small dots or spots on each side of tergite 1 and lateral foveae of tergite 2 black; base of tergites 2 to 4 sometimes very narrowly black; face below level of antennae white, with lower end of sub-antennal plates and two spots on disk of clypeus sometimes black; legs pale yellow with broad but broken black annulus at base of femora; head and thorax with coarse white hair

flavicauda Timberlake

Abdomen creamy white, changing to fulvous yellow on tergites 4 to 6; trifold mark at base of tergite 1, narrow band at junction of tergites 1-2 to 2-3, abbreviated band at apex of tergite 3 fuscous; clypeus and triangular lateral marks and sometimes two supraclypeal spots white; legs pale yellow, hind tibiae slightly infuscated on outer side; pubescence white, fine and erect on mesonotum *idonea*, n. sp.

- 7. Tergite 5 entirely dark; scape of antennae mainly or entirely dark 8
Apex of abdomen mainly light or fulvous, or if dark then tergite 5 with enclosed light band and scape of antennae mainly yellow 9
- 8. Face entirely dark, or sometimes a small whitish spot adjacent to clypeus on each side, or a small median spot on clypeus; abdominal bands narrower than dark intervals, that on tergite 4 sometimes interrupted medially or evanescent; head and thorax dark green, rather dull, with thin erect hair on mesonotum . . . *melanostoma melanostoma* Swenk and Cockerell
Similar but face marks enlarged, clypeus often white except for black stripes on disk, lateral marks often reaching level of antennae; light bands of abdomen broad and entire

melanostoma albovincta Timberlake

- 9. Two apical segments of abdomen light or fulvous, sometimes paler across base of tergite 5 10
Two apical segments of abdomen dark, except for enclosed light band on tergite 5 16
- 10. Apex of abdomen not reddened or fulvous 11
Apex of abdomen fulvous, tergite 4 sometimes suffused with same color, tergite 5 sometimes paler across base; white bands on tergites 1 to 4 very broad, the dark intervals usually brownish; clypeus and large lateral marks white, or clypeus more or less black on upper half of disk; frons and vertex granular tessellate and opaque. *rhodura* Cockerell
- 11. Clypeus and lateral marks pale yellow or white. 12
Face dark, except small yellowish spot on disk of clypeus; scape of antennae and pronotum dark with white spot on tubercles; abdomen creamy white, with four dark bands, including one at base of tergite 1. *knowltoni* Timberlake
- 12. Disk of pronotum yellow, but flanks more or less dark. 13
Disk of pronotum dark or with dark cross band. 14
- 13. Abdomen creamy white, with dark band at junction of tergites 1-2 to 4-5 (that part of band at apex of segments not reaching lateral margins) and a mark on each side of base of tergite 1; lateral face marks narrow, abruptly widened at anterior end; labrum dark; pubescence of mesonotum short and erect, with dense prescutellar band

indioensis Timberlake

Markings pale yellow, including labrum, scape of antennae and legs, except hind tibiae and tarsi; abdomen with five dark bands including base of tergite 1; mesonotum uniformly invested with short erect white hair *mimula* Timberlake

- 14. Supraclypeal mark white or yellow. 15
Supraclypeal area dark; scape of antennae, mark on each side of disk of pronotum, tubercles,

- apex of femora, front tibiae and anterior side of middle tibiae and abdomen yellow; spot on each side of base of tergite 1 and band at junctions of tergites 1-2 to 5-6 fuscous; mesonotum strongly tessellate, nearly as dull as frons.....*snowii* Cockerell
15. Markings yellow, including small spot on middle of frons; lateral face marks intruding strongly between foveae and eyes; marks on disk of pronotum confluent with mark on tubercles; abdomen with six dark bands, including one at base of tergite 1; mesonotum tessellate, less dull than frons.....*rectangulata* Cockerell
- Markings creamy white; lateral face marks ending broadly at anterior end of foveae; abdomen with five dark bands, not quite reaching lateral margins, including one at base of tergite 1; legs white, with femora, except broadly at apex and on inferior edge of front and middle pair, black, and a more dilute mark on apical half of hind tibiae; wings whitish hyaline, with pallid nervures.....*croceipes* Timberlake
16. Light bands of abdomen broad and reaching lateral margins except on tergite 5..... 17
Light bands of abdomen not reaching lateral margins except on tergites 1 and 2..... 18
17. Mesonotum weakly tessellate, almost polished; abdominal bands white; as broad as or broader than dark intervals, that on tergite 5 not reaching lateral margins and sometimes absent; clypeus and rather small lateral marks white, clypeus often with two brown or fuscous stripes on disk; scape of antenna broadly yellow beneath.....*nitidella* Cockerell
- Mesonotum more strongly tessellate and moderately dull; abdominal bands about as wide as dark intervals and bent backward at outer ends (a dark mark at basal corners of tergites 3 to 5); lateral marks of face more or less l-shaped; clypeus white, except for small dark mark at outer ends.....*percineta*, n. sp.
18. Face marks pale yellow, including clypeus except anterior margin and dark mark on each side of summit of disk, and large lateral marks reaching anterior end of foveae; bands of abdomen yellowish white, broad and enclosed on tergites 3 to 5, and touching lateral foveae on tergite 2; facial foveae narrow; mesonotum tessellate, with thin, erect white hair
hirtella, n. sp.
- Face marks creamy white; large dark mark on each side of disk of clypeus, reaching more than halfway to anterior margin; lateral marks large, triangular, but leaving small area at anterior corners of face dark; light bands of abdomen moderately wide, narrowed and bent backward at outer ends and reaching lateral margins on tergites 1 to 3, more abbreviated and notched behind on tergite 5; front and middle tibiae and tarsi yellowish, except dark blotch on posterior side of tibiae.....*tacita*, n. sp.
19. Interruption of light bands of abdomen narrow..... 20
Interruption of abdominal bands broad, at least equal to transverse length of marks..... 23
20. Light band on tergite 2 interrupted..... 21
Bands on tergites 2 to 4 and small spot on lateral margin of tergite 1 yellow; band on tergite 2 narrowed medially, those on tergites 3 and 4 with linear interruption; clypeus dark, with median ovate mark and smaller one on each side, and lateral marks pale yellow; two spots on pronotum and tubercles yellow; mandibles black, reddish at apex.....*sparsa* Fox
21. Smaller species, about 4 mm. long; light band on tergite 2 not or only slightly more broadly interrupted than other bands..... 22
About 6 mm. long; abdominal bands broad and white, that on tergite 2 more broadly interrupted than others, that on tergite 4 merely notched in front and behind and not reaching lateral margins; clypeus and supraclypeal area black, marks on clypeus and lateral marks creamy white; head and thorax dark green, frons opaque, impunctate.....*reperta*, n. sp.
22. Abdominal bands rather broad, bent backward at outer ends and reaching lateral margins on tergites 2 to 4, that on tergite 5 evanescent; lateral face marks and clypeus, except anterior margin and two stripes on disk, white; lateral marks subquadrate, rounded within, hardly higher than wide; supraclypeal area dark, with two white dots; wings nearly clear hyaline; nervures and margins of stigma testaceous.....*claripennis*, n. sp.
- Light bands of abdomen not reaching lateral margins on tergites 3 to 4, or 5, and sometimes also on tergite 1, and that on tergite 2 nearly touching lateral foveae; face marks much as in *claripennis*, those on sides of clypeus sometimes very small, with clypeus in large part

- and supraclypeal area black; lateral marks broad at anterior end with narrow extension on orbits to level of antennae; wings slightly dusky, nervures and margins of stigma testaceous brown *sejuncta*, n. sp.
23. Clypeal and lateral face marks creamy white or pale yellow..... 24
 Face entirely dark; abdomen black, with narrow and interrupted white bands on tergites 1 and 2, sometimes lacking; pronotum dark, except white tubercles; frons and mesonotum tessellate, with frons somewhat the duller *phymatae* Cockerell
24. Scape of antennae and entire thorax dark; abdominal markings restricted to tergites 1 to 3. 25
 Scape of antennae narrowly beneath and tubercles light; abdomen black, with white bands on tergites 1 to 4, that on tergite 1 narrow and interrupted, those on tergites 2 and 3 more broadly interrupted, curved backward at outer ends and reaching lateral margins, and that on tergites 4 in form of widely separated transverse marks; clypeus white, with black mark on each side of summit of disk; lateral marks much higher than wide, attenuated above and reaching anterior end of foveae *fallax* Cockerell
25. Duller than *fallax*, with frons and mesonotum about equally opaque; abdominal markings transverse, not reaching lateral margins, although touching lateral foveae on tergite 2; clypeus except two discal stripes, and lateral marks much narrowed above white; pygidial plate as broad as long, sides arcuately converging to rounded and distinctly notched apex
translineata Timberlake
- Rather more shining than *fallax*; abdominal marks more longitudinal than transverse, almost touching lateral margins, and reduced to small dot on each side of tergite 1; clypeus and supraclypeal area black, broad median stripe on clypeus and lateral marks ending thickly at level of antennae white; pygidial plate broader than long and only very slightly retuse at apex *fuscipes*, n. sp.
26. Yellow τ -mark of mesopectus more or less invading pleural region..... 27
 Thorax dark, except for usual marks on pronotum and tubercles..... 35
27. Arms of yellow τ -mark extending broadly to tubercles..... 28
 Arms of τ -mark separated from tubercles by dark interval..... 31
28. Yellow bands of abdomen reaching lateral margins, except that on tergite 1 sometimes enclosed 29
 Yellow bands enclosed by dark ground color except on tergite 6; legs yellow, hind tibiae and tarsi, and blotch on front and middle tibiae and hind femora fuscous; yellow of face reaching foveae on each side and with median quadrate extension halfway on frons above level of antennae *maculipes* Cockerell
29. Sides of thorax with dark mark extending onto mesopectus..... 30
 Sides and undersurfaces of thorax yellow, including prosternum and mark on flanks of propodeum, but excepting triangular dark mark from base of wings to middle coxae; face to level of foveae and cheeks except upper third yellow; legs yellow, except dark band on middle tibiae and infuscation on outer edge of hind tibiae and tarsi
melanostoma Swenk and Cockerell
30. Face yellow to level of foveae (foveae usually not enclosed by the yellow); pronotum yellow, with dark band across disk onto flanks; antennae yellow, pedicel and flagellum fuscous above; head but little broader than long, parocular areas of lower face not as wide as intervening space *gutierreziae* Cockerell
 Face yellow to point halfway between level of foveae and anterior ocellus; cheeks broadly yellow except behind summit of eyes; dark band on pronotum abbreviated; antennae entirely yellow; head broad, parocular areas far exceeding width of intervening space; hind tibiae and tarsi, and blotch on anterior and posterior side of hind femora fuscous
rectangulata Cockerell
31. Yellow of face terminating well below level of anterior ocellus..... 32
 Face yellow to level of anterior ocellus except for short green lobe slanting toward fovea on each side; antennae yellow, pedicel above and half an annulus on next three or four joints fuscous; abdomen yellow with narrow dark bands; legs yellow, hind tibiae and tarsi except beneath and posterior side of hind femora fuscous..... *flavifrons*, n. sp.

32. Arms of mesopectal τ -mark extending toward tubercles but ending far from them; yellow of face reaching level of foveae but the green descending more or less on each side toward antennal sockets 33
 Arms of τ -mark with slender extension on each side toward middle of mesepimeron; yellow of face terminating more or less evenly at level of foveae..... 34
33. Tergite 7 with the usual bluntly tapering apical lobe of *octomaculata* group; abdomen dark, with enclosed yellow bands; legs yellow, posterior side of all femora more or less, streak on middle tibiae and hind tibiae except beneath, fuscous.....*aperta*, n. sp.
 Tergite 7 broadly truncate at apex, with shallow median emargination; abdomen yellow, with fuscous bands; green lobes of frons reaching antennal sockets; legs yellow, outer side of hind tibiae and tarsi infuscated*truncatella*, n. sp.
34. Abdomen yellow, with five or six dark bands; legs yellow, outer side of hind tibiae with a dark streak; undersurface of head and inferior orbits to middle of eyes yellow; green band on pronotum extending to middle of flanks; wings whiter than usual; mesonotum strongly tessellate but more shining than frons.....*croceipes* Timberlake
 Abdomen yellow, becoming orange yellow or fulvous on apical half; tergites 1 and 2 with fuscous margins more or less developed, the yellow on tergite 1 sometimes enclosed and slightly interrupted; legs yellow, posterior side of hind femora and hind tibiae on outer side fuscous; mesonotum nearly as dull as frons, and with rather coarse, erect white hair
rhodura Cockerell
35. Yellow or white of face extending above antennae in median line or straight across..... 36
 Yellow or white of face extending above antennae only on each side if at all..... 40
36. Face markings yellow 37
 Face white straight across slightly above level of antennae, although tinged with yellow on upper border and between antennal sockets; abdomen yellow, broad base of tergite 1, apical spot on each side of tergites 1 and 2, and narrow band at base of tergites 2 to 4 fuscous*flavicauda* Timberlake
37. Face yellow straight across above antennae; yellow bands of abdomen not interrupted... 38
 Face yellow above antennae only in middle and on each side; yellow bands of abdomen enclosed and interrupted on tergites 1 to 5; legs partly yellow, but posterior side of front and middle femora and tibiae, and hind legs except knees dark.....*occlusa*, n. sp.
38. Abdomen mainly yellow, with dark bands on basal segments, or pale brown with suffused and enclosed yellow bands; pronotum mainly dark..... 39
 Abdomen yellow with six dark bands, including one at base of tergite 1; pronotum yellow, with dark band from flank to flank; termination of yellow of face uneven, extending half-way on frons in median line; legs yellow, except for hind tibiae and tarsi and slight streak on middle tibiae and hind femora.....*mesillensis*, n. sp.
39. Abdomen yellow, tinged with fulvous on tergites 4 to 7, base of tergite 1, band at junction of tergites 1-2, and evanescent bands at junction of tergites 2-3 and 3-4 fuscous; legs yellow, blotch on posterior side of middle of hind femora, small blotch on front femora, and posterior side of hind tibiae fuscous; antennae yellow, flagellum orange.....*idonea*, n. sp.
 Abdomen pale brown, with suffused pale yellow bands on tergites 1 to 5, broad and enclosed on tergites 1 to 3, and fainter and more suffused on apical segments; legs yellow, posterior side of front and middle femora, and hind femora in front and behind except at apex pale brown, hind tibiae slightly brownish; mesonotum tessellate and moderately dullish
biparticeps Cockerell
40. Face completely yellow below level of antennae, or anterior end of subantennal plates only more or less darkened..... 41
 Face below antennae mainly yellow, but green of frons intruding more or less strongly between lateral and subantennal marks, or even extending to clypeus..... 46
41. Tergite 7 bluntly tapering to ogival apex 42
 Apex of tergite 7 moderately broad and slightly curved upward, with margin rounded on each side of small median notch; yellow bands of abdomen narrowly interrupted on tergites 1 to 4, more broadly on tergite 5, and reaching lateral margin except on tergites 4 and 5; wings somewhat whitish hyaline*solidaginis* Cockerell

42. Face markings yellow; abdomen dark, with yellow or whitish bands..... 43
 Markings of face, pronotum and legs white; abdomen ferruginous red, tergites 1 and 2 mainly black, with abbreviated, narrow, pale ferruginous or yellowish bands
rufescens, n. sp.
43. Bands of abdomen pale yellow, entire or only slightly interrupted..... 44
 Bands of abdomen whitish, and more distinctly interrupted..... 45
44. Bands of abdomen broad, entire except narrowly interrupted on tergite 1, bent backward at outer ends and notched behind in middle; venter almost entirely pale yellow; legs yellow, hind tibiae dark except at base and broadly in front; face entirely yellow below level of antennae*cognata* Timberlake
 Bands generally not quite reaching lateral margins, except on tergite 1 and sometimes slightly interrupted on one or two segments (on tergites 1, 2, or 5 in types); face yellow below level of antennae, except sometimes on anterior margin of subantennal plates; head and thorax dark blue green with abundant rather long pubescence.....*reperta*, n. sp.
45. Tergites 1 to 3 each with white or yellowish white band moderately well interrupted and reaching lateral margins; apex of all femora narrowly and anterior side of front and middle tibiae broadly yellow*ordinata* Timberlake
 Bands of abdomen whitish, distinctly interrupted although narrowly on tergite 1, and reaching lateral margins except on tergites 4 and 5 (band on tergite 5 sometimes absent); basal third or more and apex of hind femora, and underside of hind tibiae yellow
apacheorum Timberlake
46. More or less diminutive species (about 3 mm. long); tergites 1 to 4 each with entire yellow band, not reaching lateral margins, or bands sometimes evanescent, but leaving two transverse marks on tergite 1 and two submedian dots on tergite 2; face marks sometimes covering most of face below antennae.....*translineata* Timberlake
 Larger, about 5 mm. long; tergites 1 to 5 with transverse yellow mark on each side, not quite reaching lateral margins, and more oblique on tergites 2 and 3; face yellow below antennae, with subantennal plates mostly dark; face and mesonotum with moderate amount of whitish pubescence*leechi*, n. sp.

Perdita apacheorum Timberlake

(Plate figs. 1229, 1230, 1318)

Perdita apacheorum Timberlake, 1960, Univ. Calif. Publ. Entom., 17:99, ♀.

The male here described as *apacheorum* agrees too well with what would be expected for that sex to be placed elsewhere. In the key (1960) it runs to *cazieri* and differs in the markings.

Male.—Head and thorax blue green. Thin line on inferior orbits nearly to middle of eyes, mandibles except red tips, labrum and face to upper level of antennal sockets yellow (only dorsal third of rims of antennal sockets dark). Lateral face marks broad and oblique above, ending on orbits at anterior end of foveae. Supraclypeal mark in one specimen with a triangular extension (enclosing small quadrate dark spot) onto frons. Collar of pronotum, cuneate mark in each side of disk and tubercles yellow. Abdomen fuscous, or tinged with brown; bands on tergites 1 to 5 creamy white, narrowly interrupted and reaching lateral margins usually on tergites 1 and 2, and sometimes on tergites 1 and 4 (one specimen with band on tergite 5 evanescent has band on tergite 1 not quite reaching lateral margins). Tergite 7 rufotestaceous, paler at apex. Legs pale yellow, coxae except at apex, mark on posterior side of trochanters, femora except broadly at apex, and hind tibiae on outer side except at base, black. Antennae yellow, flagellum more dusky yellow with apical joint distinctly brown, pedicel and flagellum fuscous or brown above and sometimes a dark spot on apex of scape. Proboscis fuscous, pale brown on galeae. Tegulae testaceous hyaline, base fuscous, margined more or less with yellow. Wings dusky hyaline, nervures testaceous brown, margins of stigma and subcosta brown.

Head as broad as long; cheeks two-thirds as wide as eyes. Posterior ocelli their distance apart

from occipital margin and somewhat closer to nearest eye. Facial foveae oval, twice as long as wide. Face below antennae gently convex; disk of clypeus somewhat broader than high, lateral extensions broadly inflexed but mostly visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis moderately long. Venation as described for female, stigma about half as wide as first submarginal cell. Frons and vertex strongly tessellate, almost opaque, with obscure punctures. Mesonotum distinctly tessellate but more shining than frons, with numerous fine punctures, mostly well separated. Pubescence rather abundant, moderately coarse and erect; short on face and mesonotum and longer on cheeks and underparts of thorax. Tergite 7 with apical lobe tapering and narrowly ogival at apex. Subgenital plate triangular, as wide as long, sides somewhat convexly arcuate to subacute apex. Caulis of genital armature shorter than usual in group; parameral lobes as long as caulis and tapering less than usual to apex in lateral view; sagittae of usual form, but slender and angulate at middle as seen from above. Length: 4-4.5 mm.; anterior wing, 2.9 mm.

New records.—ARIZONA. Mohave Co.: 3 males, 10 miles from Kingman, Sept. 2, 1961 (J. S. Buckett). Cochise Co.: 3 females, 2 miles northeast of Portal, on *Baccharis*, Aug. 5, 1959 (M. Statham). NEW MEXICO. Hidalgo Co.: 6 females, Rodeo, on *Asclepias*, Aug. 22, 1962 (Rozen, Statham and Hessel); 1 female, same data, except on *Heterathea*; 1 female, 5 miles north of Rodeo, Aug. 21, 1962 (Rozen, Statham and Hessel). WYOMING. Johnson Co.: 3 females, 5 miles south of Kaycee, on *Grindelia squarrosa*, Aug. 4, 1963 (Bohart and Torchio).

***Perdita aperta*, n. sp.**

(Plate figs. 1231, 1232, 1319)

At present *aperta* is known only in the male sex from localities in New Mexico and Arizona. In my key to this group (1960) the male falls with *nitidella* but is distinctly larger, with femora heavily marked with fuscous. In Cockerell's key (1898) it runs to *rectangulata* (male of *affinis*), but abdominal bands not interrupted and mesopectus with a yellow mark.

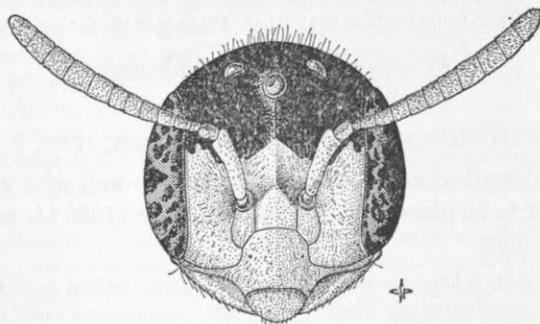


Fig. 9. *Perdita aperta*. Frontal view of head of male.

Male.—Head and thorax dark bluish-green. Postgenae and inferior orbits nearly to middle of eyes, mandibles except red tips, labrum and face to level of foveae bright yellow. Margin of green on frons passing through foveae and descending on each side about halfway toward antennal sockets. Pronotum yellow, with broad green band, not descending below level of tubercles on flanks, and the yellow interrupted on hind margin of disk. Arms of yellow τ -mark on mesopectus separated from tubercles by dark interval. Abdomen fuscous, with yellow bands on tergites 1 to 6, enclosed except sometimes on tergites 1 and 6, very broad and even on tergites 2 and 3 and narrowed at outer ends on tergite 1; venter yellow. Legs yellow, hind coxae except at apex, posterior side of femora (except apical part of front and middle pair), more or less of a streak developed on front and middle tibiae behind (often lacking on front pair), and hind tibiae, except at base and beneath, black; small joints of hind tarsi pale brownish. Antennae yellow, becoming yellowish brown on flagellum, with pedicel and flagellum broadly fuscous above.

Proboscis fuscous, with apical half testaceous. Tegulae hyaline, base yellow. Wings somewhat dusky hyaline, nervures testaceous, margins of stigma and subcosta brown.

Head as broad as long; cheeks rounded, nearly as broad as eyes. Posterior ocelli slightly closer to nearest eye than distance apart and more remote from occipital margin. Facial foveae well impressed and punctiform. Face below level of antennae gently convex; disk of clypeus not much broader than high, lateral extensions broadly inflexed but mostly visible in frontal aspect. Mandibles tapering, acute and reaching far margin of fossa. Proboscis moderately long, galeae and stipites equal. Pterostigma about three times as long as wide, and two-thirds as wide as first submarginal cell; parts of marginal cell subequal beneath and beyond stigma, or the part beyond slightly the longer; second submarginal cell narrowed but little more than one-half to radius. Head and thorax shining, but frons and vertex tessellate and dull, mesonotum more smoothly tessellate and more shining than frons. Face including frons virtually impunctate; punctures of mesonotum minute and moderately close. Pubescence white, erect, moderately thin and long. Abdomen twice as long as wide, subdepressed; tergite 7 with normal, ogival apical lobe of group. Subgenital plate triangular, broader than long, lateral margins undulate, apex slightly obtuse. Genital armature much as in *croceipes*, but parameral lobes more slender and more bulbous at apex, and lateral angles of sagittae closer to apex. Length: 4-4.5 mm.; anterior wing, 2.9-3.1 mm.

Holotype male.—Eight miles north of Carrizozo, Lincoln Co., New Mexico, on *Gutierrezia microcephala*, Sept. 10, 1961 (Timberlake).

Paratypes.—NEW MEXICO: Lincoln Co.: 2 males, 24 miles west of Carrizozo, on same flower, Sept. 12 (Timberlake and Hurd), and 1 male, Carrizozo, on *Lepidium montanum*, Sept. 10, 1961 (P. D. Hurd, Jr.). ARIZONA: Navajo Co.: 1 male, 10 miles south of Snowflake, Sept. 2, 1958 (D. D. Linsdale).

Type in collection of the University of California, Riverside, and paratypes at Riverside and Berkeley.

Perdita aplopappi Timberlake

New record.—Three males, 10 miles southwest of Shivwits, Washington Co., Utah, on *Gutierrezia*, Sept. 22, 1964 (Timberlake and Papp).

Perdita beatula Timberlake

Perdita beatula Timberlake, 1960, Univ. Calif. Publ. Entom., 17:22. ♂.

The type of *beatula* is a male from Lovelock, Nevada; and both sexes have been collected recently in Nevada at flowers of *Sphaeralcea*. The female is very similar to *xanthochroa* which also visit *Sphaeralcea*, but *beatula* has much denser pubescence. Another close ally is *bridwelli*, which also visits *Sphaeralcea* in the Colorado Desert of California and Arizona.

Female.—Entirely yellow, with only the foveae of face and of tergite 2 black. Legs yellow. Antennae also yellow, with pedicel above and band on outer side of flagellar joints 2 to 4 fuscous, following joints of flagellum suffused with pale brown. Tegulae hyaline, with yellow base. Wings whitish hyaline, nervures pale yellow, margins of stigma and subcosta orange yellow.

Head slightly broader than long; cheeks rounded, two-thirds as wide as eyes. Posterior ocelli approximately their distance apart from occipital margin and distinctly closer to nearest eye. Facial foveae well impressed, twice as wide (or sometimes less) as interval between them and eyes and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae evenly convex; disk of clypeus large, broader than high, with lateral extensions gradually inflexed and almost fully visible in frontal aspect. Mandibles tapering and acute. Proboscis when fully extended about twice as long as head. Pterostigma three times longer than wide and somewhat more than half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, metacarpus nearly twice as long as apical truncation. Pygidial plate as long as wide at base, sides arcuately converging to strongly notched

apex. Head and thorax moderately dull; frons, vertex, and mesonotum minutely tessellate and with minute close punctures. Pubescence nearly whitish, abundant, mostly erect and moderately coarse; rather dense on cheeks and occiput, and considerably shorter and subappressed on frons and mesonotum. Length: about 5 mm.; anterior wing, 3.6 mm.

New records.—NEVADA. Washoe Co.: 20 females, 10 males, 2 miles north of Nixon, on *Sphaeralcea*, July 3, 1963 (G. I. Stage); 1 male, Patrick, June 30, 1964 (M. Irwin). Churchill Co.: 3 females, 3 males, 4 miles west of Frenchman, on *Sphaeralcea*, July 1, 1963 (Stage).

Perdita bigeloviae Cockerell

Perdita fasciata Timberlake, 1960, Univ. Calif. Publ. Entom., 17:57, ♀ (new synonymy).

P. fasciata was described from Crook, Logan County, Colorado, and another specimen has been collected at 13 miles northeast of La Junta, Bent County, Colorado, Aug. 24, 1963 (N. and B. Marston). Specimens, however, collected at 5 miles east of Roswell, Chavez County, New Mexico, at flowers of *Aplopappus pleurifloris*, Sept. 11, 1961 (Timberlake and Hurd) are virtually identical with *fasciata* and taken with typical males of *bigeloviae*. It is certain, therefore, that *fasciata* is merely a form of *bigeloviae* with the light bands of abdomen broader than usual and the mesonotum more weakly tessellate.

Perdita biparticeps Cockerell

Perdita biparticeps Cockerell, 1896, Proc. Acad. Sci., Phila., 48:84, ♂.

The type and only known specimen of *biparticeps* has been examined. In the key to this group (1960) it runs out at couplet 162, but is rather close to *nitidella* and differs in the pale brown color of the abdomen, with enclosed yellow bands on tergites 1 to 5, more suffused on the distal segments.

Male.—Head and thorax bluish green, with undertone of brown. Anterior half of gular region, inferior orbits to middle of eyes, mandibles except red tips, labrum and face to level of foveae yellow. Anterior margin of green on frons broadly lobed on each side. Pronotum dark, greenish luster weak, collar, cuneate mark on each side of disk, tubercles and outer ends of flanks yellow. Abdomen brown, with enclosed yellow bands on tergites 1 to 6 increasingly suffused on distal segments, that on tergite 6 very faint; band on tergite 1 in form of a triangular mark, somewhat broader than long, and that on tergite 2 even and as broad as apical dark band. Venter dullish yellow. Legs yellow, but pale brown on posterior side of front and middle femora except margins, and on hind femora except apex and yellowish suffused streak on outer side; hind tibiae faintly brownish except on basal fourth. Antennae yellow, pedicel and flagellum broadly brown above. Tegulae hyaline, base yellow. Wings distinctly dusky hyaline, nervures testaceous brown, margins of stigma and subcosta much darker brown.

Head not enlarged, rotund, slightly broader than long; cheeks evenly rounded, nearly as wide as eyes. Facial foveae punctiform. Face below antennae gently convex; disk of clypeus somewhat broader than high, lateral extensions broadly inflexed and not much visible in frontal aspect. Proboscis moderately long, not exceeding fossa, galeae reaching base of stipites. Flanks of pronotum not impressed. Wings small; pterostigma hardly as long as first submarginal cell and about one-half as wide; marginal cell about as long as stigma, somewhat narrowed toward apex, apical truncation distinctly shorter than metacarpus and parts beneath and beyond stigma equal; second submarginal cell not narrowed more than half to radius. Frons and vertex moderately tessellate, rather dull and impunctate. Thorax shining; mesonotum minutely and weakly tessellate, with very sparse, minute obscure punctures. Pubescence whitish, short, erect, densest on each side of occiput, very thin on mesonotum, thin on vertex, and absent on face. Length: 3 mm.; anterior wing, 2.2 mm.

Type male in collection of the Academy of Sciences, Philadelphia.

Perdita claripennis, n. sp.

In the key to the *octomaculata* group (1960) the type of *claripennis* runs to *affinis* as the scape is dark, but it differs in the very narrowly interrupted bands of abdomen, almost whitish wings and smaller size. It is the specimen mentioned on page 100 of the revision, where it is doubtfully referred to *apacheorum*.

Female.—Head and thorax blue green, labrum, dark parts of clypeus and supraclypeal area black. Basal half of mandibles, lateral margin of clypeus, connecting with median stripe on disk, broadened below, and lateral marks creamy white. Two broad stripes on disk dark, convergent but not meeting above and not quite reaching summit (except very narrowly on one side), fused with normal lateral dark dots and narrowed below before uniting with dark anterior margin. Lateral face marks only slightly higher than wide, rounded within and reaching about halfway to level of antennae. Supraclypeal area with two white dots widely separated on anterior margin. Collar of pronotum, narrow marks on hind margin of disk and large mark on tubercles white. Abdomen black, with moderately broad white band on tergites 1 to 4 and two vestigial marks on tergite 5; bands narrowly interrupted and reaching lateral margins to pass over onto reflexed ventral parts of segments, those on tergites 3 and 4 bent backward and narrowed at outer ends, with basal corners of segments dark. Apical depression of tergites almost whitish hyaline and pygidial plate pale orange testaceous. Underside of abdomen entirely dark except reflexed tergal parts. Legs fuscous, apex of femora, front and middle tibiae except broadly behind or beneath, front tarsi, middle basitarsi at least beneath, and base of hind tibiae pale yellow. Antennae fuscous, flagellum yellowish brown beneath, scape blacker, with its extreme base and apex beneath and radicle joint yellowish. Mandibles red on apical third, shading through testaceous to white at base. Proboscis fuscous, galeae pale brown. Tegulae testaceous hyaline, base fuscous. Wings paler than usual for *octomaculata* group, with a whitish opacity, nervures and margins of stigma testaceous, subcosta brown.

Head about as broad as long; cheeks rounded, two-thirds as broad as eyes. Posterior ocelli their distance apart from occipital margin and closer to nearest eye. Facial foveae nearly twice as wide as interval between them and eyes, and reaching from slightly below upper level of antennal sockets about halfway to level of anterior ocellus. Face below level of antennae evenly and moderately convex; disk of clypeus considerably broader than high, but less twice as broad, and with lateral extensions only partly visible in frontal aspect. Proboscis moderately short, galeae distinctly shorter than stipites. Frons, vertex and mesonotum strongly convex, dull, but not opaque, mesonotum slightly less dull than frons. Both frons and mesonotum with minute, but distinct and rather close punctures. Pubescence rather abundant, fine, erect and moderately long, that on face and mesonotum somewhat shorter than elsewhere, and that on cheeks rather dense; hair of front coxae moderately long and dense. Abdomen oval, depressed, moderately shining; pygidial plate about as broad as long, narrowed to the rounded and notched apex. Length: 4 mm.; anterior wing, 3.1 mm.

Holotype female.—Thirty-three miles east of Deming, probably in Dona Ana Co., New Mexico, 4,300 feet, Aug. 2, 1946 (H. A. Scullen).

Type now at Riverside, but will go to the Academy collection, San Francisco.

Perdita cognata Timberlake

Perdita cognata Timberlake, 1960, Univ. Calif. Publ. Entom., 17:93, ♂.

New material from Wyoming includes the female which runs to *senecionis* in the 1960 key. It differs from *senecionis* in having white bands on tergites 1 to 5, with all except the one on tergite 5, passing over the lateral margins to become confluent with bands on venter; broad apex of front and middle femora and front and middle tibiae yellow except behind; and hair of mesonotum erect, moderately abundant and long. This and the new species *reperta* are closely allied to *seneci-*

onis, which is known only from the type female, collected in 1895 at Las Cruces, New Mexico.

Female.—Head and thorax dark olive green, with slight bronzy luster on mesonotum; underparts of thorax and propodeum bluish; supraclypeal area and dark part of clypeus and labrum black. Clypeus and lateral marks pale yellow with anterior margin of clypeus and two stripes on disk dark; discal stripes converging above but not quite reaching dorsal margin, although often engulfing usual dark lateral dots. Lateral marks large, broad anteriorly, narrowed gradually above and ending bluntly at level of antennae. Collar of pronotum, interrupted band on hind margin of disk, nearly confluent with large mark on tubercles pale yellow. Abdomen fuscous, with broad creamy-white band on tergites 1 to 4 and two enclosed marks on tergite 5; bands very narrowly interrupted at middle, that on tergite 4 notched medially or with interruption very thin, and all passing over lateral margins and confluent with yellowish bands on venter. Marks on tergite 5 erose marginally, more or less oblique, and in one example confluent at outer ends with pale apical margin; this apical margin on tergite 5 yellowish, as also band on tergite 6 preceding testaceous pygidial plate. Sternites 1 and 5 entirely dark, but 2 to 4 pale yellowish, with broad band across base fuscous (reduced to two round marks on sternite 2) and with two transversely oval apical marks, which on segment 4 become more or less confluent with basal band. Legs black, all knees broadly, front and middle tibiae except behind or beneath, front tarsi and middle basitarsi pale yellow. Antennae fuscous, scape beneath yellow and flagellum yellowish brown. Mandibles pale yellow except red tips. Proboscis fuscous. Tegulae subhyaline, base pale yellow. Wings slightly dusky hyaline, nervures testaceous brown, margins of stigma especially on inner side, and apical part of subcosta more infuscated.

Head as broad as long; cheeks rounded, two-thirds as wide as eyes. Posterior ocelli closer to occipital margin than their distance apart, and a little closer still to nearest eye. Facial foveae twice as wide as very narrow interval between them and eyes and reaching from level of middle of antennal sockets two-thirds of distance to level of anterior ocellus. Face below antennae evenly convex; disk of clypeus somewhat broader than high, with lateral extensions but little visible in frontal aspect. Pterostigma about two-thirds as wide as first submarginal; marginal cell only slightly longer beyond them beneath stigma, but metacarpus nearly twice as long as apical truncation. Head and thorax mostly dull; frons and vertex granular tessellate, opaque, and impunctate; mesonotum strongly tessellate, but not opaque, and with moderately sparse minute punctures. Pubescence rather long, fine and erect; moderately thin and long on face and mesonotum, and longer, denser and whiter on cheeks and underparts of thorax. Abdomen elongate oval, depressed; pygidial plate as broad as long, with sides arcuately converging to strongly notched apex, point on each side of notch subacute. Length: 6 mm.; anterior wing, 4 mm.

New records.—WYOMING. Sweetwater Co.: 6 males, 1 female, 10 miles east of Farson, on *Chrysothamnus*, Aug. 9, 1963 (Bohart and Torchio). UTAH. Grand Co.: 1 female, 25 miles south of Moab, on *Chrysothamnus*, June 10, 1963 (Bohart and Brumley).

Perdita croceipes Timberlake

Perdita croceipes Timberlake, 1960, Univ. Calif. Publ. Entom., 17:72, ♂.

Material collected in Eddy County, New Mexico, includes the previously unknown female. In the 1960 key the female runs to *rhodura*, but differs in the white face markings, with a supraclypeal mark present, and in the white ground color of abdomen, not reddened toward apex.

Female.—Head and thorax dark green. Base of mandibles, labrum, clypeus, supraclypeal and lateral marks creamy white; supraclypeal mark nearly twice as broad as high, the elevated part of supraclypeal area between antennal sockets black. Lateral marks triangular, intruding slightly between foveae and eyes. Collar of pronotum, band on hind margin of disk interrupted medially, but continuous laterally with large mark on tubercles white. Abdomen white, with band

at base of tergite 1 and bands at junction of tergites 1-2 to 4-5 fuscous; tergite 5 with three small irregular fuscous spots subapically. Legs white or yellowish white, including apex of coxae and trochanters; front and middle femora black, except broadly at apex and on lower margins; hind femora black except apex; hind tibiae with a fuscous blotch on both sides of apical half but not reaching apex. Scape of antennae yellowish white, except for triangular fuscous mark on apical half above; pedicel and flagellum narrowly fuscous above, but paler toward apex, and dull pale yellow beneath. Proboscis pale brown. Tegulae white at base, subhyaline on margin. Wings clear hyaline, almost whitish, nervures and margins of stigma testaceous, subcosta brown.

Head as broad as long; cheeks about two-thirds as wide as eyes. posterior ocelli nearly their distance apart from occipital margin and distinctly closer to nearest eye. Frontal foveae well impressed, their own width from margin of eyes and reaching from slightly below level of upper margin of antennal sockets somewhat more than half-way to level of anterior ocellus. Face below antennae moderately convex; disk of clypeus nearly twice as broad as high, with lateral extensions broadly inflexed but mostly visible in frontal aspect. Mandibles tapering, acute. Proboscis of moderate length, galeae almost reaching base of stipites. Pterostigma about three-fourths as wide as first submarginal cell; marginal cell as long as stigma, with part beyond somewhat longer than part beneath; second submarginal cell narrowed more than half to radius. Frons and vertex strongly tessellate, dull and with rather close but very obscure fine punctures; mesonotum less strongly tessellate and more shining than frons, with moderately close minute punctures. Pubescence whitish, moderately abundant, fine, erect and moderately long; hair brush on front coxae rather long and dense. Abdomen of usual form; pygidial plate about as long as wide at base, sides strongly converging to rather narrow apex with median notch. Length: about 5-5.5 mm.; anterior wing, 3.6-3.8 mm.

New records.—NEW MEXICO. Eddy Co.: 2 males, 10 females, 6.3 miles east of Carlsbad, on *Gutierrezia microcephala*, Oct. 2, 1962 (Timberlake and Papp); 11 males, 3 females, one-half mile north of state line (highway 62) on same flower, Oct. 2 (Timberlake). Socorro Co.: 1 male, 3 miles west of Bingham, on *Baileya*, Sept. 13, 1961 (P. D. Hurd, Jr.). ARIZONA. Mohave Co.: 2 females, 7 miles west of Peach Springs, on *Gutierrezia*, Sept. 28, 1964 (Timberlake). UTAH. Kane Co.: 1 female, Glen Canyon, on *Gutierrezia*, Sept. 23, 1964 (Timberlake).

Perdita crotonis Cockerell

Since the treatment of this species in 1960 two additional subspecies have been recognized, of which *juabensis* was described in 1962 and *perpicta* herewith. In the male sex these two are distinguished from each other and other forms in the following key:

KEY TO CERTAIN SUBSPECIES OF CROTONIS

1. Abdomen with four dark bands including one at base of tergite 1.....2
 Dark band at junction of tergites 3 and 4 evanescent or absent, with apical margins of tergite 3 orange fulvous; white bands of abdomen very broad.....*crotonis crotonis* Cockerell
2. White bands of abdomen more or less broad, even and entire.....3
 White bands very narrow, more or less abbreviated or interrupted; thorax and dark part of head shining dark blue.....*crotonis caerulea* Timberlake
3. Tergite 4 more or less definitely white across the middle.....4
 Tergite 4 orange fulvous, sometimes paler across middle but not whitened.....5
4. Tergite 4 with fuscous band at base unusually wide, the white band across middle interrupted or delineated apically by a transverse fuscous mark on each side *crotonis dilucida* Timberlake
 White bands broad and even; dark band at base of tergite 4 narrow except for rounded dilation at outer ends; wings more whitened than usual.....*crotonis juabensis* Timberlake
5. White bands comparatively broad; tergite 4 not paler across middle; wings somewhat whitened, margins of stigma and subcosta brownish.....*crotonis cucullata* Timberlake
 White bands generally less broad and more narrow at outer ends on tergites 1 and 3; tergite 4 often paler across middle; wings slightly dusky, nervures darker.*crotonis perpicta*, n. subsp.

***Perdita crotonis perpicta*, n. subsp.**

Material from Kansas and Nebraska formerly included in *dilucida* is now referred to *perpicta*.

Female.—Head and thorax dark blue green, base of mandibles, clypeus, lateral and supraclypeal marks white. Lateral marks in form of equilateral triangles or moderately higher than wide. Supraclypeal mark transverse and sometimes divided into two spots. Collar of pronotum, transverse mark on each side of hind margin of disk and tubercles white. Abdomen with three broad white bands on basal segments and four fuscous bands subequal to the white; three apical segments orange fulvous, tergite 4 sometimes paler across middle but not much if at all whitened. Legs black, apex of all femora, front and middle tibiae except beneath and all tarsi white. Antennae blackish, scape broadly white beneath and flagellum yellowish brown beneath. Labrum testaceous or fuscous. Mandibles shading through testaceous to red at apex. Proboscis fuscous, galeae paler. Tegulae hyaline, white at base. Wings slightly dusky, nervures pale testaceous brown, margins of stigma and subcosta pale fuscous.

Other characters normal for species. Length: about 4.5–6 mm.; anterior wing, 3.2–3.4 mm.

Male.—Similar to female, but face white below level of antennae, including labrum. First three tergites of abdomen with subequal black and white bands, white bands on tergites 1 and 3 often considerably narrowed at outer ends; four distal tergites orange fulvous, with tergite 4 sometimes paler but hardly whitened across middle. Scape of antennae white beneath, flagellum yellowish brown beneath, but two or three apical joints entirely dark.

Other characters normal for species. Length: 4–5 mm.; anterior wing, 2.8–3.4 mm.

Holotype female and allotype.—Ojo Caliente, Arriba Co., New Mexico, on *Eriogonum*, July 31, 1962 (D. C. Heninger).

Paratypes.—Six females, 38 males taken with types (Heninger). NEBRASKA. Thomas Co.: 14 females, 10 males, 3 miles east of Theftord, on *Euphorbia marginata*, Aug. 19, 1960 (W. E. La Berge). Grant Co.: 3 females, 6 males, 5 miles west of Hyannis, July 24, 1959 (La Berge). Sioux Co.: 3 females, 7 miles north of Harrison, Aug. 13, 1962 (J. K. and B. L. Rozen).

The six specimens recorded under *dilucida* in 1960 may be considered to have paratypic value, although not actually paratypes.

Types in collection of the University of California, Riverside; paratypes in the collections of the University of Nebraska, the American Museum of Natural History and of G. E. Bohart.

***Perdita dolichocephala* Swenk & Cockerell**

Perdita wunderi Cockerell, 1922, Amer. Mus. Novitates, 33:10, ♀ (new synonymy).

Through the kindness of Jerome G. Rozen the type of *wunderi* has been examined. It is essentially like *dolichocephala* except in the larger face marks. The small and very narrow abdominal markings of *wunderi* may or may not occur in typical *dolichocephala*. Anterior margin of clypeus and two rather broad arcuate stripes on disk, and lateral marks yellowish white; lateral marks filling space between clypeus and anterior end of eyes and with a narrow orbital extension to anterior end of facial foveae.

As typical females of *dolichocephala* have been taken much further west in Colorado than Wray it is very probable that *wunderi* is no more than an individual variant of the species.

One female (type of *wunderi*), 3 males, Wray, about 3,700 feet, Yuma Co., Colorado, August 17–19, 1919 (F. E. Lutz), in the American Museum.

***Perdita fallax* Cockerell**

Perdita fallax fontis Cockerell, 1922, Amer. Mus. Novitates, 23:9 ♀ (new synonymy).

New records.—One female, 3 miles west of Bingham, Socorro Co., New Mexico, on *Baileya*,

Sept. 13, 1961 (P. D. Hurd, Jr.); 1 female, Brazos Co., Texas, on *Heterotheca*, Oct. 13, 1963 (A. H. Alex).

The Texas specimen is not typical, and differs in being duller, with frons and mesonotum about equally opaque. Pronotum entirely dark; antennae blacker, scape entirely dark; dark stripes on disk of clypeus well developed. Abdominal markings not reaching lateral margins although touching lateral foveae on tergite 2; tergite 4 entirely dark. Marginal cell with part beneath stigma longer than part beyond (reverse true for typical *fallax*). Pygidial plate as broad as long, sides arcuately converging to rounded and distinctly notched apex.

Through the kindness of Jerome G. Rozen the type of *fontis* has been examined and found to fall within the range of variation of females of *fallax* recorded in 1960.

Type female of *fontis*, Glenwood Springs, Garfield Co., Colorado, Aug. 5, 1920 (Lutz), in the American Museum of Natural History.

Perdita flavicauda Timberlake

(Plate figs. 1233, 1234, 1320)

Perdita flavicauda formosa Timberlake, 1960, Univ. Calif. Publ. Entom. 17:40, ♀ (new synonymy).

New material includes the male, previously unknown, and additional females from the Coachella Valley and from west of Blythe indicate that the subspecies *formosa* has no validity.

Male.—Head and thorax dark bluish green. Anterior half of gular region of head, inferior orbits rather broadly to middle of eyes, labrum and face to a little above level of antennae creamy white, changing to pale yellow in triangular area between and above antennal sockets. Pronotum pale yellow, with a broad dark band from flank to flank, abbreviated on flanks and with a narrow median projection to hind margin of disk. Abdomen pale yellow, whitish beneath, with fuscous markings as follows: trifold band at base of tergite 1, narrow band at base of tergites 2 to 5 (traces of band also on tergite 6), usually more or less covered or concealed by preceding segments, and transversely oval mark on each side of apical part of tergites 1 and 2 (or 1 to 3). Legs pale yellow, hind coxae except broadly at apex, hind femora except on apical fourth and on dorsal margin nearly to base, fugitive spot on posterior side of middle femora and small mark on apical half of posterior side of hind tibiae black. Antennae yellow, pedicel and following joints above dilutely fuscous, the color gradually dimmer toward apex. Tegulae nearly hyaline, spot at base white. Wings whitish hyaline, nervures pale testaceous, stigma opaquely white, margins of stigma and subcosta pale brown.

Head rotund, as broad as long; cheeks evenly rounded and narrower than eyes. Facial foveae small, oval, about twice as long as wide. Disk of clypeus considerably broader than high, lateral extensions broadly inflexed but partly visible in frontal aspect. Mandibles slender, acute, and reaching far margin of fossa. Proboscis rather long, about twice as long as head, when fully extended. Flanks of pronotum not impressed. Pterostigma moderately large, about two-thirds as wide as first submarginal cell; marginal cell as long as stigma, parts beneath and beyond stigma equal, with metacarpus nearly twice as long as apical truncation. Head and thorax moderately shining, impunctate, frons and mesonotum very minutely tessellate. Pubescence white, moderately long and coarse; moderately abundant on face and mesonotum, denser on cheeks, and somewhat longer on underparts of thorax. Abdomen oval; tergite 7 narrowed to obtuse apex. Subgenital plate acutely triangular, apical half of disk minutely pubescent. Caulis of genital armature nearly as long as wide, with large basal orifice and no dorsal lobes; parameral lobes unusually long and slender, and moderately widened at base as seen from side; volsellae well exposed in dorsal view; sagittae elongate fusiform, not at all angulated at sides, and acute at apex, and in lateral view subdepressed and not much sinuate except for the basal rods. Length: about 4.5–4.8 mm.; anterior wing, 3.1–3.2 mm.

Female.—All femora with dark marks in type of *formosa*; clypeus with abbreviated dark discal stripes and a dark mark at anterior end of subantennal plates. One additional female from near Blythe agrees closely with typical *flavicauda*, and a female from Thousand Palms is much like the type of *formosa*.

New records.—CALIFORNIA. Riverside Co.: 1 female, 8 miles west of Blythe, May 24, 1954 (G. H. Nelson); 2 males, 18 miles west of Blythe, April 25, 1961 (Rozen and Schrammel); 1 female, Thousand Palms, March 20, 1963 (F. D. Parker).

***Perdita flavifrons*, n. sp.**

(Plate figs. 1235, 1236, 1321)

This species, based on males from New Mexico and Utah, has the face yellow to level of ocelli except for an oblique green lobe on each side. In the 1960 key it runs near *luteiceps*, *trifida*, and *flaviceps*, but the yellow of thorax is restricted to the pronotum and a T-mark on mesopectus, the arms of which are broadly separated from the yellow on tubercles.

Male.—Head and thorax green, becoming more or less blue on propodeum and sides of thorax. Undersurface of head except occiput, mandibles except red tips, labrum and face to level of summit of eyes bright yellow. Cheeks yellow to beginning of posterior third of margin of eyes. Green of vertex with a narrow lobe extending obliquely halfway from inner side of posterior ocelli toward adjacent fovea, the yellow extending from summit of eye to posterior ocelli, the anterior ocellus almost enclosed by the green. Pronotum yellow with dark crossband on disk, extending more narrowly halfway down on flanks. Prosternum and broad-limbed T-mark on mesopectus yellow, the arms of T-mark ending well separated from yellow of tubercles. Abdomen yellow, with six narrow fuscous bands, that at base of tergite 1 strongly trifid. Legs yellow, hind femora except at base, apex and broadly on upper margin, hind tibiae except at base and underneath, hind tarsi and streak on posterior side of middle tibiae fuscous (in paratype hind femora dark only behind, hind tibiae more broadly yellow beneath, and middle tibiae entirely yellow). Antennae yellow, flagellum more orange yellow; spot on dorsal side of pedicel and joint 1 of flagellum, and narrow incomplete annulus on joints 2 to 4 of flagellum brown or fuscous. Proboscis yellow. Tegulae yellow, broadly testaceous hyaline on outer margin. Wings slightly dusky, nervures brownish testaceous, subcosta more brownish (nervures darker in paratype).

Head slightly broader than long; cheeks rounded, as broad as eyes. Posterior ocelli nearly equally distant from each other, occipital margin and nearest eye. Facial foveae black, well impressed, twice as long as wide (in paratype broadly oval, slightly longer than wide). Face below level of antennae subdepressed; disk of clypeus but little broader than high, with summit broadly subtruncate (convexly arcuate to a slight degree), lateral extensions broadly inflexed but visible in frontal aspect. Mandibles tapering, acute and not quite reaching far margin of fossa. Proboscis not surpassing fossa, galeae reaching base of stipites in repose. Pterostigma about half as wide as first submarginal cell; marginal cell slightly longer beyond than beneath stigma, metacarpus nearly twice as long as apical truncation. Frons and vertex strongly and minutely tessellate, dull and impunctate; mesonotum strongly tessellate, moderately shining, and with sparse minute punctures. Pubescence whitish, erect and moderately long; rather short, somewhat coarser and thin on mesonotum, and longer and denser on cheeks, vertex and underparts of thorax; hair of frons fine and very short in type, but longer in paratype. Abdomen of usual form, with apical lobe of tergite 7 as long as wide at base, sides converging to moderately narrow, ogival apex. Subgenital plate equilaterally triangular, pubescence on apical half of disk fringing margin briefly. Caulis of genital armature oval, dorsal lobes subacute; parameral lobes shorter than usual and strongly incurved; volsellae well exposed in dorsal view and subequal in length; sagittae depressed, thinly fusiform and distinctly angulate beyond the middle in dorsal view. Length: 4.5–4.8 mm.; anterior wing, 2.7–2.9 mm.

Holotype male, 24 miles west of Carrizozo, Lincoln Co., New Mexico, on *Gutierrezia microcephala*, Sept. 12, 1961 (Timberlake).

Paratype.—One male, Lucia, Box Elder Co., Utah, on *Chrysothamnus*, July 30, 1963 (Bohart and Torchio).

Type in collection of the University of California, Riverside; paratype in collection of G. E. Bohart.

Perdita fuscipes, n. sp.

This bee is allied to *phymatae*, but face marks well developed, pronotum entirely dark, and abdominal markings in form of almost longitudinal spots close to lateral margins of tergites 2 and 3.

Female.—Head and thorax slightly bluish green; clypeus and supraclypeal area black, broad median stripe on clypeus and triangular lateral marks reaching very bluntly to level of antennae white. Thorax entirely dark. Abdomen fuscous, tinged with brown, with white markings more longitudinal than transverse on lateral margins of tergites 2 and 3, and small dot on each side of tergite 1; marks on tergite 2 about three times longer than wide and parallel to lateral margins, and those on tergite 3 more irregular and subtriangular, leaving basal corners of segment dark. Pygidial plate testaceous, venter dark. Legs fuscous, front and middle knees with small testaceous spot, streak on anterior side of front tibiae white. Antennae blackish (lacking in type beyond pedicel). Mandibles testaceous, shading into red on apical half and white at extreme base. Proboscis fuscous, galeae apparently entirely fuscous. Wings strongly dusky, nervures testaceous brown, subcosta fuscous.

Head broader than long (crushed and split open on anterior half, accentuating transverse form in type); cheeks rounded, about two-thirds as wide as eyes. Posterior ocelli their distance apart from nearest eye and closer to occipital margin. Facial foveae as wide as interval between them and eyes, narrowed above, and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae subdepressed; disk of clypeus broader than high, with lateral extensions partly visible in frontal aspect. Mandibles tapering, acute. Proboscis moderately long, galeae about as long as stipites. Pterostigma two-thirds as wide as first submarginal cell; marginal cell with parts beneath and beyond stigma subequal, metacarpus distinctly longer than apical truncation; first and second abscissae of radius subequal. Frons, vertex, and mesonotum strongly tessellate, dull, but not opaque, mesonotum about as dull as frons and with minute, well-separated punctures. Pubescence apparently thin, whitish, fine, moderately long and erect (but in poor condition in type), with hair of mesonotum rather short. Pygidial plate of abdomen broader than long, sides strongly converging to rounded and very slightly retuse apex. Length: about 4 mm.; anterior wing, 2.7 mm.

Holotype female, Arch, Roosevelt Co., New Mexico, June 10, 1961 (D. C. Henninger).

Type in collection of the University of California, Riverside.

Perdita gutierreziae Cockerell

In my 1960 account of *gutierreziae*, males from Sioux County, Nebraska, were included, in accordance of treatment of Swenk and Cockerell, although they differed from typical *gutierreziae* in color characters. Such specimens are now considered to be the previously unrecognized male sex of *melanostoma*. Since 1960 I have had the opportunity to collect both species in New Mexico and have observed that both frequently fly to the same flower, which is usually *Gutierrezia*.

Material of *gutierreziae* from New Mexico differs in the female sex from specimens from southern California in having femora mainly black except at apex, front and middle tibiae more or less black behind, white bands of abdomen moderately wide, and pronotum dark, with collar, posterior marks on disk and tubercles white. Females from California have femora more or less white, at least on anterior side, front and middle tibiae nearly all light, pronotum white, with a dark cross band and white bands of abdomen very broad.

New records.—NEW MEXICO. Luna Co.: 2 males, 17 miles east of Deming, on *Gutierrezia*, Sept. 13, 1957 (R. C. Dickson). Dona Ana Co.: 1 male, Mesilla Park, Sept. 7, 1961; 2 females, 12

males, 5.3 miles east of Mesilla Park, Sept. 30, 1962; 1 female, 8.1 miles east of Mesilla Park, Sept. 30, 1962; 5 males, 6.5 miles east of Las Cruces, Oct. 6, 1962 (Timberlake), all on *Gutierrezia lucida*. Lincoln Co.: 1 female, 1 male, 24 miles west of Carrizozo, on *Gutierrezia microcephala*, Sept. 12, 1961 (Timberlake and Hurd). Socorro Co.: 1 male, 3 miles east of Bingham, on *Gutierrezia microcephala*, Sept. 12, 1961 (Timberlake); 18 males, same place and flower, and 1 male on *Baileya*, Sept. 13 (Timberlake); 15 males, same place on *Baileya pleniradiata*, Sept. 13 (P. D. Hurd, Jr.); and 1 male, same place, on *Sphaeralcea*, Sept. 13 (Timberlake); 5 males, 11 miles east of San Antonio, on *Gutierrezia microcephala*, Sept. 12, 1961 (Timberlake). ARIZONA. Cochise Co.: 1 female, 1 male, 6.5 miles north of Apache, on *Gutierrezia microcephala*, Oct. 4, 1962 (Timberlake).

Swenk and Cockerell (1907) recorded specimens of *Perdita* from Nebraska as *gutierreziae*, but the females were actually *rhodura* and the males belong with *melanostoma*.

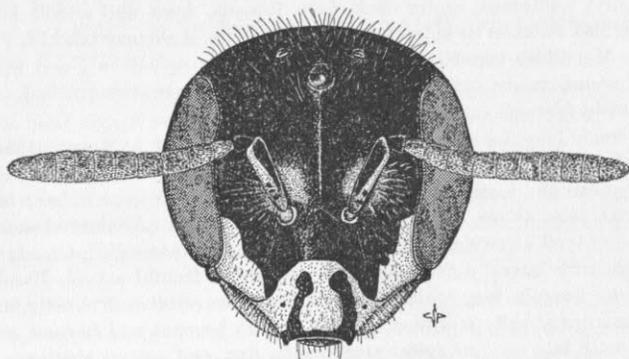


Fig. 10. *Perdita hirtella*. Frontal view of head of female.

Perdita hirtella, n. sp.

In the 1960 key the female of *hirtella* runs to *electa* and *retusa* in couplet 66 but it is considerably smaller with the light bands of abdomen not passing over lateral margins except very slightly on tergite 1 and not even reaching the lateral margins on tergites 3 to 5.

Female.—Head and thorax somewhat brassy green, supraclypeal area black, labrum fuscous. Clypeus and lateral marks pale yellow; anterior margin of clypeus and small mark on each side of summit of disk brown; lateral marks triangular, higher than wide, and ending rather broadly and obliquely at anterior end of foveae. Small mark on each side of hind margin of pronotum and tubercles white. Abdomen blackish, with rather broad entire whitish bands on tergites 1 to 5, that on tergite 5 more or less abbreviated, that on tergite 1 passing over onto reflexed parts of segment, the others not reaching lateral margins, although broadly touching lateral foveae on tergite 2. Legs dark, apex of all femora, front and middle tibiae except behind and front tarsi pale yellow. Antennae fuscous above, more brownish toward apex, scape except dorsal margin of apical half and underside of pedicel pale yellow, and underside of flagellum more brownish yellow. Base of mandibles white, apical third red. Proboscis fuscous, galeae pale brown. Tegulae testaceous hyaline, base broadly yellowish white. Wings dusky hyaline, nervures pale testaceous brown, subcosta brown.

Head as broad as long, cheeks two-thirds as wide as eyes. Posterior ocelli about their distance apart from nearest eye and occipital margin. Facial foveae narrow, their own width from margin of eyes, and reaching from slightly above upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae evenly convex; disk of clypeus broader than high, with lateral extensions strongly inflexed and visible only at inner ends in frontal

aspect. Mandibles tapering, acute. Proboscis moderately long, galeae as long as stipites. Pterostigma about one-half as wide as first submarginal cell; marginal cell as long as stigma, with part beyond stigma somewhat longer than part beneath. Frons, vertex and mesonotum tessellate and moderately dull, with mesonotum nearly as dull as frons. Punctures of mesonotum minute, moderately sparse, and those of frons obscure. Pubescence white, somewhat coarse and erect, the hair of frons very short and that of mesonotum rather abundant and moderately long, like that of cheeks but less dense. Abdomen of usual form; pygidial plate as broad as long, apex rather broadly ogival and distinctly notched. Length: about 4.5 mm.; anterior wing, 3.4 mm.

Holotype female, Heber, Wasatch Co., Utah, Aug. 11, 1962 (R. M. Bohart).

Paratype.—One female, same data.

Type in collection of the University of California, Riverside; paratype in the University collection at Davis.

Perdita hirticeps Timberlake

A male from Idaho is a new variety of *hirticeps* and may prove to belong to a distinct new subspecies when adequate material is available. The male of *hirticeps luteocincta* is unknown, but from the male of *hirticeps candidipennis* the Idaho specimen differs in having the abdominal bands yellow and entire on tergites 2 to 4, head and thorax dark green instead of blue and the subantennal plates dark-margined below. From *hirticeps hirticeps* it differs in the clearer wings, with paler nervures, whiter pubescence, and in lacking lateral marks on disk of pronotum. From *hirticeps apicata* it differs in the entire yellow bands of abdomen, dark disk of pronotum and legs with less white at apex of femora and on anterior side of middle tibiae.

New record.—One male, Sand Dune Lakes, Owyhee Co., Idaho, June 13, 1962 (W. F. Barr).

Perdita hirticeps candidipennis Timberlake

Both sexes of *candidipennis* have been collected at Cornish, Utah, and the male is new.

Male.—Head and thorax blue. Mandibles except red tips, labrum, and face below level of antennae white (one has subantennal plates entirely dark). Collar of pronotum, small spot on each side of disk and tubercles white. Abdomen fuscous, with narrow, interrupted white band on tergites 1 to 4, that on tergite 4, interrupted also on each side, or reduced to two submedian marks, or lacking. Legs dark, apex of femora, anterior side of front tibiae, more or less of anterior side of middle tibiae, and their tarsi white. Antennae fuscous, scape broadly white beneath, and joints 4 to 8 of flagellum yellowish beneath. Tegulae hyaline, base fuscous, edged with white. Wings almost whitish hyaline, nervures testaceous, margins of stigma brown, subcosta fuscous except toward base.

Other characters normal for *hirticeps*. Length: about 4.8–5 mm.; anterior wing, 3.1–3.4 mm.

New record.—Four females, 4 males, Cornish, Cache Co., Utah, on *Stephanomeria*, Aug. 4, 1959 (G. E. Bohart and R. A. Nielsen).

Perdita idonea, n. sp.

(Plate figs. 1237, 1238, 1322)

Perdita knowltoni Timberlake, 1960, Univ. Calif. Publ. Entom., 17:51, figs. 562, 563, 883 ♂ (excluding type ♀).

The female of *idonea* runs to *crotonis* in the 1960 key but differs in smaller size, tessellate and dull mesonotum, abdomen less reddened on apical segments and with four narrow dark bands. In the same key the male runs to *knowltoni* and the specimen supposed to belong with *knowltoni* undoubtedly belongs here but is not exactly typical.

Female.—Head and thorax dark green, supraclypeal area black. Mandibles except reddish tips, labrum, clypeus, triangular lateral marks reaching anterior end of foveae, and often two small dots or spots on anterior part of supraclypeal area white. Collar of pronotum, large cuneate mark on each side of disk and large mark on tubercles white. First three segments of abdomen yellowish white; slender-pronged trifold mark at base of tergite 1, narrow band at junction of tergites 1-2 and 2-3, lateral foveae of tergite 2 and abbreviated narrow band at apex of tergite 3 fuscous or black; three apical segments fulvous yellow, unmarked. Legs yellowish white, dorsal side of hind coxae black and hind tibiae slightly infuscated on posterior side. Antennae blackish above, scape white except above on apical half, pedicel and flagellum changing from white to dull yellowish beneath toward apex, the terminal joint nearly all pale. Proboscis yellow, stipites more infuscated. Tegulae testaceous hyaline, large mark at base white. Wings faintly dusky hyaline, nervures pale testaceous brown, becoming pale testaceous at base of stigma and base of subcosta.

Head as broad as long, cheeks narrower than eyes. Posterior ocelli a little more than half their distance apart from occipital margin and about two-thirds of same distance from nearest eye. Facial foveae narrow, about their own width from margin of eyes and reaching from upper level of antennal sockets about one-half of distance to level of anterior ocellus. Face below antennae gently convex; disk of clypeus large, broader than high and well rounded above; lateral extensions more weakly inflexed than usual and visible in frontal aspect. Mandibles slender, tapering, acute. Proboscis moderately long, galeae reaching base of stipites. Pterostigma about four times longer than wide and somewhat more than two-thirds as wide as first submarginal cell; marginal cell somewhat longer beyond than beneath stigma, with metacarpus distinctly longer than apical truncation. Frons, vertex and mesonotum strongly tessellate and about equally dull. Punctures of frons sparse and very obscure, those of mesonotum fine, distinct and rather close. Pubescence white, very sparse on face, short, erect and abundant on mesonotum, and longer and thinner on cheeks and sides of thorax; hair of front coxae shorter and thinner than usual. Pygidial plate short, as broad as long, arcuately narrowed to rounded apex, which is slightly refuse in middle. Length: about 4-4.5 mm.; anterior wing, 3-3.1 mm.

Male.—In general as described for the supposed male of *knowltoni*. Head and thorax more bluish green than in female. Cheeks yellow to middle of eyes, then very narrowly to summit of eyes. Yellow marks on hind border of disk of pronotum separated from mark on tubercles (confluent with mark on tubercles in Moab male). Antennal scape yellow, pedicel fuscous above and next four joints with transverse pale fuscous marks, flagellum otherwise fulvous yellow.

Mesonotum less strongly tessellate than in female, the punctures sparser, the hair longer, coarser, and thinner. Face rather thinly hairy, but cheeks and underparts of thorax with much longer, coarser, and denser hair than in female. Apical lobe of tergite 7 short, about as broad as long and moderately narrowed to rounded apex. Length: 4 mm.; anterior wing, 3 mm.

Holotype female and allotype.—Sixteen miles west of Glen Canyon, Kane Co., Utah, on *Gutierrezia*, Sept. 23, 1964 (Timberlake).

Paratypes.—UTAH. Kane Co.: 3 females taken with types (Timberlake and Papp); 1 female, Glen Canyon, on *Gutierrezia*, Sept. 23 (Timberlake). Washington Co.: 1 female, 5 miles west of Hurricane, on *Gutierrezia*, Sept. 12, 1964 (Timberlake). Grand Co.: 1 male, Moab, Sept. 15, 1943 (G. F. Knowlton). ARIZONA. Coconino Co.: 2 females, 2 miles south of Page, on *Gutierrezia*, Sept. 23, 1964 (Timberlake).

Types in collection of the University of California, Riverside.

Perdita knowltoni Timberlake

New record.—One female, Moab, Grand Co., Utah, on *Chrysothamnus*, Sept. 30, 1960 (G. E. Bohart).

Perdita leechi, n. sp.

(Plate figs. 1239, 1240, 1323)

The male of *leechi* is very similar to *octomaculata* but has a larger, broader head, with broader cheeks, and face and mesonotum much more hairy.

Male.—Head and thorax dark bluish-green. Mandibles except red tips, labrum, face below level of antennae, except subantennal plates mostly dark, small spot at posterior corner of disk of pronotum and tubercles yellow (reddened by cyanide in type). Abdomen black, with a large pale yellow mark on each side of tergites 1 to 5, marks separated by more than their own transverse length, but by less than twice their length, those on tergites 2 and 3 curved backward at outer ends, those on tergites 1 and 2 with slender extension to lateral margins, others well separated from margins. Pygidial plate dark testaceous brown; venter dark. Legs blackish, all of femora, anterior side of front tibiae, and abbreviated line on middle tibiae yellow. Antennae blackish, flagellum mostly paler beneath, scape yellow except for dark line above nearly to base. Proboscis brown. Tegulae dark testaceous brown, base infuscated. Wings dusky hyaline to about same extent as in *octomaculata*, nervures and stigma brown, margins of stigma and subcosta blackish.

Head rather large and broader than thorax; cheeks rounded, about two-thirds as broad as eyes. Posterior ocelli somewhat closer to nearest eye than to occipital margin. Facial foveae rather large for a male, three times as long as wide and pointed at both ends. Face below antennae moderately convex; disk of clypeus large, but less than twice as broad as high, lateral extensions broad and exposed in frontal aspect. Proboscis moderately long, maxillary palpi two-thirds as long as galeae (in *octomaculata* nearly as long as galeae). Mandibles normal, acute, reaching far margin of labrum. Pronotum and wing venation virtually the same as in *octomaculata*. Head and thorax tessellate, frons and vertex opaque, mesonotum moderately dull and more shining than in *octomaculata*. Frons and vertex impunctate, parocular area of face with a few minute punctures and mesonotum with punctures minute and moderately close. Pubescence whitish, fine, mostly erect; short, rather dense on face, longer and thinner on vertex, and moderately long and rather thin on mesonotum; and long and denser on underside of head and thorax. Apical lobe of tergite 7 narrower than in *octomaculata*. Subgenital plate triangular, about as long as wide at base, bluntly rounded at apex and disk rather densely and minutely pilose on apical half. Genital armature normal for group, with parameral lobes moderately wide and thickened along ventral edge, sagittae rather elongate, angulate near middle and very acute at apex; apex of volsellae well exposed in dorsal view. Length: 5 mm.; anterior wing, 3.7 mm.

Holotype male.—Road to La Partosa, 5.5 miles northwest of Ensenado Todos Santos, Baja California, Mexico, Jan. 13, 1959 (H. B. Leech).

Type in collection of the California Academy of Sciences, San Francisco.

Perdita luteiceps Cockerell

New record.—One female, 7 males, 10 miles south of Lander, Fremont Co., Wyoming, on *Gutierrezia*, Aug. 9, 1963 (Bohart and Torchio).

Perdita maculipes Cockerell

The type male of *maculipes* runs in the 1960 key to the species distinguished in couplets 123 to 130 and differs from all the species there included except *ensenadensis* in having the yellow bands of abdomen enclosed except on tergite 6. It differs from *ensenadensis* in having the lateral arm of the mesopectal yellow mark extending broadly and obliquely to touch the yellow mark on tubercles, and the legs yellow with posterior side of front and middle tibiae and hind femora maculated with brown (in *ensenadensis* the yellow arms of T-mark end far from tubercles, and all femora as well as front and middle tibia blotched with brown or fuscous).

Male.—Head and thorax blue green. Undersurface of head and cheeks broadly to slightly above middle of eyes, mandibles except red tips, labrum, and face to general level of foveae yellow. Upper margin of yellow on frons very uneven, with broad lobe in middle, truncate at end, reaching halfway above foveae to level of anterior ocellus, and the green on each side sending a rather small lobe slightly below level of foveae. Pronotum yellow, a green band across

disk to flanks at level of tubercles. Prosternum and broad Γ -mark on mesopectus yellow; outer ends of arms of Γ -mark covering anterior margin of mesopleura to a little above level of tubercles, then with oblique truncate-emarginate extension toward middle coxae. Thorax otherwise dark. Abdomen rather dark brown, with yellow bands on tergites 1 to 6, all enclosed narrowly at outer ends except on tergite 6; band on tergite 1 broad in middle, acute at outer ends and nearly interrupted by dark line in median crease; bands on following segments about as wide as dark intervals. Venter yellow. Legs yellow, streaks on lower outer side of front and middle tibiae, blotch on dorsal half of posterior side of hind femora, and smaller spot close to apex and nearly on dorsal margin, brown; hind tibiae except beneath and outer margin of hind basitarsi more fuscous. Antennae yellow, brown above on pedicel and flagellum. Proboscis pale brown. Tegulae hyaline, base yellow. Wings nearly clear hyaline, nervures pale testaceous brown, subcosta slightly more brownish.

Head slightly broader than long; cheeks evenly rounded, nearly as wide as eyes. Facial foveae rather large but punctiform. Face below level of antennae gently convex; disk of clypeus about one and one-fourth times as broad as long, lateral extensions broad, inflexed, and partly visible in frontal aspect. Subantennal plates about twice as long as wide. Mandibles and proboscis (retracted in type) normal for group. Pronotum normal. Pterostigma rather narrow, hardly more than half as wide as first submarginal cell; parts of marginal cell beneath and beyond stigma subequal, with metacarpus slightly longer than apical truncation; second submarginal cell narrowed nearly two-thirds to radius. Head and thorax tessellate, moderately dull, the mesonotum apparently about as dull as frons (coarse pin has destroyed mesocutum except anterior and lateral margins). Pubescence whitish, moderately long and erect, rather dense on underside of head, and thinner on vertex, anterior border of mesoscutum and on scutellum, and shorter and thin on face. Abdomen oval, about twice as long as wide; tergite 7 narrowed to ogival and moderately narrow apex. Length: 3.8 mm.; anterior wing, 2.9 mm.

Holotype male, "Las Cruces, N.M. Holt 6," and recorded by Cockerell as "one example on *Bigelovia wrightii*, Sept. 5, 1895 (A. M. Holt)."

Type in collection of the Academy of Natural Sciences, Philadelphia.

Perdita melanostoma melanostoma Swenk and Cockerell

(Plate figs. 1241, 1242, 1324)

Perdita melanostoma Swenk and Cockerell, 1907, Entom. News, 18:57, ♀.

Perdita gutierreziae Swenk and Cockerell, 1907, Entom. News, 18:56, ♂ (not Cockerell, 1896); Timberlake, 1960, Univ. Calif. Publ. Entom., 17:56, ♂, in part (not Cockerell).

Melanostoma was described from the female collected at Glen, Sioux County, Nebraska, and the male has remained unknown up to the present time, but I now conclude that it can be none other than the male which Swenk and Cockerell thought was the male of *gutierreziae*. Both have been taken together repeatedly and even the male is perfectly distinguishable from *gutierreziae* now that its characters have been evaluated.

Male.—Dark part of head and thorax blue green. Anterior half of undersurface of head, cheeks broadly to upper third of eye, mandibles except red tips, labrum and face almost to level of anterior ocellus, bright yellow. Anterior margin of green on frons uneven, with a small projecting lobe on each side, foveae enclosed by yellow (except in one male from Tsegi Canyon, Arizona). Pronotum yellow, with small dark spot on each side, or with a cross band extending narrowly onto flanks. Notum of thorax entirely dark, sides and undersurface yellow, except a dark mark extending from beneath wings to middle coxae (occasionally dark mark enlarged to include anterior and inferior border of flanks of propodeum). Abdomen yellow, with six or seven pale brown or fuscous bands, including one at base of tergite 1 but the one at apex of tergite 6 faint or obsolete. Legs yellow, outer side of hind tibiae, and hind tarsi and streak on posterior side of middle tibiae fuscous. Antennae yellow, flagellum and pedicel narrowly brownish fuscous above, and flagellum beneath slightly brownish yellow. Proboscis yellow.

Tegulae hyaline, base yellow. Wings dusky hyaline, nervures testaceous brown, margins of stigma and subcosta fuscous.

Head slightly broader than long; cheeks rounded and two-thirds as wide as eyes. Posterior ocelli only slightly farther apart than distance to nearest eye or occipital margin. Facial foveae punctiform, a little longer than wide. Face below antennae moderately convex; disk of clypeus not much broader than high, lateral extensions broadly inflexed but largely visible in frontal aspect. Mandibles tapering, acute, and reaching far margin of fossa. Proboscis moderately long, galeae as long as stipites. Pterostigma about three times longer than wide, and three-fourths as wide as first submarginal cell; marginal cell with parts beneath and beyond stigma about equal, metacarpus not much longer than apical truncation; second submarginal cell

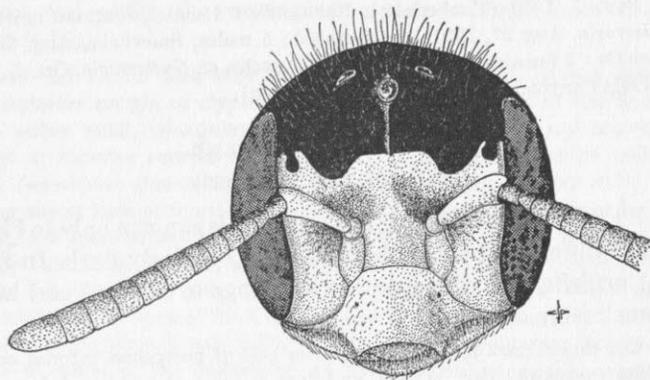


Fig. 11. *Perdita melanostoma*. Frontal view of head of male.

narrowed about one-half to radius. Head and thorax moderately shining, with frons and vertex tessellate and dull, and mesonotum almost as dull. Punctures of mesoscutum very fine and well separated. Pubescence white, erect, moderately long and thin, becoming slightly coarser on mesonotum and rather dense on cheeks. Abdomen normal, apical lobe of tergite 7 rather broadly ogival at apex. Subgenital plate triangular, broader than long, subacute at apex, and fine hair on apical half of disk. Genital armature much as in *gutierreziae*, but rather shorter and broader; apical part of parameral lobes somewhat broader as seen from above; sagittae shorter, with angles as seen from above not greatly beyond middle of length. Length: 4-4.5 mm.; anterior wing, 2.8-3 mm.

New records.—NEBRASKA. Dawes Co.: 1 female, Wood Reserve, Fort Robinson. SIOUX Co.: 14 males on *Gutierrezia*, Aug., 1903 (Swenk, Jones and Bruner), previously recorded under *gutierreziae*; 3 males, Aug. 28, 1959 (W. E. La Berge and O. W. Jackson). COLORADO. Costilla Co.: 1 male, Fort Garland, on *Chrysothamnus*, Aug. 9 (Bruner). UTAH. Washington Co.: 1 male, Enterprise, Aug. 25, 1960 (Knowlton). Kane Co.: 11 males, 16 miles west of Glen Canyon, on *Gutierrezia*, Sept. 23, 1965 (Timberlake). IDAHO. Owyhee Co.: 4 males, Sand Dune Lake, Sept. 9, 1963 (Barr and Hewitt). NEW MEXICO. Lincoln Co.: 1 female (in a population of *albocincta*), 24 miles west of Carrizozo, on *Gutierrezia*, Sept. 12, 1961 (Hurd).

Perdita melanostoma albocincta Timberlake (new status)

Perdita albocincta Timberlake, 1960, Univ. Calif. Publ. Entom., 17:78, ♀.

On comparison of *albocincta* with *melanostoma* an almost complete intergradation is revealed and it has been taken repeatedly with males that are not distinguishable from typical *melanostoma*.

New records (some made previously as male sex of *gutierreziae*).—NEW MEXICO. Santa Fe Co.: on *Gutierrezia*, Aug. 25, 1931 (Timberlake). San Miguel Co.: 3 males, near Rowe, on *Gutierrezia*, Sept. 5, 1930 (Timberlake). Valencia Co.: 3 males, near Correo, on *Gutierrezia*, Sept. 4, 1930

(Timberlake). Lincoln Co.: 7 females, 2 males, 8 miles north of Carrizozo, on *Gutierrezia*, Sept. 10, 1961 (Timberlake); 1 male, same locality, on *Aplopappus spinulosus*, Sept. 10 (Hurd); 4 females, 21 males, 24 miles west of Corrizozo, on *Gutierrezia*, Sept. 12, 1961 (Timberlake and Hurd). Socorro Co.: 4 females, 11 males, 3 miles west of Bingham, on *Gutierrezia* and *Baileya*, Sept. 12-13, 1961 (Timberlake and Hurd); 3 females, 2 males, 11 miles east of San Antonio, on *Gutierrezia*, Sept. 13, 1961 (Timberlake). Dona Ana Co.: 13 females, 5.3 miles east of Mesilla Park, on *Gutierrezia*, Sept. 30, 1962 (Timberlake and Papp); 1 female, 8 miles east of Mesilla Park, on *Gutierrezia*, Sept. 30 (Papp); 2 females, 6.5 miles east of Las Cruces, on *Gutierrezia*, Oct. 1, 1962 (Timberlake). Taos Co.: 7 males, 10 miles east of Ojo Caliente, Aug. 12, 1962 (J. G. and B. L. Rozen). ARIZONA. Apache Co.: 12 males, 36 miles east of Holbrook, on *Gutierrezia*, Sept. 3, 1930 (Timberlake). Navajo Co.: 4 males, southern entrance, Petrified Forest, on *Gutierrezia*, Aug 27, 1931 (Timberlake); 5 males, Snowflake, Aug. 29, 1957 (Univ. Kansas). Cochise Co.: 2 females, 6.5 miles north of Apache, on *Gutierrezia*, Oct. 4, 1962 (Timberlake); 1 male, Tsegi Canyon, Aug. 13, 1936 (D. D. Jensen).

***Perdita mesillensis*, n. sp.**

(Plate figs. 1243, 1244, 1325)

In Cockerell's table (1896) the male of *mesillensis* can run only to *bigeloviae* and *gutierreziae* but differs in having the mesopectus entirely dark. In the 1960 key it runs out at *aridella*, but differs in the markings of the legs and in having the mesonotum much more shining.

Male.—Head and thorax dark blue green. Anterior half of postgenae, inferior orbits to middle of eyes, mandibles except red tips, labrum, and face to level of middle of frons, clear yellow. Upper margin of yellow on frons touching anterior end of foveae, with broad lobe of green descending on each side halfway or more to level of antennae. Thorax dark, except yellow pronotum, with green band extending only slightly below middle of flanks, narrowed exteriorly on each side of disk, but with median extension to hind margin. Abdomen yellow; rather narrow brownish-fuscous bands at base of tergite 1 and at junction of tergites 1-2 to 6-7, the most distal band dilutely colored; lateral margins of tergites 2 to 6 more or less distinctly but very narrowly brownish, thus enclosing yellow bands more or less obscurely; yellow bands at least on tergites 1 to 4 broader than dark intervals. Legs yellow, hind tibiae except at base and beneath, and hind tarsi, brownish fuscous, a line or streak on posterior side of middle tibiae, and small spot or streak on posterior side of base of hind femora. Antennae yellow, flagellum more brownish yellow, pedicel and first three joints of flagellum brown above, remainder of flagellum only slightly darker above than beneath. Proboscis brownish fuscous, galeae testaceous brown. Tegulae testaceous hyaline, base yellow. Wings slightly dusky hyaline, nervures testaceous brown, nervures of marginal cell, margins of stigma and subcosta darker brown.

Head as broad as long; cheeks rounded, two-thirds as wide as eyes. Posterior ocelli closer to nearest eye than distance apart, and distinctly more removed from occipital margin. Facial foveae punctiform. Face below antennae moderately convex; disk of clypeus somewhat broader than high, with lateral extensions not much visible in frontal aspect. Mandibles tapering, acute, and reaching far margin of labrum. Proboscis moderate in length, galeae and stipites about equal. Pterostigma moderately large, not much more than half as wide as first submarginal cell; parts of marginal cell beneath and beyond stigma equal, and metacarpus only slightly longer than apical truncation. Head and thorax shining, frons and vertex distinctly tessellate and moderately dull, mesonotum weakly tessellate, shining and with minute sparse punctures. Pubescence whitish, fine and erect; thin and rather short on frons and mesonotum and distinctly denser but only moderately longer on cheeks. Tergite 7 with usual narrow apical lobe of *octomaculata* group. Subgenital plate broader than long, very acute at apex, lateral apodemes recurved. Genital armature with caulis almost as broad as long, with dors lobes blunt and separated by broad triangular emargination; parameral lobes moderately long and broad; fused body of sagittae broadly fusiform and weakly angulate in dorsal view, but very thin or depressed dorsoventrally. Length: 3-4 mm.; anterior wing, 2.4-2.7 mm.

Male holotype.—Three miles east of Mesilla Park, Dona Ana Co., New Mexico, on *Pectis pappos*, Sept. 7, 1961 (Paul D. Hurd, Jr.).

Paratypes.—Twenty-seven males on *Pectis* and 6 males on *Gutierrezia lucida*, 4.8 miles east of Mesilla Park, Sept. 13, 1965 (Timberlake).

Types in collection of the University of California, Riverside.

Perdita nitidella Cockerell

Additional material of *nitidella* includes females which agree with Cockerell's description of that sex and are also from the type locality. However, they are more shiny than the male, with the mesonotum almost polished, instead of distinctly tessellate and dullish.

Female.—Head and thorax dark blue green. Base of mandibles, clypeus and lateral marks creamy white. Anterior margin of clypeus and sometimes two stripes on disk brown or fuscous. Lateral marks rather small, triangular, reaching level of antennae, and sometimes having a small dark spot at anterior corners of face. Collar of pronotum, spot on each side of hind margin of disk (sometimes absent) and tubercles white. Abdomen creamy white, with five dark bands, including one at base of tergite 1, the white intervals more or less broader than the dark. Margins of tergite 5 more or less completely infuscated, enclosing the white, or sometimes the segment entirely dark. Legs fuscous, apex of front and middle femora rather broadly and including more or less of anterior side, front tibiae except dark streak behind, anterior side of middle tibiae, small spot at apex of hind femora, and front tarsi pale yellow or yellowish white. Antennae fuscous, scape beneath pale yellow and flagellum beneath pale yellowish brown. Labrum testaceous or more or less infuscated at base. Mandibles shading through testaceous to red at apex. Tegulae white, outer margin testaceous hyaline. Wings dusky hyaline, nervures brown, subcosta more infuscated.

Head about as broad as long; cheeks half as wide as eyes. Distance between posterior ocelli greater than distance to nearest eye and less than distance to occipital margin. Facial foveae their own width from margin of eyes and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae evenly convex; disk of clypeus nearly twice as broad as high, lateral extensions inflexed and not much visible in frontal aspect. Mandibles tapering acute. Proboscis moderately long, not exceeding fossa. Pterostigma about three times longer than wide and two-thirds as wide as first submarginal cell; marginal cell with parts beneath and beyond stigma equal, and metacarpus slightly longer than apical truncation. Head and thorax shining, frons and vertex smoothly tessellate and slightly dullish, mesonotum with only a faint tessellation. Punctures of frons and mesoscutum minute and sparse. Pubescence whitish, fine, erect; short and thin on mesonotum and longer and rather dense on cheeks. Pygidial plate about as long as wide at base, sides arcuately converging to ogival and slightly notched apex. Length: about 4.5 mm; anterior wing, 3 mm.

New records.—NEW MEXICO. Dona Ana Co.: 1 female, 3 miles east of Mesilla Park, on *Pectis papposa*, Sept. 7, 1961 (P. D. Hurd, Jr.); 1 female, 4 miles east of Mesilla Park, on *Bahia absinthifolia*, Sept. 5, 1961 (Timberlake); 1 female, 6.5 miles east of Las Cruces, on *Gutierrezia lucida*, Oct. 1, 1962 (Timberlake). Socorro Co.: 12 males, 3 miles west of Bingham, on *Baileya pleniradiata*, except four on *Gutierrezia microcephala*, Sept. 12–13, 1961 (Hurd and Timberlake). NEVADA. Clark Co.: 1 male, 1 mile east of Glendale, on *Gutierrezia lucida*, Sept. 22, 1964 (Timberlake).

Perdita oclusa, n. sp.

(Plate figs. 1245, 1246, 1326)

The male of *occlusa* runs to *fallax* in the 1960 key but differs in having yellow bands on tergites 1 to 5, all narrowly interrupted except on tergite 1, and not reaching lateral margins, that on tergite 1 much broadened in middle, with deep anterior notch. In *fallax* the bands are restricted to tergites 1 to 3, reach lateral margins and are more broadly interrupted.

Male.—Head and thorax dark bluish green. Mandibles except red tips, labrum, face to slightly above level of antennae, and sometimes anterior margins of postgenae and short narrow mark on inferior orbits bright yellow. Green of frons descending on each side to antennal sockets but enclosing, or partly enclosing, small yellow spot, which may be more or less confluent with the yellow of parocular area. Collar of pronotum, cuneate marks on each side of disk, large mark on tubercles and posterior margin of flanks below tubercles, yellow. Abdomen brownish fuscous, with yellow band not reaching lateral margins but narrowly interrupted medially on tergites 1 to 5, that on tergite 1 broadened in middle and divided, or nearly so, into two triangular marks by a deep anterior notch; two parts of band on tergite 2 sometimes widened at outer ends, and those on tergite 5 sometimes reduced or widely separated. Venter with much yellow and apical lobe of tergite 7 testaceous. Front legs yellow, except base of coxae, broad blotch on posterior side of femora and tibiae fuscous, but knees broadly annulated with yellow; other legs fuscous, with knees, mark on anterior side of middle trochanters and femora and anterior side of middle tibiae yellow. Antennae fuscous above, flagellum broadly dull yellow beneath, scape except triangular dark mark above and pedicel beneath bright yellow. Proboscis pale yellowish brown. Tegulae testaceous hyaline, small mark at base fuscous. Wings dusky hyaline, nervures and margins of stigma brown, subcosta fuscous.

Head as broad as long; cheeks rounded and as broad as eyes. Posterior ocelli about as far apart as distance to nearest eye and to occipital margin. Facial foveae narrowly oval. Face below antennae moderately convex; disk of clypeus not much broader than high, summit truncate between subantennal plates; lateral extensions partly visible in frontal aspect. Mandibles tapering, acute, and reaching far margin of labrum. Proboscis moderately long, slightly surpassing fossa in repose. Pterostigma rather small and half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed one-half, or somewhat more, to radius. Frons and vertex minutely granular tessellate and opaque; mesonotum strongly tessellate but less dull than frons. Punctures of mesoscutum minute, numerous but well separated. Pubescence whitish, fine, erect and moderately long; rather short, very fine and abundant on frons; thin and moderately short on mesonotum, and longer and denser on cheeks. Apical lobe of tergite 7 tapering to narrowly ogival apex. Subgenital plate and genital armature similar to same parts in *fallax*, with perhaps the most important difference being the more equal length of volsellae on each side. Length: 4.75–5 mm.; anterior wing, 2.9–3.1 mm.

Male holotype.—Walnut Canyon, about 6,500 feet, near Flagstaff, Coconino Co., Arizona, Aug. 18, 1934 (F. E. Lutz).

Paratype.—One male, same data.

Type in collection of the American Museum of Natural History, New York; paratype in collection of the University of California, Riverside.

Perdita ordinata Timberlake

New records.—ARIZONA. Cochise Co.: 3 males, Southwestern Research Station, 5 miles west of Portal, 5,400 feet, on *Heterotheca subaxillaris*, Aug. 21, 1962 (J. G. Rozen); 1 male, 5 miles northeast of Portal, Sept. 12, 1961 (Rozen and Statham). NEW MEXICO. Hidalgo Co.: 2 males, 4.8 miles north of Rodeo, on *Pectis papposa*, Sept. 4, 1961 (P. D. Hurd, Jr.). UTAH. Cache Co.: 1 male, Cornish, Sept. 5, 1961 (G. E. Bohart).

Perdita percincta, n. sp.

The female of *percincta* runs to *media* in the 1960 key, but differs in the bronzy green color, head broader than long, pygidial plate smaller, with apex rounded and slightly retuse, lateral face marks tending to be L-shaped, pronotum broadly green across disk, and abdomen with five well-developed white bands instead of four.

Female. Head and thorax dark green, supraclypeal area black. Basal half of mandibles, clypeus and lateral marks creamy white. Labrum and anterior margin of disk of clypeus testaceous;

anterior margin of lateral extensions of clypeus black except at inner ends. Lateral marks l-shaped, covering anterior end of parocular area from margin of eye to margin of clypeus, with orbital extension more or less parallel-sided and ending bluntly against anterior end of foveae. Collar of pronotum, large mark on each of hind margin of disk, and tubercles white. Abdomen blackish, with broad even white bands on tergites 1 to 5, as broad or broader than dark intervals, reaching lateral margins and passing over onto reflexed parts of segments, except on tergite 5, and with narrow deep emargination in front on tergite 1. Pygidial plate testaceous, venter mostly brown. Legs fuscous, apex of front and middle femora, front and middle tibiae and tarsi and knees of hind legs pale yellow. Antennae fuscous, flagellum broadly brownish yellow beneath, scape pale yellow except for triangular dark mark above. Mandibles shading into red at apex. Proboscis fuscous, galeae pale brown. Tegulae testaceous hyaline, base white. Wings faintly dusky hyaline, nervures almost uniformly testaceous brown.

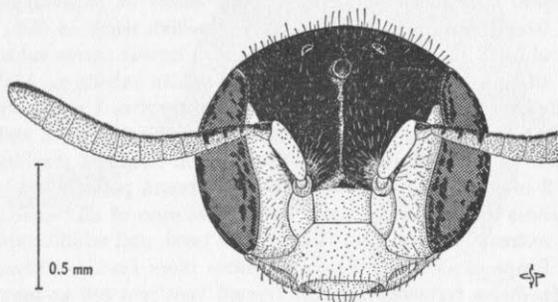


Fig. 12. *Perdita ordinata*. Frontal view of head of male.

Head distinctly broader than long; cheeks evenly rounded, two-thirds as wide as eyes. Posterior ocelli about their distance apart from occipital margin and somewhat closer to nearest eye. Facial foveae their own width from margin of eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae gently convex; disk of clypeus evenly rounded above, somewhat broader than high, with lateral extensions broadly but not strongly inflexed and at least half visible in frontal aspect. Mandibles tapering, acute. Proboscis moderately long, galeae reaching base of stipites. Pterostigma rather small, about two-thirds as wide as first submarginal cell; marginal cell as long as stigma, with parts beneath and beyond stigma subequal, metacarpus less than twice as long as apical truncation. Frons, vertex, and mesonotum strongly tessellate and moderately dull, mesonotum slightly more shining than frons. Punctures of frons and mesonotum fine and moderately close, those of mesoscutum more distinct. Pubescence whitish, rather thin, moderately long, fine and erect; hair of mesonotum sparse in type, but probably worn. Pygidial plate about as long as as wide, sides arcuately converging to rather broad, ogival and slightly retuse apex. Length: about 5 mm.; anterior wing, 3.8 mm.

Holotype female.—Skull Rock Pass, 6,100 feet, Utah, Aug. 20, 1957.

Type in collection of the University of Kansas, Lawrence.

Perdita rectangulata Cockerell

Perdita martini Stevens, 1919, *Canad. Entom.* 51:207, ♀, ♂ (not Cockerell) (new synonymy).

New record.—One female, 16 miles northeast of Howe, Butte Co., Idaho, on *Chrysothamnus* July 21, 1957 (W. F. Barr); 1 male, 9 miles north of Holbrook, Navajo Co., Arizona, on *Gutierrezia*, Sept. 27, 1964 (Timberlake).

The female from Idaho differs from typical *rectangulata* in having supraclipeal area brown, the frontal spot very faint and base of tergite 1 dark. It agrees in the distinctly yellow color of the markings of face and abdomen, lateral face marks

extending halfway or more between facial foveae and eyes, and abdomen with five broad yellow bands, reaching lateral margins of segments.

***Perdita reperta*, n. sp.**

(Plate figs. 1247, 1248, 1327)

This bee runs near *affinis* in the 1960 key to the *octomaculata* group but differs in the olive-green color of the head and thorax, with the mesonotum duller, rather densely hairy and virtually impunctate, the face marks smaller and nervures of wings darker.

Female.—Head and thorax dark olive green, with propodeum bluish, labrum, dark part of clypeus and supraclypeal area black (a slight metallic luster on supraclypeal area). Base of mandibles, marks on lateral margin of disk of clypeus, median mark on disk, and lateral marks white; median mark widened on anterior half of disk and lateral marks subtriangular and ending acutely at level of antennae. Thorax dark except white tubercles. Abdomen black, with moderately wide white bands on tergites 1 to 4; with narrow but not linear interruption, that on tergite 2 somewhat more broadly interrupted, and that on tergite 4 entire although notched in front and behind; all except on tergite 4 reaching lateral margins, with that on tergite 2 broadened at outer ends to pass around posterior end of lateral foveae. Pygidial plates testaceous orange; venter dark. Legs black, apex of all femora, front and middle tibiae except behind, extreme base of hind tibiae, front tarsi, and middle tarsi except on dorsal margin, pale yellow. Scape of antennae black, flagellum more fuscous above, and broadly dull yellowish beneath. Mandibles testaceous orange beyond base and red at apex. Proboscis black, galeae brownish. Tegulae testaceous, base white. Wings slightly dusky hyaline, nervures testaceous brown, margins of stigma, metacarpus and subcosta fuscous.

Head as broad as long; cheeks widest opposite posterior third of eyes. Posterior ocelli somewhat closer to nearest eye than their distance apart. Facial foveae close to margin of eyes and reaching from level of middle of antennal sockets two-thirds of distance to level of anterior ocellus. Face below level of antennae strongly convex; disk of clypeus about twice as wide as high, rounded at summit and broadly reflexed at sides, with lateral extensions not much visible in frontal aspect. Mandibles tapering, acute and reaching far margin of fossa. Proboscis moderately long. Pterostigma somewhat more than three times as long as wide, about three-fourths as wide as first submarginal cell; marginal cell distinctly longer beyond than beneath stigma, with metacarpus about twice as long as apical truncation; second submarginal cell narrowed one-half to radius. Head and thorax minutely tessellate and dull, frons and vertex nearly opaque, mesoscutum somewhat more shining. Clypeus with fine shallow punctures, but punctures of frons and mesoscutum excessively minute and obscure. Pubescence unusually abundant, about as dense as in *hirsuta*, but finer and less white, erect or suberect, moderately long on face and mesonotum and longer on cheeks and vertex. Pygidial plate as long as wide at base, sides arcuately converging to distinctly notched apex. Length: about 6 mm.; anterior wing, 4 mm.

Male.—Head and thorax dark olive green. Mandibles except reddish tips, labrum and face below level of antennae yellow. Lateral marks truncate at level of antennae, with slender orbital extension nearly to foveae; anterior end of subantennal plates frequently with a dark spot, or suture dark. A thin postorbital line reaching neither anterior end of eye nor the middle, cheeks and postgenae otherwise dark. Collar of pronotum, large mark on each side of hind margin of disk, often narrowly confluent with large mark on tubercles, and broad anterior margin of flanks yellow. Abdomen black above, apical lobe of tergite 7 testaceous; tergites 1 to 5 with moderately wide yellow bands, interrupted medially on tergites 1 and 5, and sometimes on tergite 2, reaching lateral margin on tergite 1 and enclosed on other segments, that on tergite 5 more abbreviated than others, and that on tergite 2 more or less broader at outer ends than at middle. Venter yellow, with apex black; segment 1 except medially, short narrow band across middle of base of segments 3 to 5 and sometimes apical margin of segment 5 fuscous. Front and middle legs yellow, posterior side of femora except apex, posterior side of tibiae except base, and posterior side of middle trochanters black; hind legs black, trochanters, apex of coxae, line on

anterior side of femora and apex and underside of tibiae yellow. Scape of antennae and pedicel broadly yellow beneath and black above, flagellum more orange yellow beneath and fuscous above. Proboscis, tegulae, and wings as in female.

Head about as broad as long; cheeks two-thirds as wide as eyes and broadest above middle of eyes. Posterior ocelli about equidistant from nearest eye and occipital margin, with their distance apart about one-fourth greater. Facial foveae minute and oval. Face below antennae moderately convex; disk of clypeus less than twice as broad as high, with lateral extensions broadly inflexed but partly visible in frontal aspect. Mandibles slender, acute, and nearly reaching far margin of fossa. Proboscis and venation as in female. Sculpture and pubescence nearly

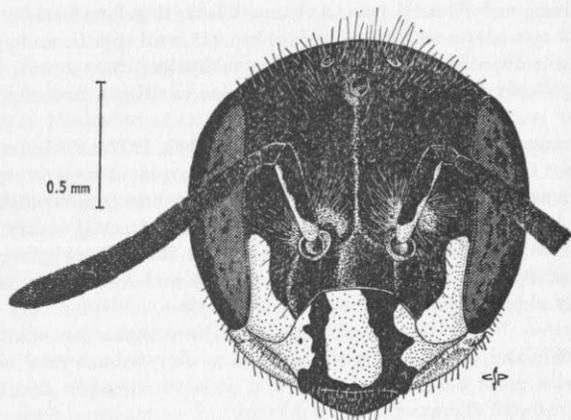


Fig. 13. *Perdita reperta*. Frontal view of head of female.

as in female, but frons more minutely granular tessellate and opaque, the punctures of clypeus more obscure. Abdomen about two and one-half times longer than wide; apical lobe of tergite 7 with sides converging to rounded apex. Subgenital plate nearly a rectangular triangle with apex rounded; disk very minutely pilose. Caulis of genital armature oval, with a low median carina in ventral wall in region of basal orifice; parameral lobes rather slender as seen from above, tapering to blunt apex in lateral view, and strongly fimbriate at apex; sagittae angulate beyond the middle and biarcuately fusiform in lateral view. Length: 4.8–5 mm.; anterior wing, 3.7–3.9 mm.

Holotype female and allotype.—Quemado, Catron Co., New Mexico, on *Chrysothamnus viscidiflorus*, Sept. 13, 1961 (Timberlake).

Paratypes.—NEW MEXICO: 5 males taken with types (Timberlake and Hurd). ARIZONA. Cococino Co.: 1 male, 26 miles southeast of Tuba City, on *Chrysothamnus*, Sept. 24, 1964 (Timberlake). Navajo Co.: 1 female, 5 males, 3 miles west of Old Oraibi, Hopi Indian Reservation, on *Chrysothamnus*, Sept. 24, 1964 (Timberlake). COLORADO. Alamosa Co.: 1 female, Great Sand Dunes, from nest of *Philanthus*, No. 2058, Aug. 28, 1964 (H. E. Evans).

Perdita rufescens, n. sp.

(Plate figs. 1249, 1250, 1328)

The male of *rufescens* collected at flowers of *Croton* in Sonora is allied to *crotonis*, but labrum not emarginate and abdomen ferruginous with first two segments mainly black. In the 1960 key this bee runs best near *stephensi*, but base of abdomen darker, mesoscutum more weakly tessellate and shining and middle and hind tibiae marked with white.

Male.—Head and thorax dark blue green. Mandibles except red tips, labrum, face below level of antennae, tubercles and usually a spot on each side of hind margin of disk of pronotum white. Lateral marks of face obliquely rounded above and ending higher than other marks. Abdomen

ferruginous; tergites 1 and 2 black, with a narrow, abbreviated, ferruginous band on disk, apical margin of tergite 2 ferruginous, more broadly on each side, and apex of tergite 1 also slightly ferruginous. In one paratype apical corners of tergite 1 rather broadly ferruginous, and band on tergite 2 uniting at outer ends with apical band; or sometimes bands on tergites 1 and 2 tinged with yellow, that on tergite 1 interrupted at middle, and tergite 3 with a brownish band across base. Legs black, marked with white; front and middle coxae except base, apex of hind coxae, all trochanters, apex of femora, with more or less broad extension on superior and inferior margins of front pair (dark patch on anterior side sometimes rather small), front tibiae except dark patch beneath, broad stripe on anterior side of middle tibiae, narrow stripe on underside of hind tibiae, and all tarsi pale. Antennae black, flagellum broadly pale ferruginous beneath, scape except spot above near apex, pedicel beneath, and spot on underside of next three joints, white. Proboscis fuscous. Tegulae testaceous subhyaline, base brown or slightly infuscated. Wings slightly dusky hyaline, nervures and margins of stigma testaceous brown, subcosta fuscous.

Head slightly broader than long; cheeks evenly rounded, half as wide as eyes. Posterior ocelli slightly farther apart than distance to occipital margin or nearest eye. Facial foveae semioval, about twice as long as wide. Face below antennae gently convex; disk of clypeus large, hardly broader than high, lateral extensions broadly inflexed but partly visible in frontal aspect. Disk of labrum truncate on median half of apex, with inflexed margin rather broad and slightly indented medially. Mandibles stout, tapering, acute and reaching far margin of labrum. Proboscis moderately short, galeae reaching base of stipites, and maxillary palpi about two-thirds as long as galeae. Flanks of pronotum normal. Pterostigma somewhat more than three times longer than wide and about two-thirds as wide as first submarginal cell; marginal cell as long as stigma with parts beneath and beyond it equal, metacarpus about twice as long as apical truncation. Head and thorax shining, but frons and vertex strongly tessellate and rather dull; mesonotum weakly tessellate with sparse minute punctures; white part of face smooth and impunctate. Abdomen oval, about twice as long as wide; apical lobe of tergite 7 distinctly shorter and blunter than in *crotonis*. Subgenital plate triangular, as long as wide at base, nearly as in *crotonis*. Genital armature in general as in *crotonis*, but dorsal lobes of caulis truncate at apex as seen from above, parameral lobes broader, and fused body of sagittae broadest and slightly angulate at middle of length. Length: about 4.5 mm.; anterior wing, 3 mm.

Holotype male.—San Carlos Bay, Sonora, Mexico, on *Croton californicus*, Aug. 18, 1964 (E. I. Schlinger).

Paratypes.—Four males, taken with type (Schlinger and Irwin).

Types in collection of the University of California, Riverside.

Perdita sejuncta, n. sp.

The type female of *sejuncta* agrees best with *affinis* in the 1960 key, but is smaller, the bands on tergites 1 to 4 more narrowly interrupted and not reaching lateral margins, lateral marks of face comparatively small, with transverse anterior part and narrow orbital extension, and pygidial plate less narrow to rounded apex.

Female.—Head and thorax dark green, propodeum more bluish. Base of mandibles, clypeus except anterior margin and two complete stripes on disk, and lateral marks creamy white. Lateral marks broadly transverse anteriorly, with narrow extension on orbits to approximate level of antennae. Labrum, dark parts of clypeus, extreme anterior corners of face and supraclypeal area black. Collar of pronotum, small mark on each side of hind margin of disk and tubercles white. Abdomen, including venter black, marked with narrow white bands on tergites 1 to 4; bands narrowly interrupted medially, not quite reaching lateral margins, those on tergites 1 and 3 pointed at outer ends and that on tergite 2 touching lateral foveae. Pygidial plate bright orange testaceous. Legs black, apex of front and middle femora, anterior side and base of front and middle tibiae, front tarsi and middle basitarsi pale yellow; small joints of middle tarsi pale brown. Antennae fuscous, flagellum yellowish brown beneath, scape entirely dark and blacker

than flagellum. Proboscis fuscous, galeae brown. Mandibles shading into red at apex. Tegulae with narrow yellowish white band between fuscous base and broad testaceous hyaline outer border. Wings dusky hyaline, nervures rather dark testaceous brown, becoming testaceous on basal fifth of disk.

Head as broad as long; cheeks about two-thirds as wide as eyes. Posterior ocelli somewhat closer to nearest eye than their distance apart and still closer to occipital margin. Facial foveae slightly wider than interval between them and eyes, and reaching from slightly below upper level of antennal sockets hardly more than halfway to level of anterior ocellus. Face below antennae evenly convex; disk of clypeus nearly twice as broad as high, with dorsal margin broadly rounded, and lateral extensions broadly inflexed. Mandibles tapering, acute. Proboscis moderately long, galeae nearly reaching base of stipites. Pterostigma two-thirds as wide as first submarginal cell; marginal cell equally long beneath and beyond stigma, metacarpus somewhat longer than apical truncation. Frons, vertex, and mesonotum strongly tessellate, about equally dull, but not opaque. Punctures of mesoscutum fine and moderately close, those on frons mostly across posterior half, with a few on each side between foveae and antennal sockets. Pubescence whitish, moderately fine and erect, rather abundant on mesonotum, but very short on posterior half of disk of mesoscutum, where it is no more than half as long as that on anterior border. Pygidial plate about as long as wide, moderately narrowed to rounded apex, with weak notch. Length; 4 mm.; anterior wing, 2.8 mm.

Paratype female.—Similar but clypeus black with broad median white stripe and a small white mark on each side, hind margin of disk of pronotum unmarked, a band present also on tergite 5 and that on tergite 4 merely notched behind in middle.

Holotype female.—Eleven miles east of San Antonio, Socorro Co., New Mexico, on *Gutierrezia microcephala*, Sept. 12, 1961 (Timberlake).

Paratype.—One female, Highway 21, Wah Wah Mts., Beaver Co., Utah, Aug. 21, 1957 (Univ. Kansas).

Type in collection of the University of California, Riverside; paratype in collection of the University of Kansas, Lawrence.

Perdita snowii Cockerell

New record.—Three females, 9 miles north of Holbrook, Navajo Co., Arizona, on *Gutierrezia*, Sept. 27, 1964 (Timberlake).

These specimens have abdomen white, with moderately wide blackish bands at junction of tergites 1-2 to 4-5, a band at base of tergite 1 and a narrow, broken or faint band at apex of tergite 5; white bands somewhat broader than dark interval. Clypeus and lateral marks white. In the 1960 key they go best to *snowii* in couplet 64. Compared with specimens from Ute Creek, Colorado, they differ in the white instead of yellow markings, finer and denser pubescence of mesonotum, and more greyish-tinted wings, with pale fuscous nervures (Ute Creek specimens have wings fulvous-tinted, with pale ferruginous nervures).

On comparison with original description of *snowii* there is much agreement. In my account of *snowii* (1960) I was dealing with only three females and thought that two species might be involved. I now believe that the Ute Creek specimens are more doubtful than the Eldora female, and that the latter and the three specimens from near Holbrook may be the true *snowii*.

Perdita solidaginis Cockerell

Perdita solidaginis Cockerell, 1922, Amer. Mus. Novitates, 33:12, ♂.

Through the kindness of Jerome G. Rozen I have been enabled to examine the type of *solidaginis*. In my key (1960) it runs best to *abdominalis* but is considerably larger, with face markings distinctly pale yellow instead of white. It also

differs from *abdominalis* and other species of the *octomaculata* group in having the apical lobe of tergite 7 rather broad at apex with a small median notch.

Male.—Head and thorax dark bluish green. Narrow streak on inferior orbits to middle of eyes, mandibles except red tips, labrum and face below level of antennae pale yellow. Collar of pronotum, cuneate mark on each side of disk, large mark on tubercles, and margin of flanks below tubercles somewhat brighter yellow than face. Abdomen black, with a brownish tinge; tergites 1 to 5 with pale yellow band, narrowly interrupted in middle (more broadly on tergite 5) and reaching lateral margins except on tergites 4 and 5 and that on tergite 2 broadened at outer ends. Apical half of tergite 7 rufotestaceous. Venter dull yellow with brown mark on each side of segments 2, 6, and 7. Legs brighter yellow than face, with base of middle coxae, hind coxae except apex, broad mark on posterior side of front and middle femora, not reaching apex, hind femora except broadly above and at apex, stripe on posterior side of front and middle tibiae, hind tibiae except beneath and at base, and hind tarsi except underside of basal joint, dark brown or fuscous. Scape of antennae brighter yellow than face, spot above at apex, pedicel and flagellum narrowly fuscous above, underside of flagellum more orange yellow than scape, apical joint pale brownish. Tegulae testaceous subhyaline, base pale yellow. Wings slightly whitish hyaline, nervures testaceous yellow, margins of stigma more brownish, subcosta pale brown.

Head as broad as long; cheeks evenly rounded and hardly more than half as wide as eyes. Posterior ocelli about as distant from occipital margin as from nearest eye. Facial foveae oval, nearly three times longer than wide. Face below antennae gently convex; disk of clypeus considerably broader than high, with lateral extension broadly inflexed and partly visible in frontal aspect. Mandibles tapering, acute, and not reaching beyond far margin of labrum. Flanks of pronotum not impressed. Wings ample; pterostigma shorter than first submarginal cell and about three-fourths as wide; marginal cell as long as stigma, parts beneath and beyond it about equal, metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed slightly more than half to radius, first recurrent nervure received by first submarginal cell close to apex. Face impunctate, almost granular tessellate and subopaque above antennae, and very finely and delicately tessellate below; thorax moderately shining, mesoscutum feebly tessellate and with sparse setigerous punctures. Pubescence whitish, fine and erect; short on face, moderately long on vertex, cheeks and mesonotum, thin on mesonotum and denser than usual on cheeks and underside of thorax. Abdomen normal for *octomaculata* group, except apical lobe moderately narrow and slightly flexed upward, with apex having a short rounded lobe on each side of a small median notch. Subgenital plate and genital armature not examined. Length: about 5 mm.; anterior wing, 3.9 mm.

Type male.—White Rocks, near Boulder, Colorado, on *Solidago*, Aug. 13, 1919 (W. P. Cockerell).

Type in American Museum of Natural History, New York.

Perdita sparsa Fox

Perdita sparsa Fox, 1893, Proc. Calif. Acad. Sci., (2)4:16, ♀; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:102, ♀.

The type material of this species is in poor condition and not altogether authentic. I have examined in the Academy collection at San Francisco one female from Magdalena Island and one female and one male from Santa Margarita Island, Baja California. The data and number of specimens agree well enough with Fox's account of the species and the Santa Margarita female seems to be certainly the one described as the variety. The female from Magdalena Island, therefore, is the presumed type, but the head has been glued on, and is evidently a substituted part as it disagrees with the original description. According to Fox the clypeus has three yellow marks, the middle one large and longitudinally ovate, and a small one on each side, and the orbits yellow to middle of eyes. The substituted head has the

clypeus entirely dark and the lateral marks transverse. The abdomen also disagrees as the three yellow bands on tergites 2, 3, and 4 are even, entire and not quite reaching lateral margins. According to Fox the bands on tergites 3 and 4 are interrupted and Cockerell corroborates this. Apparently the specimen cannot be the original type, but a substituted one.

In my opinion the specimens from Santa Margarita Island are not conspecific at least with the presumed type, but they are in too poor condition for description. Both species belong to the *octomaculata* group.

Perdita tacita, n. sp.

The female of *tacita* agrees best with *scitula* to which it runs in the 1960 key. It differs in having bands of abdomen narrowed at outer ends, that on tergite 1 much broadened in middle and notched by the dark median crease, a band well developed on tergite 5 but enclosed, scape of antennae broadly white beneath, hind tibiae broadly white at base and hind femora briefly white at apex. It has the frons and mesonotum moderately shining and about equally dulled by tessellation.

Female.—Head and thorax dark green, supraclypeal area and dark part of clypeus black. Base of mandibles, labrum, clypeus and lateral marks creamy white, anterior and lateral margins of clypeus tinged with testaceous. Two large triangular dark marks on disk of clypeus, leaving median pale area, narrowed above and reaching posterior margin; narrow anterior ends of dark marks curved slightly inward and ending at about one-fifth of length of disk from anterior margin. Lateral marks large, subtriangular, reaching level of antennae and touching anterior end of foveae, but leaving a small black spot partly on lateral extensions of clypeus and on anterior corners of face. Thorax dark, except white tubercles. Abdomen fuscous, with moderately wide white bands on tergites 1 to 5, narrowed and curved backward at outer ends on tergites 2 and 3, narrowly enclosed on tergites 4 and 5 and reaching lateral margins on other segments; band on tergite 1 much widened in middle and deeply notched by median crease; bands otherwise narrower than dark intervals. Pygidial plate testaceous. Legs fuscous, apex of all femora, front and middle tibiae except behind, their tarsi and basal fourth of hind tibiae yellowish white. Antennae fuscous, scape white except triangular mark above nearly reaching base, and flagellum dull yellowish beneath. Mandibles red at apex. Proboscis brownish, more fuscous toward base. Tegulae testaceous hyaline, base white. Wings dusky hyaline, nervures testaceous, margins of stigma and subcosta brown.

Head rotund, as broad as long; cheeks two-thirds as wide as eyes. Posterior ocelli distinctly closer to nearest eye than their distance apart and still closer to occipital margin. Facial foveae well impressed, close to margin of eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae moderately convex; disk of clypeus broadly truncate above and only a little broader than high; lateral extension strongly inflexed and mostly concealed in frontal aspect. Mandibles tapering, acute and reaching slightly beyond far margin of fossa. Proboscis moderately long. Pterostigma small and about half as wide as first submarginal cell, marginal cell as long as stigma, with parts beneath and beyond stigma about equal; metacarpus distinctly although not much longer than apical truncation; second submarginal cell narrowed less than half to radius. Head and thorax tessellate, moderately dull, frons and mesonotum about equally dull. Punctures of frons fine, indistinct, mostly confined to area between foveae and adjacent antennal socket; punctures of mesonotum minute, rather distinct and moderately close. Pubescence whitish, moderately abundant, fine and erect; rather short and thin on face, more abundant and somewhat longer on mesonotum and denser on underside of head. Abdomen narrowly oval; pygidial plate as long as wide at base, with sides converging to moderately narrow, rounded, and slightly retuse apex. Length: 5 mm.; anterior wing, 3 mm.

Holotype female.—Sand Dune Lake, Owyhee Co., Idaho, June 13, 1962 (W. F. Barr).

Type at present in the University collection at Riverside, but will ultimately go to California Academy of Sciences, San Francisco.

Perdita translineata Timberlake

Perdita translineata Timberlake, 1960, Univ. Calif. Publ. Entom., 17:93 ♂.

Additional material includes the female, which runs best in the *octomaculata* key to *aplopappi*. It differs from *aplopappi* in smaller size, opaque mesonotum with shorter hair, and in having abdominal markings much less broadly interrupted, more distant from lateral margins and restricted to tergites 1 to 3. It differs also from *fallax* in the same way.

Female.—Head and thorax very dark blue green. Basal half of mandibles, clypeus except two fuscous stripes on disk, triangular lateral marks, reaching acutely to level of antennae, and two small spots on supraclypeal area creamy white or pale yellow (reddened by cyanide in one specimen). Thorax entirely dark. Abdomen blackish, with abbreviated and broadly interrupted, narrow white band on tergites 2 and 3, taking the form of two transverse lines separated by their transverse length, and traces of band on tergite 1. These markings sometimes enlarged and nearly as in *fallax*, but not quite reaching lateral margins and lacking on tergite 4. Legs blackish, front knees, anterior side of front tibiae and front tarsi pale yellow. Antennae blackish, scape narrowly white beneath, or entirely dark, flagellum brown beneath. Labrum fuscous, more or less testaceous at apex. Mandibles shading into red at apex. Proboscis fuscous. Tegulae testaceous hyaline, base fuscous. Wings strongly dusky hyaline, nervures and margins of stigma testaceous brown, subcosta more infuscated.

Head about as wide as long, cheeks half as wide as eyes. Posterior ocelli somewhat farther apart than their distance to nearest eye and closer to occipital margin. Facial foveae narrow, close to margin of eyes and reaching from level of antennal sockets halfway to level of anterior ocellus (slightly broader and longer in the specimen with whiter markings and enlarged marks on abdomen). Face below antennae strongly convex; disk of clypeus considerably broader than high, with lateral extensions broadly inflexed and not much visible in frontal aspect. Mandibles tapering, acute. Proboscis moderately long, galeae reaching base of stipites in repose. Pterostigma about two-thirds as wide as first submarginal cell; marginal cell as long as stigma, part beneath at most slightly longer than part beyond stigma, metacarpus longer than apical truncation. Frons, vertex, and mesonotum minutely granular tessellate and opaque; other parts of head and thorax moderately dull. Punctures of frons and mesoscutum very minute and obscure, those of clypeus sparse and comparatively coarse and shallow. Pubescence whitish, fine, erect and rather short, that of pronotum moderately abundant, and that of frons rather thin and short. Pygidial plate as long as basal width, sides strongly arcuate to rounded and notched apex.

Male.—Additional specimens similar to type, except face usually almost all yellow below level of antennae.

New records.—TEXAS. Brazos Co.: 4 males, 1 female, on *Heterotheca subaxillaris*, Sept. 28, 1962; 1 male on *Aplopappus divaricatus*, Oct. 3, 1962; and 1 female on *Aplopappus*, Oct. 13, 1963 (A. H. Alex). NEW MEXICO. Socorro Co.: 1 male, 3 miles west of Bingham, on *Baileya pleniradiata*, Sept. 13, 1961 (P. D. Hurd, Jr.).

Perdita truncatella, n. sp.

(Plate figs. 1251, 1252, 1329)

The male of *truncatella* is remarkably like *nitidella* in almost all characters except that tergite 7 of the abdomen lacks the more or less narrow apical lobe of other species of *octomaculata* group; on the contrary it is broadly rounded at apex with a shallow median emargination.

Male.—Head and thorax dark blue green. Postgenae, cheeks to middle of eyes, mandibles except red tips, labrum and face to level of foveae yellow, except that green of frons descends on each side to antennal sockets. Pronotum yellow, except for broad green band, extending more

than halfway down on flanks, with median extension on disk to posterior margin and broad extension on each side to anterior margin. A yellow T-mark on mesopectus, with anterior arms short, broad and ending far from level of tubercles. Abdomen yellow, trilobed mark at base of tergite 1 (median lobe linear, lateral lobes broad) and narrow band at apex of tergites 1 to 5 fuscous. Dark bands supplemented by infuscation at extreme base of segments at least on tergites 3 and 4. Legs yellow, outer and posterior side of hind tibiae, and hind tarsi, except on underside of basitarsi, fuscous. Antennae yellow, pedicel and flagellum fuscous above, changing to pale brown on apical joints. Proboscis pale yellowish. Tegulae hyaline, base broadly yellow. Wings dusky hyaline, nervures and margins of stigma rather dark brown.

Head somewhat broader than long; cheeks rounded, no broader than eyes. Posterior ocelli about their distance apart from occipital margin and slightly closer to nearest eye. Facial foveae punctiform. Face below antennae moderately and evenly convex; disk of clypeus not much broader than high, with lateral extensions broadly inflexed and partly visible in frontal aspect. Mandibles acute, reaching far margin of labrum. Length of proboscis moderate. Pterostigma rather small, shorter than first submarginal cell and about two-thirds as wide; marginal cell as long as stigma and slightly shorter beneath than beyond stigma, with metacarpus distinctly longer than apical truncation; second submarginal cell narrowed two-thirds to radius, both recurrent nervures interstitial. Frons tessellate, impunctate, dull, but not opaque; mesonotum rather weakly tessellate, shining, and with sparse weak or obscure punctures. Pubescence thin, moderately long, erect and whitish, becoming longer and coarser on sides of thorax and very short on face. Abdomen oval, but little more than twice as long as wide. Tergite 7 lacking usual apical lobe of *octomaculata* group, but short and broadly rounded, with a broad, shallow median emargination, enclosed on each side by a small subacute lobe; emargination occupying about one-fourth of apical margin, and equal to about one-third of basal width of segment. Subgenital plate triangular, much broader than long. Caulis of genital armature with basal orifice circular; parameral lobes moderately wide, appearing narrower than usual in lateral view, with apical half nearly parallel-sided; sagittae angulate at middle of fused part and acute at apex. Length: about 4 mm.; anterior wing, 2.9 mm.

Holotype male, Snowflake, Navajo Co., Arizona, Aug. 29, 1957 (Univ. Kansas).

Type in collection of the University of Kansas, Lawrence.

VENTRALIS GROUP

Several new species of this group have been collected, or have come to my attention, since the revision of the group was completed in 1962. The new species, together with several little-known species are distinguished in the following key.

KEY TO NEW AND LITTLE KNOWN SPECIES

- 1. Females 2
- Males 12
- 2. Thorax more or less yellow or whitish besides usual marks on pronotum or tubercles..... 3
- Thorax entirely dark, or with usual marks on pronotum or tubercles..... 6
- 3. Larger species, with mesonotum at least slightly dullish from minute tessellation..... 4
- Mesonotum polished except narrowly around margins; pterostigma hardly more than twice as long as wide, rounded within, and slightly wider than first submarginal cell; face markings yellow, lateral marks and broad mark on cheeks reaching almost to summit of eyes; abdomen yellow, with four broad dark bands; length, about 3.5-4 mm..... *xanthoxyli*, n. sp.
- 4. Not entirely yellow 5
- Yellow, except for tips of mandibles, tarsal claws, foveae of face and abdomen; differs from *wootoniae* in smaller size, deeper yellow color, lack of dark mark on mesopectus and smaller size of facial foveae and subantennal plates..... *holoxantha* Timberlake
- 5. Abdomen and legs entirely yellowish white; disk of mesoscutum with nubilous whitish U-mark; lateral face marks broadly truncate at level of antennae, with slender spur extending between foveae and eyes; whitish T-mark on mesopectus with broad anterior arms covering anterior half of mesopleura..... *albata*, n. sp.

- Head and thorax dark green, with yellowish-white markings, including more or less lunulate mark on hind border of mesoscutum and marks on scutellum and metanotum; lateral marks of face narrowed almost evenly to apex at summit of foveae; abdomen light with dark bands, and legs light except hind tibiae and tarsi. *lunulata* Timberlake
6. Tubercles white or pale yellowish. 7
 Thorax entirely dark 11
7. Mesoscutum polished, at least on disk 8
 Mesoscutum tessellate, dull, with thin short erect hair; face marks almost pure white, including clypeus, lateral marks narrowed almost evenly to acute apex, and quadrate supraclypeal mark; scape of antennae broadly white beneath; marks on disk of pronotum continuous with mark on tubercles; abdomen dark, with narrow, whitish, enclosed band on tergites 2 to 4. *rheni praeclara*, n. subsp.
8. Abdomen dark, with enclosed bands or markings on tergites 1 to 5; wings hyaline. 9
 Abdomen yellow, with tergite 1 and margins of tergite 2 more or less fuscous; wings milky hyaline, nervures pallid *semicrocea* Cockerell
9. Face entirely dark 10
 Face dark, except for white, triangular clypeal mark, rounded at summit; abdomen dark, sometimes paler at base of tergites 2 and 3; wings dusky hyaline, nervures dark
gentilis Timberlake
10. Abdominal light bands abbreviated, ending far from lateral margins, those on tergites 2 and 4 narrowly interrupted, others entire, that on tergite 1 reduced to small transverse mark; head and thorax entirely dark except for white tubercles; legs dark, anterior side of front tibiae and front tarsi pale yellow; scape of antennae narrowly yellow beneath
melanops, n. sp.
- Similar, but abdominal bands more yellowish, entire, those on tergites 3 to 5 notched medially behind; scape of antennae pale yellow, apical fourth infuscated above; venter of abdomen mainly dull yellow *glabrella*, n. sp.
11. Head and thorax blue green, clypeus and mesonotum black; frons and vertex somewhat brassy; pygidial plate as long as wide at base, narrowly rounded at apex; wings milky hyaline, nervures and stigma white. *austini* Cockerell
 Similar but frons and vertex hardly brassy; antennae narrowly dull yellow beneath except toward apex of flagellum; wings hyaline, nervures pale testaceous, margins of stigma brown, subcosta fuscous; pubescence shorter, cheeks and mesonotum nearly bare
stagei, n. sp.
12. Thorax partly or entirely yellow, besides usual marks on pronotum or tubercles. 13
 Thorax entirely dark or with usual marks on pronotum or tubercles. 16
13. Head, thorax and abdomen partly dark 14
 Entirely yellow, except for faint brownish bands sometimes present on tergites 1 to 3; cheeks broad, sometimes angulate anteriorly, but not dentate. *holoxantha* Timberlake
14. Notum of thorax entirely dark. 15
 Lateral margins of scutum, median mark on disk, and mark on scutellum and metanotum yellow; sides and undersurface of abdomen yellow except for large quadrate mark on each side of mesopectus; abdomen yellow, tergite 1 and bands on following segments brown or fuscous *lunulata* Timberlake
15. Thorax dark above, sides and undersurface yellow, except for dark stripe from beneath wings to middle coxae (with pleura and flanks of propodeum also sometimes dark); head yellow, except vertex and occiput dark, or the green sometimes extending to antennal sockets on each side; abdomen yellow, with broad fuscous bands; pterostigma broader than first submarginal cell *xanthoxyli*, n. sp.
 Face yellow to level of foveae, the green sometimes nearly reaching antennal sockets on each side; pronotum yellow except for dark band, and a yellow T-mark on mesopectus, with arms reaching level of tubercles; pterostigma hardly as wide as first submarginal cell
pectoralis, n. sp.

16. Face yellow or white to level of antennae (margins of subantennal plates darkened in *sodalis*); tubercles or other marks on pronotum yellowish white.17
 Subantennal plates and supraclypeal area dark; lateral face marks narrowed above and ending bluntly at foveae; thorax entirely dark; cheeks strongly receding, occiput deeply and narrowly concave*austini* Cockerell
17. Abdomen with yellow or whitish markings, or mainly light.18
 Abdomen dark without markings; face below antennae yellow, but margins of subantennal plates darkened; frons, vertex, and mesonotum tessellate and moderately dull. *sodalis*, n. sp.
18. Head quadrate, cheeks very broad, angulate or dentate anteriorly; flanks of pronotum more or less impressed, posterior corners of disk prominent; antennae of normal length.19
 Head more normal; pronotum with disk depressed and flanks about normal; antennae short, joints of flagellum broader than long, scape sometimes short and broad.21
19. Mesoscutum and scutellum black; frons and vertex tessellate and dullish.20
 Head and thorax shining dark green, propodeum more bluish; face below level of antennae yellow, lateral marks reaching level of foveae; disk of pronotum dark, but tubercles and large part of flanks yellow; abdomen brownish, with enclosed yellowish band at base of tergites 1 to 4*stagei*, n. sp.
20. Mesonotum weakly tessellate, more shining on middle of disk; pronotum dark, posterior border of disk, tubercles and margins of flanks yellow; anterior third of cheeks and face below level of antennae yellow; legs yellow, hind tibiae except beneath and small blotch on femora fuscous*consimilis*, n. sp.
 Similar but mesonotum nearly polished and more shining; head large, cheeks much broader than eyes and bluntly dentate anteriorly; pronotum yellow with transversely oval dark mark on disk; legs yellow, hind tibiae fuscous, except beneath*stabilis*, n. sp.
21. Face white to level of antennae, depressed, parocular areas slightly impressed; scape of antennae short and broad, joints of flagellum distinctly but not strongly nodose

nodosicornis, n. sp.

Face white and trilobed above level of antennae, the median lobe less broad but reaching same level as other lobes; scape of antennae not broadened, joints of flagellum not nodose; abdomen pale yellow, base of tergite 1 fuscous, narrow bands at junction of tergites pale brown*gentilis* Timberlake

VENTRALIS SUBGROUP

Perdita albata, n. sp.

This species is a close ally of *mentzeliarum* to which the female runs in the key to the species of the *ventralis* group (1962). It differs from *mentzeliarum* in having a large supraclypeal mark, the lateral marks ending broadly at level of antennae, with a slender spur intruding between foveae and eyes, a whitish U-mark on mesoscutum, and abdomen and legs entirely whitish.

Female.—Ground color of head and thorax fuscous, without any metallic luster. Anterior half of undersurface of head, basal half of mandibles, labrum, clypeus, lateral and supraclypeal marks yellowish white. Usual dark dots of clypeus obsolete. Lateral marks wider at both ends than at middle opposite subantennal plates, and broadly truncate at level of antennal sockets, with slender spur between foveae and eyes. Supraclypeal mark higher than wide, slightly narrowed above, with summit rounded between antennal sockets. Subantennal plates dilute fuscous, becoming pale brownish on upper half. Posterior half of vertex, continuous parts of occiput and cheeks, and posterior end of cheeks in part nubilously brownish. Pronotum dark, collar, narrow posterior border of disk, narrow margins of flanks and tubercles white. Mesoscutum with a broad-limbed, yellowish-white U-mark, leaving a broad median vitta, ending shortly behind the middle, and sublateral and posterior margins dark. Mesopectus with broad extension to tubercles, covering more than half of mesipisternum, upper and lower ends of metapleura, part of flanks of propodeum and large part of its posterior face yellowish white. Light parts of thorax, except

those of pronotum, nubilously merging into the darker parts. Abdomen and legs creamy white, with pygidial plate pale ferruginous, lateral foveae of tergite 2 black, and tarsal claws ferruginous. Antennae dull yellowish white, apex of scape, apical half of pedicel and flagellum narrowly fuscous above, first three joints of flagellum having a half annulus of fuscous. Mandibles grading through testaceous to dark red on apical third. Tegulae pale testaceous, with basal third white. Wings subopaquely whitish, nervures and stigma pale testaceous.

Head as broad as long; cheeks evenly rounded and four-fifths as wide as eyes. Posterior ocelli about twice their diameter from ill-defined occipital margin and somewhat closer to nearest eye than their distance apart. Facial foveae narrow, but slightly wider than narrow interval between them and eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face strongly convex, especially below level of antennae; clypeus moderately projecting beyond anterior end of eyes, disk about as broad as high. Subantennal plates twice as long as wide and acute at anterior end. Mandibles stout, with small inner tooth before blunt apex. Proboscis moderately long, galeae shorter than stipites; maxillary palpi thin and about as long as galeae; two apical joints of labial palpi exceeding galeae. Pterostigma large, about as wide as first submarginal cell; parts of marginal cell beneath and beyond stigma nearly equal, the poststigmatal part quadrate, with metacarpus equal to apical truncation. Head and thorax moderately shining; frons, vertex, and mesonotum minutely tessellate, dullish and with very sparse minute punctures; face below antennae almost impunctate and more shining. Pubescence whitish, fine and sparse; short, subappressed and very thin on face and mesonotum; moderately long and denser on occiput and cheeks and sparse on mesopleura. Hair of front coxae long, silky, and dense. Pygidial plate mostly concealed in type, apparently about as long as wide at base and narrowed to bluntly rounded apex. Length: 5.5 mm.; anterior wing, 4.3 mm.

Holotype female, 9 miles north of Holbrook (highway 77), Navajo Co., Arizona, on *Mentzelia pumila*, Sept. 26, 1964 (Timberlake).

Perdita austini Cockerell

Perdita austini Cockerell, 1895, Proc. Acad. Sci. Phila., 47:13, ♂.

Perdita aeneifrons Cockerell, 1896, Proc. Acad. Sci., Phila., 48:91, ♀.

Perdita austini Timberlake, 1962, Univ. Calif. Publ. Entom., 28:40, ♂; 1964, Univ. Calif. Publ. Entom., 28:125 (synonymy of *aeneifrons* established).

Cockerell named *austini* and *martini* after his two sons by his first wife, both of whom died in early childhood. Of *austini* numerous specimens of both sexes were collected by Timberlake and Hurd in New Mexico in September, 1961, thus establishing the relationship of *aeneifrons* to *austini*.

In the key to the *ventralis* group (1963) the female runs with difficulty beyond couplet 19 as the abdomen is black without markings, but it agrees best with *semicrocea*. The two species are distinguished in the preceding key.

Female.—Head and thorax dark blue green, frons distinctly brassy, clypeus, disk of mesoscutum and scutellum black. Abdomen black. Pale markings lacking, but mandibles yellowish white, with apex red. Legs blackish, apex of front femora, front tibiae except behind and front tarsi yellow; middle tibiae brownish, slightly yellowish on anterior edge, and middle tarsi pale brown. Proboscis pale brown, basal part and labial palpi fuscous. Antennae dark, flagellum brown beneath. Tegulae hyaline, base white. Wings milky hyaline, nervures and stigma colorous but more opaque, margins of stigma and subcosta slightly testaceous.

Head as broad as long; cheeks strongly receding but nearly as wide as eyes. Posterior ocelli about their distance apart from margin of occiput and distinctly closer to nearest eye. Facial foveae well impressed, close to margin of eyes and reaching halfway from upper level of antennal sockets to level of anterior ocellus. Face below antennae moderately convex; clypeus large, disk broader than high, with lateral extensions broadly inflexed and not visible in frontal aspect. Mandibles tapering, acute, with small inner tooth, and reaching far margin of fossa. Proboscis rather long, but not exceeding fossa, galeae reaching base of stipites in repose. Pterostigma three times longer than wide and almost as wide as first submarginal cell; marginal cell slightly longer

beneath than beyond stigma, with metacarpus slightly longer than apical truncation; second submarginal cell narrowed one-half to radius. Head and thorax shining, frons, vertex, pleura, and propodeum minutely tessellate but only slightly dullish, disk of mesoscutum and scutellum highly polished. Punctures of mesoscutum restricted to anterior border, minute and obscure; those of face similar, very sparse and restricted mainly to parocular region. Pubescence white, scanty and erect, that on cheeks longer and denser than elsewhere, on face short and confined mostly to each side between antennal bases and eyes and that on anterior border of mesoscutum short, coarse, and mosslike; disk of scutum and scutellum bare. Hair of front coxae rather short and thin; scopal hair of hind tibiae thin and not much longer than greatest width of tibiae. Abdomen oval, depressed; pygidial plate about as long as wide at base, with apex bluntly rounded or subtruncate. Length: 4.5-5 mm.; anterior wing 3.3-3.5 mm.

New records.—NEW MEXICO. Otero Co.: 47 females, 69 males, 7.5 miles south of Three Rivers, on *Gutierrezia microcephala*, Sept. 9, 1961 (Timberlake and Hurd). Socorro Co.: 2 males, 3 miles west of Bingham, on *Gutierrezia*, Sept. 13, 1961 (Hurd), and 1 female, 1 male on *Baileya pleniradiata*, Sept. 13 (Timberlake and Hurd). Eddy Co.: 3 females, 7 males, 6.7 miles east of Carlsbad, on *Gutierrezia*, Oct. 2, 1962 (Timberlake). ARIZONA. Cochise Co.: 1 female, 3 males, 6.5 miles north of Apache, on *Gutierrezia*, Oct. 4, 1962 (Timberlake).

Perdita consimilis, n. sp.

(Plate figs. 1253, 1254, 1330)

The one male specimen of this bee from Sonora is similar to *mentzeliae* and *punctifera* and runs to *mentzeliae* in the key (1962). The less whitened wings, small differences in the coloration of the face and legs and certain differences in the genital armature such as the divergent sagittal rods and involuted tips of the parameral lobes seem to be distinctive, and it will be interesting to discover whether the bee is a visitor of *Mentzelia* or goes to some other flower.

Male.—Head and thorax blue green, disk of mesoscutum and scutellum black. Anterior part of gular region and broad mark on cheeks nearly to middle of eyes, mandibles except red tips, labrum and face below level of antennae yellow; lateral marks truncate at level of antennae, except for blunt extension on orbits to anterior end of foveae; supraclypeal mark quadrate, as high as wide. Pronotum dark, with margins almost completely yellow, including tubercles, but anterior margin of flanks rather dusky. Abdomen yellow, but tergite 1 infuscated, and a dilutely fuscous apical band and dark basal corners of tergite 2 nearly enclose a broad yellow band; base of tergite 3 also infuscated across middle part. Legs yellow, hind tibiae infuscated, but paler beneath, and femora with pale fuscous streak on posterior side, that on hind pair broader. Antennae yellow, pedicel and basal half of flagellum faintly and narrowly infuscated above. Tegulae testaceous hyaline, with small yellow spot at base. Wings slightly whitish hyaline, nervures pallid, margins of stigma and subcosta pale ferruginous.

Head quadrate, broader than long; cheeks nearly twice as broad as eyes, widest opposite upper third of eyes, and almost abruptly narrowed anteriorly; occiput strongly concave. Posterior ocelli slightly closer together than distance to nearest eye and somewhat more remote from occipital margin. Facial foveae small, oval, longer than wide. Face below antennae depressed; disk of clypeus about as wide as anterior end of parocular areas and somewhat broader than high; lateral extensions strongly inflexed, produced on each side of labrum, but narrowly visible to base of mandibles in frontal aspect. Subantennal plates almost perfectly semioval, straight on outer margin and convex within. Mandibles long, tapering, acute, almost reaching base of each other, and quadrately expanded on outer side of base. Proboscis rather short, galeae not quite reaching base of stipites. Flanks of pronotum strongly and broadly impressed, posterior corners of disk rectangular and prominent and collar strongly elevated. Pterostigma large, four times as long as wide, about as long and nearly as wide as first submarginal cell; marginal cell nearly twice as long beneath as beyond stigma, with metacarpus and apical truncation about equal. Head and thorax shining, frons and vertex smoothly tessellate and moderately dullish, mesoscutum minutely and weakly tessellate and shining. Punctures of frons sparse and minute, those of mesoscutum

restricted mostly to anterior border. Pubescence white, moderately long and rather dense on underside of thorax; thin, short and depressed on cheeks; and short, thin and erect on frons and mesonotum, with disk of scutum and scutellum nearly bare. Abdomen oval, depressed; tergite 7 narrowed evenly to slightly obtuse apex. Subgenital plate triangular, about as long as wide, obtuse at apex; disk with median ridge at apex and very thin short pubescence. Genital armature basically similar to parts of *mentzeliae*, but involuted tips of parameral lobes and divaricate rods of sagittae distinctive. Length: 4 mm.; anterior wing, 3 mm.

Holotype male.—Magdalena, Sonora, Mexico, May 11, 1953 (R. C. Bechtel and E. I. Schlinger). Type in collection of the University of California, Riverside.

Perdita holoxantha Timberlake

Perdita holoxantha Timberlake, 1962, Univ. Calif. Publ. Entom., 28:17, ♂.

This species has been known from only one male, taken at St. George, Utah, but recent material includes both sexes. The female differs from *wootoniae* in the entirely yellow color, shorter subantennal plates and shorter antennal scape (scape nearly reaching anterior ocellus in *wootoniae*).

Female.—Head, thorax, and abdomen pale yellow, without dark markings. Antennae yellow, joints 1 to 3 of flagellum with a short, oblique fuscous line across upper side. Legs yellow, apical half of tarsal claws moderately reddened. Mandibles yellow, with apex red. Facial foveae and lateral foveae of tergite 2 fuscous. Proboscis yellowish. Tegulae hyaline, base yellow. Wings hyaline, nervures pale yellowish.

Head slightly longer than wide; cheeks evenly rounded, about two-thirds as wide as eyes and strongly receding. Posterior ocelli about equidistant from nearest eye, the occipital margin and from each other. Facial foveae linear, their own width from margin of eye and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below level of antennae evenly convex; disk of clypeus large, as broad as high, with lateral extensions very broadly inflexed and only partly visible in frontal aspect. Mandibles rather slender, acute and abruptly narrowed on inner margin before apex, without complete formation of inner tooth. Proboscis moderately long. Pterostigma nearly as wide as first submarginal cell; marginal cell slightly longer beneath than beyond stigma, and metacarpus slightly longer than apical truncation. Tarsal claws bifid, inner tooth about half as long as the outer. Head and thorax minutely tessellate, slightly dullish and virtually impunctate; face below level of antennae smoother and more shining, with a few faint punctures on clypeus. Pubescence whitish, fine and scanty; almost lacking on face and mesonotum; moderately long on cheeks, and comparatively long and dense on mesopectus. Hair of front coxae long and rather dense; scopal hair of hind tibiae sparse, with hairs on inner face gently curved and longer than greatest width of tibia. Abdomen oval, depressed; pygidial plate as long as wide at base, sides converging to moderately narrow subtruncate apex. Length: about 5 mm.; anterior wing, 3.2 mm.

New records.—UTAH. Grand Co.: 7 males, Moab, on *Poleomintha incana*, June 9, 1963 (G. E. Bohart and R. Brumley); 3 females, Arches National Monument, June 10, 1963 (Bohart). ARIZONA. Navajo Co.: 3 males, 1 female, 9–10 miles north of Holbrook, on *Mentzelia pumila*, Sept. 24 and 26, 1964 (Timberlake).

Observation.—The female of *holoxantha* is very similar to *luteola* and will require careful discrimination. It has the face, especially the clypeus, more shining, without any distinct punctures, except a few on clypeus (faint punctures generally apparent on frons in *luteola*); subantennal plates larger than in *luteola*, and longer than facial foveae; labrum shining, with only a small elevated part and with only a few, short, fine hairs on lateral edges (elevated part in *luteola* hairy and almost angulated in front); and mandibles with a small inner tooth (tapering and simple in *luteola*).

Perdita lunulata Timberlake

Perdita lunulata Timberlake, 1962, Univ. Calif. Publ. Entom., 28:22, ♀.

Perdita perplexa Timberlake, 1962, Univ. Calif. Publ. Entom., 28:19, figs. 739, 740, 848, ♂ (excluding type ♀).

This species was described from a single female collected in the Painted Desert of Arizona, about 24 miles northeast of Holbrook, in Apache County. On Sept. 24 and 26, 1964, I found this bee collecting pollen from the flowers of *Mentzelia* at 9 to 10 miles north of Holbrook. The male associated with the females is the same as the supposed male of *perplexa*, which was described from a specimen collected 17 miles east of Quemado, New Mexico, in 1931.

New records.—ARIZONA, Navajo Co.: 7 females, 1 male, 10 miles north of Holbrook (highway 77), on *Mentzelia pumila*, Sept. 24, 1964; and 22 females, 9 males, 9 miles north of Holbrook on same flower, Sept. 26 (Timberlake).

Perdita mentzeliae Cockerell

New records.—ARIZONA, Greenlee Co.: 1 female, Morenci, Sept. 23, 1956 (G. D. Butler). Navajo Co.: 1 female, 5 males, 4 miles north of Snowflake, on *Mentzelia*, Aug. 28, 1964 (E. I. Schlinger); 1 female, 9 miles south of Holbrook, Sept. 26, 1964; and 29 females, 16 males, 9 and 10 miles north of Holbrook, on same flower, Sept. 24 and 26, 1964 (Timberlake).

Perdita mentzeliarum Cockerell

New record.—One male of the var. *lauta* Cockerell, 4.5 miles south of Three Rivers, Otero Co., New Mexico, on *Bahia absinthifolia*, Sept. 9, 1961 (P. D. Hurd, Jr.).

Perdita nigridia Timberlake

New record.—Thirteen females, San Felipe, Baja California, Mexico, on *Mentzelia* sp., near *M. pumila*, March 29, 1963 (G. I. Stage).

These specimens agree with California specimens of *nigridia*, but have the clypeus more uniformly or entirely black.

Perdita semicrocea Cockerell

New records.—NEW MEXICO, Otero Co., 1 female, 4.5 miles south of Three Rivers, on *Bahia absinthifolia*, Sept. 9, 1961 (Hurd). ARIZONA, Cochise Co.: 1 female, 3 miles south of Willcox, Aug. 29, 1959 (M. Cazier).

Perdita sodalis, n. sp.

(Plate figs. 1255, 1256, 1331)

This member of the *ventralis* group falls in the 1962 key near *glabrescens*, but differs in its considerably larger size, darker color of the abdomen, mostly darker legs, darker nervures, more tessellate and duller mesonotum, and in having lateral marks of face obliquely subacute above level of antennae.

Male.—Head and thorax dark green. Mandibles except red tips, labrum, and nearly all of face below level of antennae yellow; lateral marks large, obliquely narrowed from lower level of antennal sockets and ending subacutely on orbits at anterior end of foveae. Thorax entirely dark except for yellow tubercles. Abdomen pale brown, fuscous at base of tergite 1, without pale markings, and much paler testaceous brown beneath. Legs black, hind tarsi brownish, middle tarsi pale brown, apex of front femora, front tibiae except shaded with brownish on posterior side, front tarsi and streak on anterior side of middle tibiae yellow. Antennae fuscous, incom-

plete line on underside of scape and underside of flagellum yellow. Proboscis brown. Tegulae broadly hyaline, base yellow. Wings hyaline, nervures testaceous, margins of stigma, metacarpus and subcosta brown.

Head as broad as long; cheeks rounded, as broad as eyes. Posterior ocelli distinctly closer to margin of occiput and slightly more distant from nearest eye than their distance apart. Facial foveae punctiform. Face below antennae moderately convex; disk of clypeus somewhat broader than high, well rounded above, with lateral extensions partly visible in frontal aspect. Mandibles reaching far margin of labrum, acute at apex and dilated on outer margin at base. Antennae rather long, joint 7 of flagellum slightly longer than thick. Flanks of pronotum about normal. Pterostigma not much more than half as wide as first submarginal cell; marginal cell slightly shorter than stigma, with parts about equal beneath and beyond it, metacarpus slightly longer than apical truncation. Head and thorax shining, frons, vertex and mesonotum tessellate and moderately dullish. Mesoscutum with minute and widely spaced punctures, face impunctate. Pubescence scanty, fine, short and erect, thin on mesonotum, and face almost bare. Abdomen oval, depressed; tergite 7 narrowed to slightly produced truncate apex. Subgenital plate about as long as wide at apex moderately narrowed toward base, with short fine pubescence on apical part. Submedian dorsal lobes of caulis acute in both dorsal and lateral views; parameral lobes about as long as caulis, incurved and acute at apex; sagittae moderately thick and conjointly obtuse at apex. Length: 4.8 mm.; anterior wings, 3.1 mm.

Holotype male, Deep Canyon, Santa Rosa Mts., Riverside Co., California, on *Hyptis emoryi*, March 29, 1963 (E. I. Schlinger).

Type in collection of the University of California, Riverside.

Perdita stabilis, n. sp.

(Plate figs. 1257, 1258, 1332)

In the key to the *ventralis* group (1962) the male of *stabilis* agrees better with *mentzeliae* than anything else. It is actually close to *cosimilis* and the distinguishing characters are given in the preceding key.

Male.—Head and thorax black, with a weak greenish tinge on dark part of head and sides and undersurface of thorax, but propodeum dark blue. Postgenae as far as end of fossa, inferior orbits broadly to middle of eyes, basal half of mandibles, labrum and face below level of antennae yellow. Upper margin of the yellow evenly level with antennal sockets halfway outward to margins of eyes, then with a short blunt extension on orbits. Pronotum yellow except for large transverse mark on disk. Abdomen brownish yellow, becoming clearer yellow across base of tergite 2; tergite 1 infuscated except across base and apex, and except median part of basal declivity; tergite 2 with a subinfuscated transverse, subapical spot on each side. Legs yellow, except for infuscated hind tibiae. Antennae clear yellow, pedicel and flagellum narrowly pale brown above. Mandibles shading into red at apex. Proboscis fuscous, galeae pale brown. Tegulae pale testaceous subhyaline, base yellow. Wings with a whitish opacity, nervures pale testaceous, margins of stigma and subcosta pale brown.

Head quadrate, nearly twice as broad as thorax; cheeks broader than eyes, not much receding and with a triangular anterior process. Posterior ocelli considerably more than their distance apart from occipital margin and much more remote from nearest eye. Facial foveae faintly impressed, broadly oval and unusually close to upper end of eyes. Antennae inserted at middle of face, but distinctly above level of middle of eyes. Face below antennae gently convex, with parocular areas distinctly broader than intervening space; supra-clypeal area as broad as high; disk of clypeus somewhat broader than high, with lateral extensions well exposed in frontal aspect. Mandibles robust, as broad at base as width of labrum, but tapering, very acute and reaching slightly beyond far margin of fossa. Proboscis moderately long, galeae as long as stipites. Flanks of pronotum deeply impressed, the posterior corners of disk prominent. Tarsal claws with strong inner tooth. Pterostigma more than three times longer than wide and about two-thirds as wide as first submarginal cell; marginal cell distinctly longer beneath than beyond stigma, with metacarpus slightly longer than apical truncation. Frons and vertex minutely

tessellate, slightly dullish; cheeks and temples polished; mesoscutum and scutellum weakly tessellate around margins and polished on disk. Punctures sparse and minute on frons, set with short fine hairs, and very sparse on mesonotum; cheeks impunctate and bare. Anterior and lateral margins of prosternum with dense white hair; mesopectus and front coxae with rather long and moderately dense white hair, which becomes thin on pleura. Hair on outer side of hind tibiae coarse and no longer than greatest width of tibiae. Abdomen ovate, depressed, thinly hairy on apical segments. Tergite 7 rounded at apex, with small pygidiform area slightly developed. Subgenital plate triangular, rounded at apex, apical third of disk minutely setose. Base of caulis of genital armature emarginate, and dorsal lobes broad and rounded as seen from above; parameral lobes slender and acute in dorsal view and moderately narrow and blunt at apex in lateral view, with usual fringe of hair absent; sagittae broadly fusiform in dorsal view, with rods separated nearly to base and acute at apex. Length: 5 mm.; anterior wing; 3.7 mm.

Holotype male.—Douglas, Cochise Co., Arizona, Aug. 26, 1964 (J. G. Rozen, Jr.).

Type in collection of the American Museum of Natural History, New York.

***Perdita stagei*, n. sp.**

(Plate figs. 1259, 1260, 1333)

This species is known from a small series collected at San Felipe, Baja California, in March from flowers of *Frankenia*, and is closely allied to the small species of the *ventralis* group including *semicrocea* and *dimidiata*. The female is entirely dark, and the male has the face yellow below level of antennae. In the general shape of the genital armature the male agrees well with *dimidiata*, but differs in having the sagittae acute at apex. In the triangular and acute subgenital plate *stagei* differs from all other small species of the *ventralis* group.

Female.—Head and thorax dark blue, face more greenish, mesoscutum and scutellum black. Abdomen black, pygidial plate pale ferruginous. No light markings. Legs fuscous, apex of front femora, front tibiae except behind, front tarsi and anterior side of middle tibiae yellow. Antennae fuscous and narrowly dull yellow beneath except toward apex of flagellum. Labrum testaceous brown. Mandibles testaceous. Proboscis fuscous, galeae testaceous brown. Tegulae subhyaline, base testaceous. Wings whitish hyaline, nervures pale testaceous, margins of stigma and subcosta fuscous except at base.

Head retund, as broad as long; cheeks evenly rounded, two-thirds as wide as eyes. Posterior ocelli about their distance apart from nearest eye and less distant from occipital margin. Facial foveae well impressed, close to margin of eyes and reaching from upper level of antennal sockets hardly more than halfway to level of anterior ocellus. Clypeus evenly convex, but parocular areas of face depressed; disk of clypeus about as broad as high, lateral extensions inflexed, but partly visible in frontal aspect. Mandibles tapering, subacute, with inner margin abruptly narrowed before apex. Proboscis moderately long, galeae about as long as stipites. Tarsal claws rather small, with small, sharp inner tooth. Pterostigma about three times longer than wide, and nearly as wide as first submarginal cell; marginal cell about as long as stigma, distinctly longer beneath than beyond it, with metacarpus and apical truncation subequal. Head and thorax shining, mesonotum polished, face obscurely tessellate. Clypeus and sides of face below antennae very sparsely punctured, more coarsely on clypeus; remainder of face and mesonotum virtually impunctate. Pubescence thin, fine, very short and erect; frons and disk of mesoscutum bare (only a few widely spaced hairs on anterior border of mesoscutum); hair of face below antennae sparse, porrect, of cheeks and occiput short and thin, of sides of thorax very thin; propodeum entirely bare; hair of mesopectus well developed as usual and hair of front coxae moderately long and dense. Abdomen oval, depressed, about twice as long as wide; pygidial plate plane, triangular, with apex moderately narrow and rounded. Length: about 3.8 mm.; anterior wing, 2.3 mm.

Male.—Head and thorax dark blue green; anterior part of under surface of head, cheeks nearly to middle of eyes, mandibles except red tips, labrum and face below level of antennae pale

yellow. Supraclypeal mark deeply and triangularly notched above by intrusion of dark color of frons; and on each side of face the yellow extends above antennae in a broad blunt lobe. Tubercles of pronotum yellow, collar more or less brownish, and in the more macrocephalous specimens a yellow mark present on flanks opposite tubercles. Abdomen brown or brownish fuscous, base of tergites 2 to 3 or 5 rather broadly banded with dull yellow; bands not reaching lateral margins and often more or less interrupted in middle; tergite 7 and venter dull yellow. Legs pale yellow, spot at base of front coxae, hind coxae, blotch on posterior side of front and middle femora, hind femora except beneath, streak on posterior side of front and middle tibiae and hind tibiae except beneath more or less fuscous and darker basad; tarsi pale but hind pair more or less brownish on outer side. Scape of antennae pale yellow, flagellum narrowly pale brown above and brownish yellow beneath. Proboscis pale fuscous, galeae brownish. Tegulae and wings as in female.

Head rotund, as broad as long; cheeks as broad as eyes, nearly evenly rounded, widest above middle of eyes and strongly receding; occiput deeply concave. In macrocephalous specimens head more quadrate, cheeks distinctly wider than eyes, widest nearly opposite summit of eyes and abruptly narrowed at anterior end. Posterior ocelli slightly more than their distance apart from nearest eye and about half as far from occipital margin, but in macrocephalous specimens these distances increased and ocelli nearly their distance apart from occipital margin. Facial foveae twice as long as wide. Face below antennae gently convex, disk of clypeus broader than long, lateral extensions visible in frontal aspect; but in macrocephalous specimens face more depressed, and disk of clypeus about twice as broad as high. Mandibles slender, but dilated on outer margin at base, tapering, acute, and in macrocephalous specimens more strongly falcate and nearly reaching base of each other. Proboscis and wings as in female. Flanks of pronotum strongly impressed, posterior corner of disk prominent. Sculpture and pubescence about as in female, except that face almost entirely bare. Hair of hind tibiae fine and about as long as greatest width of tibiae. Abdomen oval, depressed, hardly recurved at apex; tergite 7 with a short, slender acute apical lobe. Subgenital plate triangular, acute at apex, disk with fine setae on apical part. Subgenital armature broadly oval; dorsal lobes acute and nearly half as long as caulis; parameral lobes strongly incurved, rather slender, tapering and acute; sagittae slender and acute at apex. Length: 2.5-3 mm.; anterior wing, 2.2-2.4 mm.

Holotype female and allotype (macrocephalous).—San Felipe, Baja California, Mexico, on *Frankenia palmeri*, March 24, 1963 (G. I. Stage).

Paratypes.—Two females, 13 males, taken with the types.

Types in collection of the University of California, Riverside; paratypes in collection of G. I. Stage.

SUBFASCIATA SUBGROUP

Perdita glabrella, n. sp.

The position of *glabrella* and *melanops*, both known from unique females, is rather uncertain, but it seems likely that both belong near *subfasciata*. In the key to the *ventralis* group (1962) the female of *glabrella* runs out at *rhois*, and differs in the entirely dark face, more polished and less hairy face and mesonotum, and in the more acute pygidial plate and smaller pterostigma.

Female.—Head and thorax blue green, labrum, clypeus, supraclypeal area, disk of mesoscutum, scutellum and metanotum black; anterior border of mesoscutum broadly blue green, and hind margin more narrowly blue. Head and thorax entirely dark except for yellow tubercles. Abdomen fuscous, with rather broad yellow band at base of tergites 2 to 5, ending at some distance from lateral margins and weakly notched at middle behind; a transverse oval mark, about twice as long as wide at summit of basal declivity of tergite 1. Pygidial plate brown, with fuscous margins; venter dull yellow. Legs fuscous, extreme apex of front femora, front tibiae except behind and front tarsi yellow. Antennae blackish, flagellum narrowly brownish yellow beneath, scape yellow except above on apical third. Mandibles yellow, shading into red at apex. Proboscis fuscous, galeae pale brown. Tegulae testaceous hyaline, base yellow. Wings whitish hyaline, nervures pale testaceous, margins of stigma pale brown, subcosta fuscous except toward base.

Head rotund, as broad as long; cheeks about two-thirds as wide as eyes. Posterior ocelli their distance apart from nearest eye and much closer to occipital margin. Facial foveae their own width from margin of eyes and reaching from level of middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Face below antennae moderately convex; disk of clypeus about as broad as high, with lateral extensions inflexed and partly visible in frontal aspect. Mandibles rather stout, abruptly narrowed on inner margin close to acute apex. Proboscis of ordinary length, galeae reaching base of stipites in repose. Pterostigma moderately large and rounded within, nearly as wide as first submarginal cell and rather less than three times as long as wide; marginal cell about as long as stigma and much longer beneath than beyond stigma, with metacarpus and apical truncation equal. Head and thorax shining, frons and margin of mesoscutum smoothly tessellate, disk of mesoscutum and scutellum polished. Face and mesonotum virtually impunctate. Pubescence fine, rather short and erect, thin on face and anterior border of mesoscutum, disk of mesoscutum bare; hair of front coxae rather long and dense. Abdomen about twice as long as wide; pygidial plate triangular, longer than wide, apex narrowly obtuse, disk plane, with margins elevated. Length: about 4 mm.; anterior wing, 3.4 mm.

Holotype female.—Continental, Pima Co., Arizona, Aug. 12, 1957 (G. D. Butler).

Type in collection of the University of California, Riverside.

Perdita melanops, n. sp.

This species and *glabella* are very similar and possibly could prove to be forms of one species when better known. The more important distinguishing characters are given in the preceding key.

Female.—Head and thorax dark blue green, anterior corners of face, clypeus, supraclipeal area, disk of mesoscutum, scutellum and metanotum black. Face entirely dark. Thorax dark, except collar of pronotum and tubercles white. Abdomen fuscous, with white, abbreviated bands at base of tergites 2 to 5, and a rather small semi-oval mark on tergite 1; band on tergite 2 entire, those on tergites 3 and 4 represented by transverse marks separated by about their own width, and that on tergite 5 linearly interrupted. Pygidial plate ferruginous; venter pale brown, at least partly transparent, as the white of tergite 3 is clearly visible from beneath. Legs fuscous, front tibiae except inner edge and front tarsi yellow, and middle tarsi pale brown. Antennae fuscous, pale yellow beneath. Mandibles yellow at base shading into red at apex. Labrum and proboscis fuscous, galeae more brownish. Tegulae broadly hyaline, base white. Wings clear hyaline, nervures testaceous, margins of stigma brown, subcosta fuscous.

Head as broad as long; cheeks about half as wide as eyes. Posterior ocelli about their distance apart from nearest eye and closer to occipital margin. Facial foveae about four times longer than wide, less than half their width from margin of eyes and reaching from upper level of antennal sockets somewhat more than halfway to level of anterior ocellus. Face below antennae strongly convex; disk of clypeus large, broader than high, with lateral extensions hardly visible in frontal aspect. Mandibles strong, tapering, abruptly narrowed on inner margin before acute apex. Proboscis moderately long, galeae equaling stipites; maxillary palpi about four-fifths as long as galeae. Pterostigma less than three times longer than wide and about as wide as first submarginal cell; marginal cell oblique to wing margin, much longer beneath than beyond stigma, with metacarpus shorter than apical truncation. Head and thorax shining, frons, vertex and anterior border of mesoscutum weakly tessellate, black part of mesoscutum and scutellum highly polished. Punctures of face and mesonotum very fine and sparse. Pubescence whitish, fine and erect; very thin on face and mesonotum, with disk of mesoscutum almost entirely bare; moderately dense and rather shorter than usual on undersurface of head; hair of front coxae long and rather dense; scopal hair of hind tibiae rather short, hairs on outer margin strongly curved and about as long as greatest width of tibia. Abdomen ovate, depressed; pygidial plate triangular, narrowly obtuse at apex, margins carinately elevated. Length: 4.5 mm.; anterior wing, 3.3 mm.

Holotype female.—Deep Canyon, Santa Rosa Mts., Riverside Co., California, on *Physalis crassifolia*, Oct. 9, 1963 (E. I. Schlinger).

Type in collection of the University of California, Riverside.

Perdita rehni praeclara, n. subsp.

On comparison with *rehni*, *praeclara* is evidently no more than subspecifically distinct and is actually similar to the subspecies *extensa*. Typical *rehni* is known from the central part of New Mexico, the western part of Texas and from Chihuahua, Mexico, and the subspecies *extensa* was described from Coahuila. The habitats of *praeclara* and *extensa* are apparently separated by the broad territory of typical *rehni*.

Female.—Much like *extensa* but markings of face almost pure white. Clypeus entirely light, usual pair of dots small and faint. Lateral marks narrowed almost evenly from base to acute

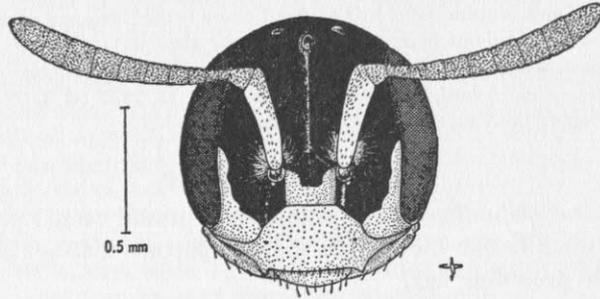


Fig. 14. *Perdita rehni praeclara*. Frontal view of head of female.

apex and intruding between foveae and eyes. Supraclypeal mark almost quadrate, with broad rounded emargination above. Scape of antennae broadly white beneath. Band on hind margin of pronotum rather broad, entire and uniting with mark on tubercles. Tergites 1 to 4 of abdomen fuscous, with yellowish-white markings; a quadrate median mark on basal declivity of tergite 1, broadened across base to lateral margin, and a white spot notching lateral margins of disk; tergites 2 to 4 each with a narrow enclosed band and a white spot on lateral margins, small on tergite 2 and successively larger and broader on tergites 3 and 4. Tergites 5 and 6 dull yellowish, with a fuscous spot in middle of tergite 5; pygidial plate more orange yellow, margins of apical half black. Legs pale yellow, narrow blotch on front femora behind, line on front tibiae, blotch on middle tibiae above, mark at apex of hind femora, outer side of hind tibiae and hind tarsi rather dilute fuscous.

Otherwise like typical *rehni* and *extensa*. Length: about 4 mm.; anterior wing, 3 mm.

Holotype female.—Southwest Research Station, 5 miles west of Portal, Cochise Co., Arizona, 5,400 feet, July 4, 1956 (C. and M. Cazier).

Type in collection of the American Museum of Natural History, New York.

Perdita snellingi Timberlake

Abundant material of this species has been collected in the last few years in Inyo County, California. At first I became perplexed whether to consider it distinct from *subfasciata* or merely a subspecies. The broader and bright-colored mandibles of the female and the less extensive face markings of the male seem to indicate a distinct species. In the male of *subfasciata* the margin of the yellow on the face is arcuate and extends higher in the middle than at the sides and reaches about three-fourths of the distance from level of antennae to anterior ocellus. In *snellingi* the margin of the yellow is more transverse and nearer the level of the foveae, with an extension of the green more or less developed on each side toward antennal sockets. The green color of cheeks also extends more forward in *snellingi*,

or at least to the middle of eyes. Also in *snellingi* the basal expansion of the mandibles is more pronounced than in *subfasciata*, and the two or three little bristles on the outer margin of the mandibles are better developed. In numerous specimens from Antelope Springs these bristles are transformed into small spines, more or less thickened at base (first spine close to basal expansion and the second at about one-third of the length of mandible from base). At first I thought that these spines might indicate a distinct species, but they appear to have no more significance than the facultative development of a tubercle or process at anterior end of cheeks, which is a feature in many species of *Perdita*.

New records.—CALIFORNIA. Inyo Co.: Antelope Springs, 8 miles southwest of Deep Springs, Aug. 29, 1960, on *Gutierrezia microcephala*, 24 males (P. D. Hurd, Jr.); on *Solidago spectabilis*, 23 males, 15 females (Hurd); on *Chrysothamnus nauseosus consimilis*, 30 males, 3 females (Hurd) and 66 males, 18 females (J. W. MacSwain); on *Rosa californica*, 1 male (M. E. Irwin); and without flower record, 6 males, 6 females (E. Jensen), and 9 males, 6 females (C. A. Toschi). Same locality, on *Eriogonum heermannii*, 7 males, June 29, 1961 (J. Powell), 19 males, 2 females, June 29 (G. I. Stage); 34 males, 1 female, July 1 (Powell) and 36 males, 1 female (Stage). Westgard Pass, on *E. heermannii*, 5 females, Aug. 24, 1960 (Hurd). Four miles west of Westgard Pass, 1 male, July 15, 1961 (H. V. Daly), 1 male, July 17 (Stage), and 1 female on *Melilotus alba*, July 23 (Daly). Westgard Pass, 4.5 miles west of White Mt. road, on *E. heermannii*, 1 female, Aug. 22, 1963 (H. E. Leech). Big Pine, on *Melilotus*, 1 male, on *Cleome*, 1 female, Aug. 24, 1960 (Hurd). Fish Springs, 5 miles south of Big Pine, on *Chrysothamnus*, 1 male, 2 females, Oct. 13, 1962 (R. C. Dickson).

Perdita subfasciata Cockerell

In my report on the *subfasciata* section of the *ventralis* group I mentioned that *subfasciata* was rare in collection and I had only eleven specimens to record. The species, however, is widely distributed west of Embudo, New Mexico, in northern Arizona, Utah, and Nevada. At a locality seven miles west of Peach Springs, Arizona, I found the species flying in great abundance at flowers of *Gutierrezia lucida* and several hundred specimens of both sexes were collected.

New records.—UTAH: Eleven males, 15 females, Skull Rock Pass, 6,100 feet, Aug. 30, 1958 (Univ. Kans.). NEVADA. Eureka Co.: 1 female, Palisade, Sept. 11, 1962 (T. R. Haig). Washington Co.: 8 males, 6 females, 4 miles southwest of Shivwits, on *Gutierrezia microcephala*, Sept. 22, 1964; and 1 male, 5 miles west of Hurricane, on *Gutierrezia*, same day (Timberlake). Kane Co.: 3 males, 9 miles east of Kanab, on *Gutierrezia*; 3 males, 18 miles east of Kanab, on *Gutierrezia*, and 1 male, 23 miles east of Kanab, on *Chrysothamnus nanscosus*, Sept. 23, 1964 (Timberlake). ARIZONA. Coconino Co.: 45 males, 44 females, 26 miles southeast of Tuba City, on *Chrysothamnus*, Sept. 24, 1964 (Timberlake). Mohave Co.: many of both sexes, 7 miles west of Peach Springs, on *Gutierrezia lucida*, Sept. 28, 1964 (Timberlake and Papp).

Perdita xanthoxyli, n. sp.

(Plate figs. 1261, 1262, 1334)

This species of *subfasciata* section differs from other species in having the lateral face marks reaching almost to summit of eyes in both sexes, and by the short, broad pterostigma which is distinctly wider than the first submarginal cell.

Female.—Head and thorax dark blue, disk of mesoscutum, scutellum and metanotum black. Broad stripe on inferior orbits nearly to summit of eyes and reaching more than halfway to margin of proboscoidal fossa, more than basal half of mandibles, labrum and most of face below level of antennae yellowish white or pale yellow. Clypeus with two rather short and somewhat arcuate brown stripes on disk. An oval light spot on subantennal plates and a quadrate supra-

clypeal mark more or less developed (an extension shaped somewhat like a spearhead sometimes reaching middle of frons), but blue of frons descending more or less broadly to clypeus and becoming black at anterior end of subantennal plates. Lateral marks extending broadly to foveae, then narrowed to pass a short distance above them. Pronotum dark, with collar and broad band from tubercle to tubercle yellow. Abdomen pale yellow, with broad brownish-fuscous band at junction of tergites 1-2 to 4-5 (bands for most part on apex of segments), the yellow intervals narrow and curved backward at outer ends on tergites 2 to 4; a dark mark more or less developed on apical part of tergite 5. Pygidial plate pale ferruginous. Legs pale yellow, with blotch on posterior side of front and middle femora, broad blotch covering apical half of dorsal side of hind femora, and posterior side of hind tibiae fuscous. Antennae fuscous, flagellum more brownish beneath, scape except for small apical spot on dorsal side and pedicel broadly beneath pale

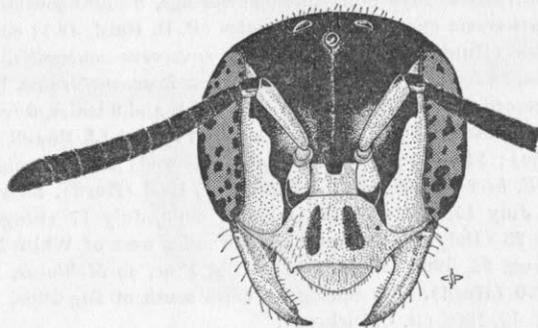


Fig. 15. *Perdita xanthoxyli*. Frontal view of head of female.

yellow. Proboscis fuscous. Mandibles red at apex. Tegulae hyaline with yellow base. Wings nearly clear hyaline, nervures pale testaceous, margins of stigma and subcosta brown.

Head rotund, as broad as long; cheeks receding and nearly as broad as eyes. Posterior ocelli about their distance apart from nearest eye and occipital margin. Facial foveae short, somewhat more than their own width from margin of eyes and occupying about the middle third of space between antennal sockets and anterior ocellus. Face below antennae evenly and moderately convex; disk of clypeus distinctly broader than high, broadly reflexed on each side of labrum with lateral extensions visible in frontal aspect. Mandibles rather stout, tapering, subacute and not reaching far margin of fossa. Proboscis short, galeae reaching halfway to base of stipites. Antennae rather long, joints of flagellum as long as wide. Pterostigma large, broader than first submarginal cell, and widest slightly beyond its middle; marginal cell oblique to wing margin, longer beneath than beyond stigma, with metacarpus somewhat longer than apical truncation. Head and thorax shining, frons and vertex rather strongly but smoothly tessellate and moderately dullish, notum of thorax polished. Punctures extremely fine and sparse, mostly restricted to anterior part of face and anterior border of mesoscutum. Pubescence whitish, short, fine and sparse; face and disk of mesoscutum virtually bare; hair of cheeks and underside of thorax moderately abundant and unusually short. Hair of front coxae rather long and moderately dense. Scopal hair of hind tibiae thin, that on outer margin short and thickened at base, the longer hair on anterior side hardly more than twice as long as greatest width of tibia. Abdomen oval, depressed; pygidial plate triangular, slightly longer than wide, and subacute at apex. Length: about 3.5-4 mm.; anterior wing, 2.6-3 mm.

Male.—Head and thorax dark bluish green, propodeum blue, disk of mesoscutum and scutellum black. Undersurface of head, except occiput, mandibles except red tips, labrum, face to and above level of antennae on both sides and in middle, pronotum except broad band on disk, and entire undersurface of thorax and anterior half of mesopleura to level of tubercles clear sulphur yellow. Median extension of yellow on frons narrow, more or less parallel-sided and reaching level of foveae; lateral marks above antennae strongly oblique on inner margin, more or less engulfing foveae and ending acutely above them, with the green descending on each side to antennal

sockets. Sometimes frons yellow straight across almost to summit of eyes on each side, with the green forming a broad lobe on each side descending halfway to level of antennal sockets. In such examples sides of thorax also yellow except broad green stripe from beneath wings to middle coxae. Green of vertex usually descending narrowly on inferior orbits to middle eyes. Abdomen fuscous above and dull yellow beneath, tergites 6 and 7 testaceous, base of tergites 2 to 5 more or less broadly yellow, and tergite 1 entirely dark or with a broad yellow spot. Legs yellow, blotch on posterior side of front femora and on apical half of hind femora above fuscous, with outer margins of hind tibiae more or less infuscated. Antennae yellow, with pedicel and flagellum brownish fuscous above. Tegulae and wings as in female.

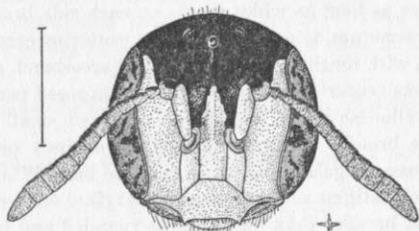


Fig. 16. *Perdita xanthoxyli*. Frontal view of head of male.

Head slightly broader than long; cheeks evenly rounded and almost as broad as eyes, or in about one out of twelve examples cheeks abruptly narrowed below anterior end of eyes and produced into a small blunt tubercle. Posterior ocelli their distance apart from occipital margin and slightly more remote from nearest eye. Facial foveae small, oval, about their own length from margins of eyes. Face below antennae slightly convex; parocular areas depressed, each nearly as wide as intervening space; disk of clypeus somewhat broader than high, with lateral extensions visible in frontal aspect. Mandibles tapering, acute and reaching slightly beyond far margin of fossa. Proboscis short. Flanks of pronotum rather strongly impressed above level of tubercles. Venation as in female, except outer nervure of second discoidal cell obsolete as usual in males. Sculpture and pubescence as in female. Hair of hind tibiae fine, only slightly longer than greatest width of tibia. Abdomen ovate depressed; tergite 7 triangularly narrowed to subacute apex. Subgenital plate slightly longer than wide, moderately narrowed to rounded apex, with disk minutely pubescent on apical half. Caulis of genitalia longer than wide, dorsal lobes divergent, acute; parameral lobes very slender; volsellae about equal, dorsal pair well exposed in dorsal view but concealing inferior pair; sagittae fusiform, with rods acute at apex in dorsal view and moderately divergent. Length: 2.5–3 mm.; anterior wing, 2.1–2.5 mm.

Holotype female and allotype.—Eight miles southeast of Tehuiztzingo, 4,100 feet, Puebla, Mexico, at flowers of *Xanthoxylon*, June 29, 1961 (Univ. Kans. Mex. Exped.).

Paratypes.—One hundred and thirty-three females, 13 males taken with types; 2 females, Corpus Christi State Park, San Patricia Co., Texas, June 5, 1961 (Univ. Kans. Mex. Exped.).

Types in collection of the University of Kansas, Lawrence; 10 paratypes in collection of the University of California, Riverside.

CLAYPOLEI SUBGROUP

Perdita gentilis Timberlake

(Plate figs. 1263, 1264, 1335)

Perdita gentilis Timberlake, 1962, Univ. Calif. Publ. Entom., 28:78, ♀.

In September, 1960, George E. Bohart collected females of *gentilis* with two kinds of males at flowers of *Eriogonum* on the north border of Arizona. One of the males with considerably broader pterostigma is described herewith as *pectoralis*; the other male with comparatively narrow stigma must belong with *gentilis*, but

it falls in the *claypolei* section of my key (1962) instead of the *nasuta* group. The pterostigma is distinctly narrower than in *thermophila* with which *gentilis* was originally compared. In the key the male falls near *jucunda*, but differs in having the lower part of face more convex and the median white mark on frons much larger.

Male.—Head and thorax dark blue. Inferior orbits narrowly to middle of eyes, mandibles except red tips, labrum and entire face below level of antennae white, with the white extending above antennae on each side and in middle halfway to level of anterior ocellus. Median mark on frons parallel-sided and twice as long as wide; marks on each side broad and obliquely rounded on inner margin. Collar of pronotum, triangular mark on posterior corners of disk and tubercles white. Abdomen pale yellow, with tergite 1 except subapical crossband, and broad apex of following segments brownish fuscous (covering all or nearly all of exposed part of tergites 4 or 5 to 7); venter entirely pale. Legs yellowish white, including coxae, but small joints of hind tarsi pale brown or fuscous. Antennae broadly white beneath, scape entirely pale, pedicel and flagellum brown above. Proboscis fuscous. Tegulae hyaline, with white base. Wings slightly dusky hyaline, nervures testaceous, margins of stigma and nervures of marginal cell brown, subcosta fuscous.

Head subrotund, somewhat broader than long; cheeks rounded and two-thirds as wide as eyes. Posterior ocelli about their distance apart from nearest eye and closer to occipital margin. Facial foveae very faint and punctiform. Face below level of antennae gently and evenly convex; disk of clypeus rounded above, slightly broader than high, with lateral extensions visible to base of mandibles in frontal aspect. Antennae short, subclavate, joints of flagellum broader than long, scape without radicle joint about twice as long as wide. Mandibles tapering, acute and reaching far margin of fossa. Proboscis rather short, galeae shorter than stipites. Flanks of pronotum not impressed. Pterostigma rather narrow, about half as wide as first submarginal cell; marginal cell as long as stigma, with parts beneath and beyond it equal. Head and thorax shining and virtually impunctate; frons and vertex distinctly tessellate and slightly dullish, mesonotum almost polished, with a faint tessellation on anterior part of scutum. Pubescence rather short, fine, erect and whitish; very thin on mesonotum and moderately abundant on occiput, cheeks and underparts of thorax; face bare. Abdomen oval, depressed, subpygidiform area of tergite 7 rather broadly truncate at apex. Subgenital plate as broad as long, with extremely minute and sparse pubescence. Caulis of genitalia short, dorsal lobes subacute and finely fimbriate beneath; volsellae unequal; fused body of sagittae rather broad and subangulate on each side as seen from above, and blunt at apex. Length: about 2.5 mm.; anterior wing, 1.8–1.9 mm.

New record.—Four females, 2 males, Vermillion Cliffs, Coconino Co., Arizona, on *Eriogonum*, Sept. 25, 1960 (G. E. Bohart).

***Perdita nodosicornia*, n. sp.**

(Plate fig. 1360)

The type of this species is very similar to *claypolei* in most respects, but differs in the distinctly nodose joints of the flagellum. I had described it in an early unpublished manuscript and had returned the specimen to Ithaca. Later without the specimen before me I recorded it under the subspecies *limatula* in the revision of the *ventralis* group (1960). On reexamination of the specimen the antennal character appears to be too important to be ignored and seems to indicate a distinct species, but there is need for additional specimens to make this certain.

Male.—Head and thorax dark blue green; mandibles except red tips, labrum, face below level of antennae, triangular spot on each side of disk of pronotum and tubercles white. The white of face enclosing antennal sockets except on posterior side and extending broadly and obliquely each side halfway to level of anterior ocellus. Abdomen brown, with pale yellow band at base of tergites 2 to 4, broadest on tergite 2 and almost reaching lateral margins, but shading into dilute brown at outer ends. Legs pale yellow, blotch on front femora behind on basal half, posterior side of middle femora and hind femora except at apex pale brown. Scape of antennae

white, flagellum pale yellow, tinged with brown above, becoming more infuscated toward base and on pedicel and upper edge of scape. Tegulae pale testaceous, with base yellowish white. Wings dusky hyaline, nervures and margins of stigma brown.

Head broader than long; cheeks much narrower than eyes. Face below antennae only slightly convex, with parocular plates distinctly depressed; disk of clypeus about twice as broad as high, with broad lateral extension abruptly inflexed, and anterior margin of disk shallowly emarginate to receive the transverse labrum. Antennae apparently 12-jointed, with first joint of flagellum reduced to a ring joint, obscurely separated from second, scape short or less than twice as long as wide at apex, flagellum strongly nodose for a *Perdita*, constriction between six apical joints especially strong. Head and thorax shining and virtually impunctate, frons distinctly tessellate and moderately dull, and mesonotum faintly tessellate. Pubescence whitish, thin, and moderately long. Other characters, including genitalia, very much the same as in *limatula*. Length: 3.5 mm.; anterior wing, 2.3 mm.

Holotype male.—Coalinga, below 500 feet, Fresno Co., California, June 1-3, 1907 (J. C. Bradley).

Type, No. 1008, in collection of Cornell University, Ithaca, New York.

NASUTA SUBGROUP

Perdita pectoralis, n. sp.

(Plate figs. 1265, 1266, 1336)

The male of *pectoralis* falls with *distans* in the key to the *ventralis* group but if the yellow mark on the mesopectus is disregarded it is very similar to *thermophila*.

Male.—Head and thorax blue green; anterior half of undersurface of head, proboscis, mandibles except red tips, labrum and face to level of foveae clear yellow. Dark part of cheeks rounded out anteriorly, with the yellow on orbits ending acutely above middle of eyes; green of frons with anterior lobe on each side, sometimes reaching antennal sockets. Pronotum yellow, with disk green, except testaceous collar and cuneate yellow marks nearly meeting on hind border; the green also narrowly extending halfway down middle of flanks. Prosternum and broad-limbed T-mark on mesopectus yellow, anterior arms of mark reaching lower edge of tubercles. Abdomen yellow, with tergite 1 fuscous except for narrow band across median part of apical margin, and broad apical bands on tergites 2 to 5 brown, the band on tergite 2 extended forward on lateral margins, nearly enclosing the yellow; abdomen if strongly contracted appears largely brown above. Legs yellow, outer margin of hind tibiae slightly brownish. Antennae yellow, pedicel fuscous, and three following joints with brownish semi-annulus above. Tegulae hyaline, base with small yellow mark. Wings hyaline, nervures colorless, except margins of stigma, nervures of marginal cell and subcosta brown.

Head rotund, slightly broader than long; cheeks strongly receding, nearly as broad as eyes. Posterior ocelli about their own distance apart from nearest eye and occipital margin. Facial foveae faint and punctiform. Face below antennae gently and evenly convex; disk of clypeus about as broad as high, with lateral extensions partly visible in frontal aspect. Antennae short, subclavate, joints of flagellum thicker than long. Mandibles tapering, very acute, and reaching beyond far margin of fossa, with outer margin dilated at base. Proboscis moderately long, not surpassing fossa in repose. Pronotum nearly normal, upper half of flanks slightly impressed, coinciding with extension of green from disk. Pterostigma rather large, about three times longer than wide and about as wide as first submarginal cell; marginal cell longer beneath than beyond stigma, with metacarpus and apical truncation subequal. Head and thorax shining, nearly impunctate, frons and vertex weakly tessellate, mesonotum polished. Pubescence white, fine, erect; rather long and moderately dense on occiput and cheeks; about as long but very thin on mesonotum and short and thin on frons. Abdomen oval or ovate, depressed; tergite 7 with pygidiform truncate apical area, defined laterally by carinae. Subgenital plate longer than wide, moderately narrowed to rounded apex and minutely pubescent on apical part. Genital armature

similar to that in other members of the *nasuta* subgroup; volsellae nearly equal in length, sagittae rather broadly swollen at middle and blunt at apex. Length: 2.75-3.5 mm.; anterior wing, 2.5-2.8 mm.

Holotype male.—Vermillion Cliffs, Coconino Co., Arizona, on *Eriogonum*, Sept. 25, 1960 (George E. Bohart).

Paratypes.—Six males, taken with the type.

Type in collection of the University of California, Riverside; five paratypes in collection of G. E. Bohart.

SPHAERALCEAE GROUP

This group is very large and varied, and especially rich in species in Mexico. Although the group has been recently revised (1964) many additional species are now at hand, and it seems likely that numerous other species will be discovered before the richness of our fauna and that of Mexico is exhausted. Of this group 69 species are known from Mexico, 27 are recorded from New Mexico, 25 from Texas, 43 from Arizona, and 69 from California. Comparatively few are known from Colorado, Utah and Nevada, and only one is known from the Atlantic Coast region. *P. drymariae* has been recorded from Michigan but since it is known otherwise only from our southern border in New Mexico and southward into Mexico, the record presumably is spurious.*

The following key distinguishes all the new species, with several little-known species also included.

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| 1. Females | 2 |
| Males | 31 |
| 2. Hair on outer margin of hind tibiae distinctly thickened and more or less darkened..... | 3 |
| Hair on outer margin of hind tibiae ordinary..... | 9 |
| 3. Face entirely dark | 4 |
| Face with distinct light markings..... | 6 |
| 4. Thorax entirely dark | 5 |
| Head and thorax blue green, with clypeus, supraclypeal area, meso- and metanotum black; basal half of mandibles and cuneate marks on disk of pronotum white; markings on front and middle legs and bands at base of tergites 2 to 5 pale yellow; wings slightly dusky, stigma pale brownish with darker margins..... | <i>obscurifacies</i> , n. sp. (p. 122) |
| 5. Entirely dark; head and thorax dull olive green, frons, vertex and mesonotum minutely but strongly tessellate; pubescence fine, erect, moderately long, but that on mesonotum rather sparse; hairs of hind tibiae thin, hardly longer than greatest width of tibia, two at apex on outer side spinelike and curved toward each other; mandibles with distinct inner tooth; wings subhyaline, stigma narrow, fuscous, with central paler streak | <i>tenebrosa</i> , n. sp. (p. 131) |
| Base of mandibles and anterior side of front tibiae pale yellow; head and thorax dark blue green, with clypeus, supraclypeal area, disk of mesoscutum, scutellum, and metanotum black; mesoscutum minutely tessellate, middle of disk polished; wings subfuliginous, stigma almost uniformly dark | <i>lustrans</i> Timberlake (p. 125) |
| 6. Abdomen with white or pale yellow markings | 7 |
| Abdomen entirely dark; head and thorax dark blue green, with dark part of clypeus, supraclypeal area, disk of mesoscutum, scutellum and metanotum black; clypeus sometimes almost all dark or irregularly variegated with yellow; lateral face marks pale yellow, transverse, sometimes with short broad orbital extensions; head broader than long, facial foveae large and broad | <i>aculeata</i> , n. sp. (p. 118) |

* The abbreviation of the Mexican State of Michoacan, being the same used for the state of Michigan, may have caused the confusion.

7. Abdomen with large triangular mark on each side of tergites 2 to 4 or 5, and small spot on lateral margins of tergite 1; metanotum often marked with pale yellow or white.....8
 Abdomen with narrow yellow band at base of tergites 2 to 4; base of mandibles, labrum in part, clypeus except two discal dark stripes, lateral, subantennal and supraclypeal marks yellow; frons and vertex tessellate and dullish; mesonotum shining; thorax entirely dark
schwartzii, n. sp. (p. 129)
8. Head and thorax dark blue green; clypeus dark, narrowly greenish across summit, and more or less yellow on anterior border; lateral marks triangular, much higher than wide and extending between foveae and eyes; yellow band on metanotum more or less evanescent; yellow marks of abdomen sometimes nearly or quite meeting on tergites 4 and 5, on 5 often concealed or absent; wings dusky hyaline, stigma narrow, with fuscous margins and central paler streak*pubescens*, n. sp. (p. 128)
 Similar but markings whiter; mark on metanotum well developed; tergite 5 with entire white band broadened at outer ends; mesoscutum more shining, less closely punctured (punctures mostly about two to four puncture-widths apart in *pubescens*)
mexicanorum Cockerell (p. 126)
9. Face entirely dark10
 Light markings more or less developed on face.....16
10. Abdomen with pale yellow bands; head and thorax entirely dark.....11
 Abdomen entirely dark12
11. Head as broad as long; head and thorax dark green, mesonotum polished; abdomen with broad yellow bands on tergites 1 to 5, ending close to lateral margins, notched medially and that on tergite 1 slightly interrupted*modestissima*, n. sp (p. 147)
 Smaller and more slender, head longer than wide; head and thorax dark green, meso- and metanotum black, the mesonotum polished; abdomen with abbreviated, narrow and interrupted yellow bands, resultant marks transversely oval and less than transverse length apart on tergites 2 to 4, small and close together on tergite 1 and small and far apart on tergite 4*tessellata* Timberlake (p. 151)
12. Mesonotum polished, the scutum sometimes tessellate around margins or on anterior border.13
 Mesonotum strongly tessellate and dull15
13. Larger species, about 4-5 mm. long; frons and vertex weakly tessellate and distinctly punctured14
 Smaller, about 3-3.5 mm. long; frons and vertex tessellate and almost impunctate; facial foveae short, slender, or no longer than space between posterior ocelli; head and thorax dark blue green, disk of mesoscutum and scutellum black, polished, and almost impunctate
divaricata, n. sp. (p. 133)
14. Frons moderately shining, bare, with punctures distinct only above close to ocelli; facial foveae not going below upper level of antennal sockets; mesoscutum black and polished on disk, but broad anterior border green, tessellate, dullish, and pubescent; head slightly longer than wide*guerreroensis*, n. sp. (p. 134)
 Frons tessellate but shining, with minute punctures scattered nearly all over, and with short whitish pubescence; facial foveae reaching lower level of antennal sockets; mesoscutum black, with greenish tinge on anterior half; scopal hair of hind tibiae gently curved and longer than width of tibia*atrovirens*, n. sp. (p. 155)
15. Mesoscutum strongly tessellate and dull, with moderately close obscure punctures and abundance of fine erect whitish hair; head and thorax dark olive green, anterior corners of face and clypeus black; head as broad as long; hair of hind tibiae gently curved and not much longer than width of tibia.....*humilis*, n. sp. (p. 156)
 Mesoscutum tessellate, moderately dull, with very sparse punctures and thin erect hair; head and thorax dark green, clypeus, disk of mesoscutum, scutellum, and metanotum black; hair of hind tibiae, except at base, strongly curved and slightly longer than width of tibia; head broader than long*concolor*, n. sp. (p. 120)
16. Abdomen with distinct light markings17
 Entirely dark, except for transverse yellow mark between clypeus and eye on each side of

- face; head and thorax dark blue green, clypeus, disk of mesoscutum, and scutellum black; mesoscutum strongly tessellate, dull, minutely punctured, and with short erect hair; head broader than long, antennae inserted below middle of face. *dispilota*, n. sp. (p. 121)
17. Abdomen with entire light bands, or interrupted medially only on tergite 1. 18
 Abdominal bands interrupted at least on tergite 2, or on all segments, with that on tergite 1 usually greatly reduced or absent 22
18. Mesonotum uniformly tessellate and dull 19
 Mesonotum shining, more or less polished on disk. 20
19. Head and thorax dark green; inverted anchor-shaped mark on clypeus and lateral marks pale yellow; abdomen brown, more infuscated toward base and redder toward apex, with broad, enclosed and nubilous yellow bands on tergites 1 to 4; mesonotum with fine, thin, erect whitish hair *ancoralis*, n. sp. (p. 155)
 Clypeus except two stripes on disk, and lateral marks, broad below and acute above, yellow; abdomen black, with enclosed, broad yellow band on tergites 1 to 4; mesonotum with very sparse and short, erect hair; large, robust species with facial foveae deeply impressed and broad *nigroaenea*, n. sp. (p. 158)
20. Face strongly punctured; mesoscutum with fine punctures, mostly well separated, and with thin erect hair, light bands of abdomen abruptly bent backward at outer ends. 21
 Frons and mesonotum shining, distinctly punctured, the punctures close on frons and moderately close on mesonotum; pubescence abundant, rather coarse and erect; clypeus except two stripes on disk, triangular lateral marks and transverse supraclypeal mark pale yellow; pronotum yellow except for large mark on flanks; yellow bands on tergites 1 to 4 broad, even and reaching lateral margin *impressa*, n. sp. (p. 153)
21. Face strongly depressed; antennae long, reaching tegulae; clypeus, lateral and supraclypeal marks yellow, lateral marks much higher than wide; scape of antennae entirely yellow; yellow bands of abdomen broad and curved backward at outer ends of tergites 2 and 3, and tergites 7 and 5 mainly yellow; tergite 1 dark, except for narrow pale band
depressa, n. sp. (p. 48)
 Face normally convex; antennae short, joints of flagellum mostly broader than long; clypeus except two stripes on disk and lateral marks yellowish white; abdomen yellow, with five broad fuscous bands, that at apex of tergite 5 incomplete, the yellow on tergites 2 and 3 bent backward at outer ends, and that on tergite 4 nearly enclosed; tergite 1 mainly light, with dark spot on each side. *replicans*, n. sp. (p. 149)
22. Abdominal light bands entire except on tergites 1 and 2, that on tergite 1 broken into four small spots or entirely absent 23
 Abdominal bands interrupted on all segments where present, except sometimes on tergite 4. 25
23. Abdominal bands enclosed by dark ground color and absent on tergite 1. 24
 Light bands of abdomen reaching lateral margins, although by slender extensions on tergite 2, and that on tergite 1 broken into four small spots; clypeus, lateral and supraclypeal marks yellow; legs mainly yellow; mesoscutum weakly tessellate, shining, with sparse fine punctures and thin erect hair; head broader than long, face depressed. *planifrons*, n. sp. (p. 148)
24. Head and thorax dark green; clypeus broadly black on disk, with small mark each side, small lateral marks and tubercles white; abdomen black, with white bands on tergites 2 to 5, narrowly interrupted on tergite 1; mesoscutum polished, with moderately close punctures and erect whitish hair *albofasciata*, n. sp. (p. 152)
 Head and thorax dark green, disk of mesoscutum almost black; labrum and clypeus brownish fuscous, streak along lateral margin of disk of clypeus and small evanescent lateral marks, close to margin of eyes, white; abdomen with broad pale yellow bands, slightly interrupted on tergite 2, and tergites 5 and 6 almost entirely light; mesoscutum weakly tessellate, slightly dullish, and almost impunctate *insequens*, n. sp. (p. 146)
25. Mesonotum strongly tessellate and dull 26
 Mesonotum highly polished and shining. 27
26. Head and thorax dark olive green, thorax entirely dark; mesonotum impunctate, but with abundant short erect whitish hair; head much broader than long; clypeus and small lateral

- marks yellow; abdomen brown, with rather small oblique, pale yellow marks on lateral margins of tergites 2 to 4 and smaller marks on tergite 1. . . . *obliquenotata*, n. sp. (p. 159)
- Head and thorax dark green, labrum and dark part of clypeus blackish; median mark on clypeus, confluent above with arcuate band across summit and sides of disk, and subquadrate lateral marks yellow; abdomen with broadly oval or oblong yellow marks on each side of tergites 2 to 5, and smaller spots on tergite 1, all not quite reaching lateral margins; mesonotum with long, erect, minutely plumose, pale ochreous hair. . . . *greggiae*, n. sp. (p. 142)
27. Tergites 2 to 4 or 1 to 4 with light markings. 28
 Tergites 2 and 3 each with two submedian transverse yellow marks, closer together than their transverse length; head and thorax dark green, clypeus and supraclypeal area black; base of mandibles and small lateral marks adjacent to sides of clypeus yellow; thorax entirely dark, or apex of tubercles slightly yellowish; legs dark at base, but apex of femora, tibiae, and tarsi yellow. *cruciferarum*, n. sp. (p. 140)
28. Cheeks hairy and narrower than eyes; markings on tergite 1 reduced to two small submedian spots or absent 29
 Head large, as broad as long; cheeks broad, widest above level of middle of eyes, and nearly hairless; triangular median mark on clypeus, oblique band on lateral margins of disk, and obliquely transverse lateral marks pale yellow; abdomen with yellow bands on tergites 1 to 4 narrowly interrupted at middle and broadened and curved backward at outer ends
imberbis, n. sp. (p. 139)
29. Markings of face small, lateral marks transverse, or no higher than wide. 30
 Face with three yellow, slender longitudinal marks, a median one on clypeus, and orbital stripes reaching level of antennae; thorax entirely dark, except small yellow spot on posterior corners of disk; bands at base of tergites 2 to 4 narrow, well interrupted and reaching lateral margins only on tergite 3; head and thorax green, dark part of clypeus black *impigra*, n. sp. (p. 157)
30. Head and thorax dark green; clypeus, supraclypeal area, disk of mesoscutum, scutellum and metanotum black; small spot on middle of clypeus and small transverse lateral marks white; abdomen with white bands on tergites 2 to 4, interrupted medially, more or less narrowed at outer ends, and generally reaching lateral margins on tergites 3 and 4; submedian marks on tergite 1 small or absent. *trinotata* Timberlake (p. 144)
 Similar, but mark across anterior border of clypeus (sometimes broken into three spots), and more or less triangular lateral marks, about as high as wide, white; thorax entirely dark; apex of abdomen red, interrupted bands on tergites 2 to 4 and two submedian marks on tergite 1 white *veris*, n. sp. (p. 137)
31. Face more or less dark below level of antennae, or if mainly light the dark color of frons strongly intruding between lateral and subantennal marks 32
 Face completely light, or nearly so below level of antennae, with at most only a slight intrusion of the dark color, or margins of subantennal plates dark. 43
32. Abdomen fuscous or black and not armed with tubercles at apex. 33
 Abdomen ferruginous, slightly infuscated at base, with nubilous yellow markings on tergites 2 to 6, and armed at apex with small tubercles; mandibles at base, clypeus and transverse lateral marks yellow; head and thorax moderately shining, posterior half of mesoscutum and scutellum nearly polished *rufiventris* (Friese) (p. 160)
33. Light marks of face restricted to clypeus and lateral marks, with only traces of supraclypeal mark sometimes present 34
 Supraclypeal or subantennal marks present, or sometimes all three marks. 39
34. Disk of clypeus more or less strongly lobate on each side of labrum and emarginate to receive labrum 35
 Lateral extensions of clypeus normally inflexed at sides of labrum 38
35. Anterior lobes of clypeus appearing large and acute in frontal aspect and broad and rounded at apex in lateral view 36
 Clypeal lobes small and blunt 37
36. Mandibles except tips, labrum, clypeus except across summit, quadrate lateral marks, trans-

- verse mark on metanotum and triangular marks on each side of tergites 2 to 5 pale yellow; head and thorax moderately shining, frons dull, mesoscutum dullish, punctures fine and obscure; cheeks as wide as eyes, rapidly narrowing toward base of mandibles; flanks of pronotum impressed, lateral margins of disk emarginate, with posterior corners of disk bluntly prominent *mexicanorum* Cockerell (p. 126)
- Markings similar but deeper yellow, lateral face marks often triangular, mark on metanotum evanescent or absent, and marks on abdomen restricted to tergite 2 to 4, or evanescent or absent; cheeks rounded, rectangular at anterior end or produced into large blunt process; pronotum normal; frons tessellate and dullish, mesonotum shining and with distinct fine punctures *pubescens*, n. sp. (p. 128)
37. Mandibles strongly dilated at middle of inner margin; clypeal lobes quadrate, or long as wide; clypeus except dark mark across summit and transverse lateral marks white; cheeks sometimes with a small blunt anterior process; mesonotum polished on disk; wings with whitish opacity, nervures testaceous, margins of stigma and subcosta brown
guerreroensis Timberlake (p. 134)
- Mandibles tapering, acute; clypeal lobes broader than long and rounded at apex; clypeus entirely and transverse lateral marks creamy white; frons and mesonotum polished, scutum almost nude; wings dusky hyaline, stigma uniformly dark *debilis*, n. sp. (p. 131)
38. Thorax and abdomen entirely dark; face marks yellow, lateral marks rather large, quadrate, broader than high; frons tessellate and dull, mesonotum polished, very thinly hairy; wings dusky hyaline, nervures rather dark brown, margins of stigma and subcosta more fuscous
annectens, n. sp. (p. 119)
- Tubercles slightly whitish at apex; abdomen with white bands on tergites 2 to 4, or 5, that on tergite 2 more or less abbreviated and interrupted, others generally reaching lateral margins; marks on clypeus and small lateral marks white; wings subhyaline, nervures testaceous brown, margins of stigma and subcosta brown *trinotata* Timberlake (p. 144)
39. Supraclypeal mark, together sometimes with subantennal marks, present 40
Clypeus, lateral marks, and oval subantennal marks perpendicular to disk of clypeus, and scape of antennae broadly beneath, pale yellow; lateral marks hardly reaching above level of summit of clypeus; frons dull, mesonotum polished, impunctate; wings dusky hyaline, stigma pale, with margins broadly dark *morelosana*, n. sp. (p. 122)
40. Subantennal marks usually well developed, but sometimes evanescent or absent; basal bands of tergites narrow and often more or less concealed or evanescent, and abdomen appearing dark 41
Supraclypeal mark large, subantennal marks often absent; abdomen with distinct light bands, rarely reduced to small marks on tergites 3 and 4 42
41. Thorax entirely dark; mandibles except tips, labrum, clypeus, large lateral marks, small supraclypeal mark and usually subantennal marks yellow, but dark color of frons reaching clypeus; abdominal light bands very narrow and often concealed, or absent; wings strongly dusky, stigma dark but with darker margins *aculeata*, n. sp. (p. 118)
- Mark on each side of disk of pronotum and tubercles yellow; abdomen with two transverse basal marks on tergites 3 and 4, the marking on other segments mainly concealed or absent, or abdomen appearing almost entirely dark; face marks yellow, with dark mark across summit of clypeus, and subantennal and supraclypeal marks enclosed in dark ground color *quadrinotata*, n. sp. (p. 123)
42. Face marks creamy white, lateral marks much higher than wide, ending broadly at level of antennae; abdomen with yellow bands on tergites 1 to 5, abbreviated and sometimes interrupted, and those on 4 and 5 often more or less nubilous or evanescent, and that on tergite 1 sometimes absent *heliotropii* Cockerell (p. 148)
- Face marks white, lateral marks nearly quadrate and no higher than wide; abdomen black, orange fulvous at apex, yellowish-white bands on tergites 1 to 5 nearly or quite interrupted, that on tergite 1 reduced to submedian spots, others reaching lateral margins except on tergite 2 *veris*, n. sp. (p. 137)

43. Abdomen fuscous, or mainly yellow with dark markings.....44
 Abdomen ferruginous, unmarked, slightly infuscated at base; mandibles except tips, labrum, face below level of antennae and tubercles white; head broader than long, cheeks broad and armed with small anterior process; head and thorax polished, impunctate; mandibles dilated at middle of inner margin*irwini*, n. sp. (p. 135)
44. Head much broader than long; pterostigma uniformly dark.....45
 Head never very broad; pterostigma light with dark margins.....46
45. Mandibles, labrum, and face below antennae yellow; lateral marks very broad, not narrowed above, but deeply indented by green of frons, with orbital extensions about three times longer than wide; abdomen dark, with yellow band at base of tergite 2 narrow, enclosed and more or less broken; thorax entirely dark; head and thorax dull; face very hairy; hair of mesonotum long and thin*maesta* Timberlake (p. 125)
 Similar; face marks yellowish white, lateral marks slightly indented above, orbital extensions as long as wide; tubercles white; long erect hair of face rather thin in comparison with *maesta*; abdomen entirely dark*maerens* Timberlake
46. Abdomen entirely dark, or yellowish along lateral margins.....47
 Abdomen with yellow bands or mainly light with dark bands.....48
47. Abdomen entirely fuscous; mandibles except tips, labrum and face below level of antennae yellowish white; tergite 7 narrowed into an apical process, longer than wide, curled downward and emarginate at apex to form more or less divaricate lobes
divaricata, n. sp. (p. 133)
 Abdomen with lateral margins nubilously yellowish; apical process of tergite 7 broader than long, emarginate at apex to form short blunt lobes; otherwise similar to *divaricata*
paula, n. sp. (p. 136)
48. Mesopectus with large yellow T-mark, or with yellow spot on each side of anterior border and flanks of propodeum partly yellow.....49
 Thorax dark, except for usual light marks on pronotum and tubercles.....50
49. Face marks bright yellow, supraclypeal mark with a spearhead extension onto frons; T-mark of mesopectus covering anterior part of mesopleura as high as tubercles; abdomen dark; with yellow bands on tergites 2 to 5.....*werneri*, n. sp. (p. 154)
 Face strongly depressed, pale yellow to level of antennae, with green of frons intruding slightly between lateral and subantennal marks; mark on each side of anterior border of mesopectus and lower half of flanks of propodeum yellow; abdomen yellow, with three fuscous bands, and tergite 1 entirely dark.....*depressa*, n. sp. (p. 48)
50. Thorax with light marks on hind margin of disk or on tubercles51
 Thorax entirely dark; mandibles except tips, labrum, face below antennae, and scape of antennae bright yellow; abdomen dark, with narrow yellow bands at base of tergites 2 to 4, not quite reaching lateral margins and interrupted except on tergite 3; mesonotum weakly tessellate, shining, and with thin, erect fine hair.....*schwartzii*, n. sp. (p. 129)
51. Face marks extending more or less above level of antennae on each side.....52
 Yellow of face terminating almost evenly at lower level of antennal sockets; yellow bands of abdomen broadly interrupted on tergites 1 to 5, with the marks gradually less separated toward apex, those on tergite 2 very broad; frons, vertex, and mesonotum tessellate, dull and obscurely punctured*greggiae*, n. sp. (p. 142)
52. Mesonotum polished and shining53
 Mesonotum, as well as frons and vertex, distinctly tessellate and dull, face white below level of antennae; abdomen yellow, but tergites 1 and 2 with dark margins enclosing the yellow, and tergite 3 with partly dark margins; legs and antennae yellow
tessellata Timberlake (p. 151)
53. Flanks of pronotum normal and posterior corners of disk not prominent54
 Flanks of pronotum strongly impressed; head much broader than long; face below antennae pale yellow, with slender extension on orbits somewhat higher, large mark on tubercles and legs entirely yellow; abdomen yellow, heavily marked with fuscous on basal segments, the yellow on tergite 1 enclosed and interrupted.....*placens*, n. sp. (p. 124)

54. Face completely white below antennae, lateral marks extending broadly to middle of eyes; bands on tergites 1 to 5 and two apical segments of abdomen pale yellow; band on tergite 1 reduced to two submedian marks, and that on tergite 2 abbreviated or interrupted near outer ends *cruciferarum*, n. sp. (p. 140)
- Face yellow to level of antennae, but lower margin of subantennal plates dark, and the green of frons intruding slightly on each side; abdomen dark, with tergites 6 and 7 and bands on tergites 2 to 5 yellow, the bands enclosed except on tergite 5; legs yellow, blotches on front and hind femora and middle and hind tibiae fuscous. *zebrata* Cresson, var. (p. 150)

SPHAERALCEAE SUBGROUP

The *elimata* subgroup proposed in 1964 for *elimata* and *salviae* is here combined with the *sphaeralceae* subgroup, and seven new species, all from Mexico, added.

Perdita aculeata, n. sp.

Perdita elimata Timberlake, 1964, Univ. Calif. Publ. Entom., 28:183, figs. 932, 934, 1110, ♂ (excluding type ♀).

Additional material shows that the supposed male of *elimata* belongs with females distinct from the type female of *elimata*, and the true male is unknown. The *aculeata* female runs to *differens* in the 1964 key, but differs in the more shining mesonotum, the more extensive face marks, and in the exceptionally broad facial foveae. The female has a distinct minute aculeus and this is the only species of *Perdita* in which I have detected a sting, although a rudimentary sting at least is presumably always present.

Female.—Head and thorax dark blue green, mesoscutum except margins, scutellum, metanotum, dark part of clypeus and supraclypeal area black. Clypeus sometimes almost all dark, or irregularly mottled with yellow; mark on base of mandibles and transverse lateral marks, sometimes with orbital extension halfway to level of antennae, yellow. Labrum fuscous, anterior border testaceous. Thorax entirely dark. Abdomen black, without markings, pygidial plate rufous. Legs fuscous, knees, anterior side of tibiae and tarsi of front legs yellow, tinged with brown on basal joint of tarsi. Antennae fuscous, more brownish toward apex, scape narrowly yellow beneath and flagellum slightly yellowish beneath. Mandibles shading into red at apex. Proboscis dark. Tegulae testaceous hyaline, base fuscous. Wings dusky hyaline, nervures testaceous brown, stigma with broad dark brown margins and paler brown central streak becoming yellowish at base, and subcosta fuscous.

Head as broad as long; cheeks evenly rounded, as wide as eyes. Posterior ocelli their distance apart from nearest eye and closer to occipital margin. Facial foveae about three times as wide as interval between them and eyes, strongly arcuate on inner margin, and reaching from lower level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae evenly convex; disk of clypeus large, nearly as high as broad, lateral extensions strongly inflexed but partly visible in frontal aspect. Mandibles reaching far margin of fossa, acute at apex, with distinct inner tooth. Proboscis moderately long, galeae reaching base of stipites. Pterostigma large, about four times longer than wide, nearly as long and three-fourths as wide as first submarginal cell; marginal cell nearly as long as stigma, longer beyond than beneath stigma, with metacarpus somewhat more than twice as long as apical truncation. Head and thorax moderately shining, frons, vertex and thorax smoothly tessellate, middle of disk of mesoscutum nearly polished; punctures minute, but distinct, close on frons and sparse on clypeus and mesonotum. Pubescence whitish, rather fine and moderately long; shorter, subappressed and moderately abundant on face and thinner on mesonotum; scopal hair of hind tibiae strongly curved, that on outer margin thickened and dark at base. Abdomen elongate ovate, depressed, apical fimbria moderately dense; pygidial plate triangular, as long as wide at base, somewhat obtuse at apex. Length: about 6 mm.; anterior wing, 4.3 mm.

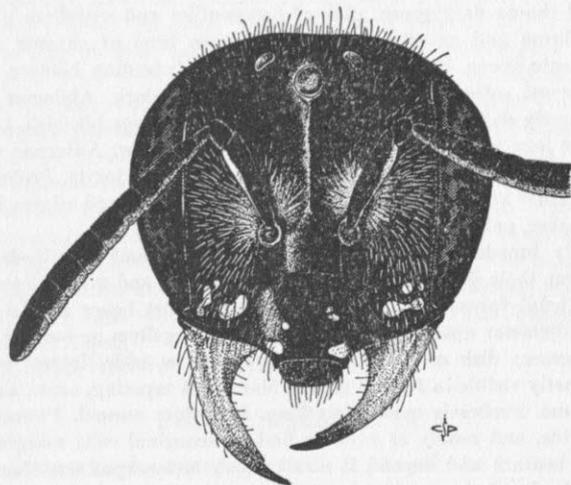


Fig. 17. *Perdita aculeata*. Frontal view of head female.

Male.—Described as the male of *elimata*. Lateral face marks varying from triangular to nearly quadrate and reaching level of antennae. Supraclypeal mark twice as broad as high. Subantennal plates varying from all dark to nearly all yellow. Base of tergites 2 to 5 very narrowly yellow, with the yellow often concealed by preceding segment or evanescent. Length: about 4.5–5 mm.; anterior wing, 3.7–3.9 mm.

Holotype female and allotype.—Two miles northwest of Tamazulapan, 6,000 feet, Oaxaca, Mexico, on *Physalis*, June 28, 1961 (Univ. Kans. Mex. Exped.).

Paratypes.—Four females, 22 males, taken with the types; 1 female, 2 males, same locality and day, but on *Baccharis*; and 1 male (former allotype of *elimata*), Puebla, Puebla, Mexico, July 3, 1952 (Gilbert and MacNeill).

Type in collection of the University of Kansas, Lawrence; paratypes in collection of the University of California, Riverside.

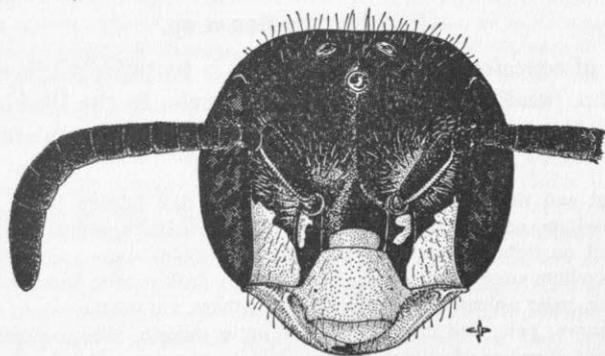


Fig. 18. *Perdita aculeata*. Frontal view of head of male.

***Perdita annectens*, n. sp.**

(Plate figs. 1267, 1268, 1337)

The unique male of *annectens* seems to be close to *aculeata* but the lateral face marks are truncately level with summit of clypeus and supraclypeal and subantennal marks are lacking. This possibly could prove to be the male of *elimata*.

Male.—Head and thorax dark green, disk of mesoscutum and scutellum blackish. Mandibles except red tips, labrum and anterior border of face to level of summit of clypeus yellow. Lateral marks truncate above, but the green triangularly intruding between them and summit of clypeus, and clypeal sutures darkened. Thorax entirely dark. Abdomen blackish, without markings, venter mostly dull yellow except on first segment. Legs blackish, broad anterior side of front and middle legs, their tarsi and hind trochanters yellow. Antennae dark, scape yellow beneath, and flagellum yellowish beneath except on first and last joints. Proboscis dark. Tegulae testaceous brown, darker at base. Wings dusky hyaline, nervures and stigma brown, margins of stigma narrowly darker, subcosta fuscous.

Head considerably broader than long; cheeks rounded, about two-thirds as wide as eyes. Posterior ocelli about their distance apart from nearest eye and much closer to the indefinite occipital margin. Facial foveae faint. Antennae inserted just below middle of face, antennal sockets twice their diameter apart, and middle joints of flagellum as long as thick. Face below antennae gently convex; disk of clypeus about as high as wide, lateral extensions strongly inflexed and only partly visible in frontal aspect. Mandibles tapering, acute, and hardly reaching far margin of labrum. Proboscis moderately long. Pronotum normal. Pterostigma nearly four times as long as wide, and nearly as wide as first submarginal cell; marginal cell as long as stigma, with parts beneath and beyond it about equal, metacarpus less than twice as long as apical truncation. Head and thorax shining, disk of mesoscutum and scutellum polished, anterior border and hind margin of scutum delicately tessellate, frons and vertex minutely tessellate and moderately dullish. Punctures of face obscure, of mesonotum very sparse and minute, disk of scutum with large impunctate spaces. Pubescence whitish, fine, erect and moderately long, thin on face and mesonotum, and denser and whiter on underside of head and thorax. Abdomen oval, depressed, about twice as long as wide; tergite 7 triangularly narrowed to apex. Subgenital plate similar to that of *aculeata* (fig. 1110) except that lateral apodemes are very broad and not recurved. Genital armature similar to that of *aculeata*, but parameral lobes with oblique crest near apex on inner side, which appears as an acute process in a certain view (in *aculeata* an acute, crestlike process is located on inner margin at middle of lobe). Length: about 4.25 mm.; anterior wing, 3.8 mm.

Holotype male.—Six and seven-tenth miles east of Chilpancingo, 4,850 feet, Guerrero, Mexico, Aug. 2, 1962 (Univ. Kans. Mex. Exped.).

Type in collection of the University of the University of Kansas, Lawrence.

Perdita concolor, n. sp.

The female of *concolor* is entirely dark and is tentatively placed in the *sphaeralcea* subgroup, pending the discovery of the male. In the 1964 key it falls next to *pumila*, but is considerably larger and different in many details of structure and color.

Female.—Head and thorax dark blue green; clypeus and labrum black, posterior half of mesoscutum, scutellum, and metanotum blackish. Abdomen black, apical depression of tergites more shining, but no lighter than disk. Legs blackish, tibial spurs pale testaceous. Antennae black at base, flagellum more nearly fuscous and broadly dark reddish brown beneath and at apex. Proboscis fuscous, paler apically. Mandibles black at base, rufotestaceous at middle and red at apex. Tegulae brown, pale, and more hyaline on outer margin. Wings slightly dusky hyaline, nervures testaceous, margins of stigma brown, subcosta fuscous; central paler streak of stigma only a little wider than darkened inner margin.

Head as broad as long; cheeks moderately receding and about two-thirds as wide as eyes. Distance between posterior ocelli subequal to distance to nearest eye and occipital margin. Facial foveae linear, their own width from margin of eyes and reaching from level of middle of antennal sockets about four-fifths of distance to level of anterior ocellus. Antennae inserted slightly below middle of face, middle joints of flagellum as broad as long. Face below antennae moderately convex; disk of clypeus distinctly broader than high, lateral extensions short, well inflexed but visible in frontal aspect. Mandibles thick at base, tapering,

and abruptly narrowed on inner margin before acute apex. Proboscis moderately short, galeae distinctly shorter than stipites; maxillary palpi about four-fifths as long as galeae. Pterostigma about four times as long as wide, and nearly as wide as first submarginal cell; marginal cell slightly longer beyond than beneath stigma, metacarpus twice as long as apical truncation; second submarginal cell narrowed two-thirds to radius. Head and thorax minutely tessellate and moderately dull, anterior part of face more shining. Punctures of mesonotum minute and sparse, very widely separated on posterior half of scutum and on scutellum; punctures of frons obscure, but clypeus with comparatively coarse, shallow punctures. Pubescence whitish, thin, fine, moderately long and erect, and more appressed on underparts; hair of front coxae rather short and moderately dense; scopal hair of hind tibiae strongly curved, that on outer margin thickened but not darkened at base. Abdomen oval, twice as long as wide; pygidial plate apparently longer than wide at base and subacute at apex. Length: about 5.5 mm.; anterior wing, 3.8 mm.

Holotype female.—Two miles northwest of Tamazulápan, 6,000 feet, Oaxaca, Mexico, June 28, 1961 (Univ. Kans. Mex. Exped.).

Type in collection of the University of Kansas, Lawrence.

Perdita dispilota, n. sp.

P. dispilota represented by a single female is placed as another tentative species of the *sphaeralceae* subgroup on the basis of the thickened hairs on outer margin of the hind tibiae and blackened disk of mesoscutum, scutellum and metanotum. In the 1964 key it runs best near *dispar* but differs in the dusky wings, narrow stigma, fine erect hair of face and mesonotum, and dark mandibles and legs.

Female.—Head and thorax blue green, clypeus, disk of mesoscutum, scutellum, and metanotum black. Head and thorax dark, except for yellow transversely oblong lateral face marks, filling space between sides of clypeus and eyes, not quite reaching level of summit of clypeus and distinctly wider on orbits than within. Abdomen and legs brownish fuscous, without markings, except for a small whitish spot at base of front tibiae. Pygidial plate ferruginous. Antennae fuscous, flagellum dark ferruginous except toward base, scape entirely black. Mandibles testaceous, slightly infuscated at base and red at apex. Proboscis fuscous. Tegulae brownish testaceous. Wings dusky hyaline, margins of stigma and subcosta fuscous.

Head distinctly broader than long, well rounded on sides and across vertex; cheeks evenly rounded, two-thirds as wide as eyes. Posterior ocelli their distance apart from nearest eye and closer to occipital margin. Facial foveae well impressed, linear, close to margin of eyes and reaching from level of middle of antennal sockets three-fourths of distance to level of anterior ocellus. Antennae inserted well below middle of face, short, scape hardly reaching more than halfway to level of anterior ocellus, flagellum weakly clavate, its joints mostly thicker than long. Antennal sockets slightly closer to margin of eyes than to each other. Face below antennae moderately convex, clypeus more strongly convex than other parts; clypeus with disk much broader than high, strongly inflexed on each side, lateral extensions visible in frontal aspect. Subantennal plates only slightly longer than wide. Mandibles rather slender, slightly tapering to blunt apex, with small inner tooth. Proboscis moderately long, galeae almost reaching base of stipites. Pterostigma small and narrow, shorter than first submarginal cell and distinctly less than half as wide; marginal cell as long as stigma, part beyond longer than part beneath, with metacarpus twice as long as apical truncation. Head and thorax finely tessellate, moderately dull, but facial marks smooth; punctures of face minute, numerous but well separated, those of clypeus coarse and much more distinct, but sparse; punctures of mesonotum sparse. Pubescence whitish, moderately abundant, fine, erect and moderately long, denser than elsewhere on underside of head, and longer on underside of thorax. Hair of front coxae moderately long and dense, and hair on outer margin of hind tibiae distinctly thickened at base but not darkened. Abdomen oval, subdepressed; apical fimbria moderately dense, with hair coarse. Pygidial plate about as long as wide at base and narrowed to obtuse apex. Length (with head stretched forward): 5.5 mm.; anterior wing, 3 mm.

Holotype female.—Fifteen and five-tenths miles northeast of Lagos de Moreno, 6,200 feet,

Jalisco, Mexico, collecting pollen from *Dalea* sp., July 26, 1962 (Univ. Kans. Mex. Exped.).
Type in collection of the University of Kansas, Lawrence.

***Perdita morelosana*, n. sp.**

(Plate figs. 1269, 1270, 1338)

This species is closely allied to *aculeata*, but the male has the lateral face marks small and quadrate, the supraclypeal area dark, but ovate yellow subantennal marks usually well developed. As in *aculeata* the thorax and abdomen are entirely dark. In the 1964 key the male goes to couplet 155 where it is distinguished by the peculiar face markings.

Male.—Head and thorax dark blue, or bluish green; scutellum and metanotum black, but disk of mesoscutum bluish. Mandibles except red tips, labrum, clypeus, lateral and subantennal marks pale yellow; lateral marks more or less quadrate, sometimes with orbital extensions above level of summit of clypeus; subantennal marks ovate, longer than wide, pointed below, perpendicular to disk of clypeus, and in one specimen incompletely developed, the left plate mostly dark. Thorax and abdomen without markings; abdomen blackish, pygidial plate dark ferruginous. Legs blackish, extreme apex of front femora, anterior side of front tibiae, and front tarsi yellow. Antennae fuscous, flagellum brownish and scape broadly yellow beneath. Proboscis fuscous, galeae brownish. Tegulae testaceous subhyaline, base fuscous. Wings dusky hyaline, nervures brown, margin of stigma and subcosta more fuscous, the stigma with distinct central paler streak.

Head broader than long; cheeks rounded, half as wide as eyes. Posterior ocelli about their distance apart from nearest eye and much closer to occipital margin. Facial foveae rather large, ovate or elliptical, more than twice as long as wide. Face below antennae evenly convex; disk of clypeus broader than high, inflexed laterally, with extensions visible in frontal aspect. Antennae reaching posterior end of tegulae, inserted on middle of face; scape rather short, reaching about two-thirds of distance to level of anterior ocellus. Antennal sockets somewhat closer to nearest eye than distance apart. Mandibles tapering, acute, barely reaching far margin of fossa. Proboscis moderately long, galeae slightly shorter than stipes. Pronotum normal, its disk far below level of the elevated and convexly declivous anterior border of mesoscutum. Pterostigma about three times as long as wide and two-thirds as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, metacarpus twice as long as apical truncation. Head and thorax shining, with frons, vertex and supraclypeal area minutely tessellate, the mesonotum polished. Punctures of mesonotum extremely minute and sparse, those of face obscure. Pubescence whitish, moderately long, erect and rather thin, becoming denser on undersurface of head and thorax; hair of hind tibiae rather coarse and about as long as greatest width of tibia. Abdomen oval, twice as long as wide, depressed; tergite 7 subtriangularly narrowed to apex but not produced medially. Subgenital plate narrow, clavate, about twice as long as apical width, disk very minutely pubescent. Caulis of genital armature narrowed toward base; basal orifice small, mostly concealed in dorsal view; parameral lobes large, broad at base, strongly incurved at apex, and with short dense hair on apical part, mostly concealed in dorsal view; sagittae elongate, rods discret and slender basad, much broadened at one-third of their length from apex and subacute apically, and in lateral view strongly depressed, thinly fusiform and straight except for upcurved basal rods. Length: nearly 4 mm.; anterior wing, 3 mm.

Holotype male.—Seven and three-tenths miles south of Yautepec, 3,000 feet, Morelos, Mexico, Aug. 17, 1962 (Ordway and Roberts).

Paratypes.—Two males, same locality and day as type (Nauman and Roberts).

Type in collection of the University of Kansas, Lawrence; one paratype in collection of the University of California, Riverside.

***Perdita obscurifacies*, n. sp.**

Although taken with a large series of *sphaeralceae notata*, the female of *obscurifacies* seems perfectly distinct from *sphaeralceae*. It differs in the dark tubercles

and in having the abdominal bands narrowed medially. Structurally it differs in slightly broader head, more acute pygidial plate, longer tarsal claws with more divaricate inner tooth, and in having the hairs on outer margin of hind tibiae more thickened at base. On account of the dark tubercles and broad outer ends of the abdominal bands there seems to be little probability of its being the female of *pueblana*.

Female.—Head and thorax dark blue green, but labrum, clypeus, anterior corners of face, supraclypeal area, disk of mesoscutum, scutellum, and metanotum black. Face entirely dark, and thorax dark, except for large yellow mark on each side of hind margin of disk of pronotum. Abdomen black, apical depression of tergites somewhat reddened; broad yellow bands at base of tergites 2 to 5 narrowed medially. Pygidial plate dark, tinged with red. Legs black, apical mark on anterior side of front femora and apex on outer side, broad anterior side of front tibiae, front tarsi, and similar but smaller marks on middle femora and tibiae yellow. Antennae black, base of scape clear yellow, pedicel and flagellum narrowly dull yellow beneath. Mandibles yellow, shading into red on apical half. Proboscis black. Tegulae testaceous, darkened at base. Wings hyaline with a testaceous tinge; nervures testaceous, narrow margins of stigma and subcosta brown, disk of stigma tinged with pale brown and white at base.

Head slightly broader than long; cheeks about two-thirds as wide as eyes. Posterior ocelli somewhat closer to nearest eye and to occipital margin than their distance apart. Facial foveae broader than interval between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae strongly convex; disk of clypeus nearly twice as broad as high, lateral extensions strongly inflexed and not much visible in frontal aspect. Mandibles stout, hardly tapering, abruptly narrowed on inner margin close to blunt apex. Proboscis moderately short, galeae about two-thirds as long as stipites. Pterostigma large, about four times as long as wide and as broad as first submarginal cell; marginal cell with parts beneath and beyond stigma equal, and metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed about one-third to radius. Head and thorax moderately dullish, frons and mesonotum minutely tessellate, mesonotum duller than face, clypeus polished. Punctures minute and sparse, but rather close on each side of frons opposite foveae. Pubescence white, moderately long and erect; thin and rather coarse on mesonotum and longer on cheeks and underside of thorax. Tuft of hair on front coxae dense and moderately long. Hair on outer margin of hind tibiae distinctly thickened and moderately darkened at base. Abdomen subovate, depressed, widest at junction of tergites 3 and 4; pygidial plate as broad as long, with apex narrowly obtuse. Length: about 7 mm.; anterior wing, 5 mm.

Holotype female.—Epazoyucan, 8,100 feet, Hidalgo, Mexico, at flowers of *Acacia* sp., June 17, 1961 (Univ. Kans. Mex. Exped.).

Paratypes.—Five females, taken with the type.

Type in collection of the University of Kansas, Lawrence; one paratype in collection of the University of California, Riverside.

Perdita quadrinotata, n. sp.

(Plate figs. 1271, 1272, 1339)

The male of *quadrinotata* runs to *oaxacana* in the 1964 key, but differs in the face and abdominal markings. By the genital armature it is closely allied to *sphaeralceae*.

Male.—Head and thorax dark green. Streak on inferior orbits mostly below middle of eyes, mandibles except red tips, labrum, clypeus, lateral, supraclypeal and subantennal marks yellow. Dark color of frons descending on each side to clypeus, and mark across summit of clypeus fuscous, more or less indented by the yellow in middle. Supraclypeal and subantennal marks separated from each other and other marks by dark intervals; supraclypeal mark twice as broad as high, rounded and slightly notched above; subantennal marks small and in alignment with supraclypeal mark. Cuneate marks on hind margin of disk of pronotum and mark on tubercles

yellow; posterior margin of tubercles and horizontal median streak fuscous. Abdomen fuscous, with very narrow basal yellow band on tergites 3 and 4, broadly interrupted and ending far from lateral margins, and in holotype distinct only on tergite 3. Venter testaceous yellow, with nubilous fuscous patches on each side of segments 2 to 4 or 5. Legs fuscous, hind pair blacker; anterior side of front legs including coxae and trochanters and tarsi, basal streak on anterior side of middle tibiae, and spot or steak on underside of middle and hind femora yellow. Antennae fuscous, scape broadly yellow and flagellum brownish yellow beneath. Proboscis fuscous, galeae brown. Tegulae testaceous hyaline, extreme base fuscous. Wings dusky hyaline, nervures testaceous, margins of stigma brown, subcosta more infuscated.

Head slightly broader than long, cheeks evenly rounded and about as broad as eyes. Posterior ocelli about their distance apart from occipital margin and somewhat more distant from nearest eye. Facial foveae broadly oval, almost twice as long as wide. Antennae inserted opposite middle of eyes, with most joints of flagellum as broad as long. Face below antennae strongly convex; disk of clypeus nearly one and one-half times broader than high, lateral extensions moderately inflexed and largely visible in frontal aspect. Mandibles stout, acute and reaching far margins of labrum. Proboscis moderately long, galeae almost reaching base of stipites. Flanks of pronotum moderately impressed, disk strongly grooved behind the strongly elevated collar. Pterostigma about four times longer than wide and three-fourths as wide as first submarginal cell; marginal cell nearly equal beneath and beyond stigma, metacarpus slightly more than twice as long as apical truncation. Head and thorax distinctly tessellate and moderately dull, face below antennae smoother and more shining. Punctures minute and obscure, very sparse on mesonotum and moderately numerous on frons. Pubescence whitish, not well preserved in type, but thin, moderately long and erect on face and mesonotum, and much longer and rather dense on underside of thorax. Abdomen ovate, depressed, widest across third segment; tergite 7 narrowed to moderately wide, rounded apex. Subgenital plate distinctly broader than long, emarginate at apex, similar to that of *sphaeralceae*. Genital armature also similar, but more robust, with parameral lobes noticeably broader. Length: 5.5 mm.; anterior wing, 4 mm.

Holotype male.—Ten miles north of Apizaco, 7,800 feet, Tlaxcala, Mexico, Aug. 20, 1962 (Univ. Kans. Mex. Exped.).

Paratype. One male, same data as type.

Type in collection of the University of Kansas, Lawrence; paratype in collection of the University of California, Riverside.

SEMICAERULEA SUBGROUP

This section of the *sphaeralceae* group was set apart for one species, but the new species *placens* seems closely enough allied to be placed here, although differing in many ways.

Perdita placens, n. sp.

(Plate figs. 1273, 1274, 1340)

The male of *placens* differs from *semicaerulea* in having the face yellow only below level of the antennae, the head not at all quadrate, with cheeks moderately wide and rounded. In the key to the *sphaeralceae* group it runs best to *eriastri* (couplet 192) but is not closely allied.

Male.—Head and thorax dark blue green. Narrow anterior margin of gular region, mandibles except red tips, labrum and face below level of antennae pale yellow; lateral marks truncate at lower level of antennal sockets, slightly oblique and with short narrow extension on orbits. Collar of pronotum, cuneate mark on each side of disk and tubercles yellow. Abdomen yellow, becoming fulvous at apex. Tergite 1 except for enclosed and interrupted yellow band, band at junction of tergites 2-3, and apical, somewhat abbreviated band on tergite 3 fuscous; vestigial band also at apex of tergite 4 with transverse spot on each side more accentuated. Yellow band on tergite 1 in form of two quadrate marks broader than long, the one on right enclosing anteriorly a small dark spot, and the one on left invaded by a corresponding dark spur. Yellow

bands on tergites 2 and 3 broader than dark bands. Legs clear yellow, hind coxae black on dorsal side except at apex and hind femora broadly brownish below except on apical third. Antennae yellow, pedicel and flagellum rather narrowly fuscous above. Proboscis fuscous, galeae brown. Tegulae pale testaceous subhyaline, base pale yellow. Wings slightly whitish hyaline, nervures pallid, margins of stigma and subcosta pale brown.

Head distinctly broader than long, occiput broadly and moderately deeply concave; cheeks rounded, about two-thirds as wide as eyes. Posterior ocelli a little closer to nearest eye than their distance apart and about two-thirds of their distance apart from occipital margin. Facial foveae faint and punctiform. Face below level of antennae gently and evenly convex; disk of clypeus not much broader than high, lateral extensions not much inflexed and visible in frontal aspect. Mandibles tapering, very acute at apex and reaching slightly beyond far margin of fossa. Proboscis moderately long, galeae reaching base of stipes. Flanks of pronotum moderately impressed. Pterostigma nearly four times longer than wide and about two-thirds as wide as first submarginal cell; marginal cell as long as stigma and subequal in length beneath and beyond it, with metacarpus somewhat longer than apical truncation. Head and thorax shining, mesonotum polished, frons and vertex with minute and rather weak tessellation; punctures minute and shallow, sparse on mesonotum and rather close on frons. Pubescence white, fine and erect; rather thin on mesonotum, moderately dense on face and much longer on cheeks and underside of thorax. Abdomen ovate, turgidly convex above; sides of tergite 7 converging to narrow obtuse apex. Subgenital plate more than twice as long as wide, narrow at base and becoming nearly twice broader at rounded apex, disk with minute setae and longer hair fringing margins of narrow part. Caulis of genital armature with rounded outline in dorsal view, but longer than high in lateral view, basal orifice large; parameral lobes very broad on apical half, and rounded at apex, with short marginal fringe; sagittae slender, slightly tapering, rods separated on apical half and moderately arcuate in lateral view. Length: about 5 mm.; anterior wing, 3 mm.

Holotype male.—Willcox, Cochise Co., Arizona, July 7, 1956 (R. D. Telford).

Type in collection of the University of California, Riverside.

MARGINATA SUBGROUP

Perdita lustrans Timberlake

The second known specimen of this species was collected 5 miles south and 2.5 miles east of Chilpancingo, 3,800 feet, Guerrero, Mexico, Aug. 5, 1962 (Univ. Kans. Mex. Exped.). A third specimen is from 3 miles north of Huajuapán de Leon, Oaxaca, Mexico, Sept. 8, 1959 (R. H. and E. M. Painter). This specimen differs from the female type in having a thin yellow stripe on anterior margin of lateral plates of face.

Perdita maesta Timberlake

(Plate figs. 1275, 1276, 1341)

Perdita maesta Timberlake, 1964, Univ. Calif. Publ. Entom., 28:192, fig. 17, ♀.

This species was described from one female from Puebla, Mexico. Additional material includes the male which is close to the male of *maerens*. Some of the characters distinguishing the two species are given in the preceding key.

Male.—Head and thorax dark blue green; mesoscutum except broad anterior border, scutellum and metanotum black. Narrow stripe on inferior orbits to middle of eyes, mandibles except red tips, labrum and face below level of antennae pale yellow. Lateral marks almost as broad as intervening space, not narrowed above but deeply indented by the green of frons, with narrow extension on orbits to above middle of eyes. Tubercles yellow, thorax otherwise dark. Abdomen brownish fuscous above and pale testaceous beneath; apical margin of tergites, especially of apical segments subhyaline; base of tergite 2 with a narrow yellow band, not reaching lateral margins, but broken, or narrowly interrupted more or less completely close to outer ends. Legs fuscous, but front coxae, anterior side of front and middle femora and tibiae, anterior side of hind

femora and underside of hind tibiae yellow; tarsi yellow beneath, apical joint pale brown. Antennae yellow beneath, more brownish yellow on flagellum and narrowly fuscous above. Proboscis fuscous. Tegulae and wings as in female, pterostigma entirely dark except for small light spot at base.

Head about one and one-half times broader than long; inner orbits slightly diverging anteriorly; cheeks as broad as eyes, evenly rounded and widest above level of middle of eyes. Posterior ocelli about their distance apart from the indefinitely defined occipital margin and considerably more remote from nearest eye. Facial foveae virtually obsolete. Anterior half of frons with a carinate median ridge ending below close to lower level of antennal sockets. Face below level of antennae depressed, except disk of clypeus gently convex, broader than high, broadly inflexed on each side of labrum, with lateral extensions much narrowed to base of mandibles and mostly visible in frontal aspect. Mandibles stout, tapering, acute and reaching far margin of labrum. Proboscis as in female. Wings nearly as in female; pterostigma nearly four times longer than wide and marginal cell narrowed toward apex, with metacarpus about two and one-half times longer than apical truncation. Head and thorax strongly tessellate and dull, frons and vertex more opaque than mesonotum, punctuation very minute and obscure. Pubescence pale ochreous, erect, long, rather coarse and moderately abundant on face; longer on vertex, longer but thin on mesonotum; hair of cheeks thin, but that on underside of head and thorax long, dense and white; hair of hind tibiae mostly a little longer than greatest width of tibia. Abdomen broadly ovate, depressed, widest at junction of tergites 2 and 3; tergite 7 with thin short pubescence and narrowed into a rounded apical lobe, nearly as long as wide. Subgenital plate very broad across base, narrowed more than half to apex, which is still rather wide, shallowly emarginate and thinly fringed with hair. Genital armature very distinctive, but in general similar to *maerens*; parameral lobes strongly and deeply emarginate on inner and upper margin and densely hairy on inferior inner margin; sagittae widest at middle, the rods thence separate, parallel, and very acuminate; in lateral view sagittae appear rather thinly fusiform, gently arcuate except basal rods curved upward. Length: nearly 6 mm.; anterior wing, 4.5 mm.

New record.—Puebla, Mexico: 1 female, 1 male, 7 miles northeast of Atlixco, 6,325 feet, without flower record, Aug. 19, 1962 (Univ. Kans. Mex. Exped.).

Perdita mexicanorum Cockerell

Perdita mexicanorum Cockerell, 1896, Proc. Acad. Sci., Phila., 48:56, ♂; Timberlake, 1964, Univ. Calif. Publ. Entom., 28:198, ♂.

Through the kindness of the late Harold J. Grant, Jr., of the Academy of Natural Sciences of Philadelphia, I have been able to examine the type of *mexicanorum* and have found it distinct from the species I am describing as *pubescens*. The specimen that I am describing as its female belongs questionably to *mexicanorum* as it agrees closely with the female of *pubescens* in structural characters, such as the peculiar labrum. More abundant material is needed to clarify its position. In the 1964 key it runs to *fumipennis* or *oaxacana*, but differs in having the thorax dark except for a white mark across metanotum and the white bands of the abdomen broadly interrupted on tergites 2 to 4.

Female.—Head and thorax bluish green, more bluish on propodeum, and dark part of clypeus and supraclypeal area black. Mark on each side of clypeus, involving lateral extensions and most of anterior border of disk, and lateral marks, much higher than wide, broad below but narrowed and ending bluntly at anterior end of foveae, creamy white. Thorax dark, except transverse white mark on metanotum, and narrow streak on collar of pronotum. Abdomen black, with creamy white markings; a small spot on lateral margins of tergite 1, large triangular mark on lateral margins of tergite 2, oblique mark on each side of tergites 3 and 4, pointed within and broadened at outer ends, and complete, moderately wide band on tergite 5. White markings strongly invading reflexed ventral part of tergites, except on tergite 5, but on tergite 2 nearly interrupted by black marginal foveae. Legs fuscous, tinged with brown, a small white spot at extreme base

of front and middle tibiae. Antennae black, flagellum only slightly more brownish beneath. Narrow anterior margin of clypeus testaceous, labrum more dusky testaceous. Proboscis dark, galeae tinged with brown. Tegulae testaceous, darker at base. Wings moderately dusky, nervures and margins of stigma brown, subcosta fuscous; stigma with central paler brown streak, hardly wider than dark margins.

Head large, broader than thorax, but only slightly broader than long; cheeks about three-fourths as wide as eyes. Posterior ocelli about their distance apart from occipital margin and more remote from nearest eye. Facial foveae twice as broad as narrow interval between them and eyes, and reaching from level of middle of antennal sockets two-thirds of distance to level of anterior ocellus. Face below antennae moderately convex; disk of clypeus broader than high, broadly inflexed laterally, with extensions mainly visible in frontal aspect. Labrum somewhat ridged and submarginate before apex to set off inverted, elongate oval, slightly concave, transverse apical space. Mandibles robust, dilated within and abruptly narrowed before subacute apex, and reaching far margin of fossa. Proboscis moderately long, galeae reaching base of stipites; maxillary palpi about half as long as galeae. Pterostigma narrow, more than four times longer than wide, and two-thirds as wide as first submarginal cell; marginal cell unusually long, somewhat longer than stigma, much longer beyond than beneath stigma, with metacarpus nearly four times longer than oblique apical truncation; second submarginal cell narrowed one-half above; radius emitted at middle of stigma, with first obscissa slightly longer than second. Tarsal claws nearly simple, inner tooth very small and obscure. Head and thorax moderately dull, sides of thorax and propodeum smooth and shining; frons and vertex minutely tessellate, closely punctured but more sparsely on sides of vertex; mesonotum less distinctly tessellate than frons and shining, with punctures fine, but strong and close, becoming coarser and sparser on scutellum. Pubescence whitish, moderately long, erect, and rather coarse, becoming short and thin on upper part of frons, and rather short and thin on mesoscutum. Hair on outer margin of hind tibiae distinctly thickened and darkened at base. Abdomen oval, nearly three times longer than wide; apical fimbria moderately long and plumose; pygidial plate apparently about as long as wide at base, and narrowed to obtuse apex. Length: 6.5 mm.; anterior wing, 4.6 mm.

Male type.—Head and thorax dark blue green with a brownish undercast. Mandibles except red tips, labrum, clypeus and lateral marks yellow. Narrow marks across summit of clypeus fuscous. Lateral marks quadrate, a little broader than high, broader on orbits than on inner side, and reaching about halfway between level of summit of clypeus and antennal sockets. Thorax dark except for yellow band across base of metanotum. Abdomen brownish fuscous, with broad transverse yellow marks on each side of tergites 2 to 5, extending for short distance onto reflexed ventral part of segments. Apical part of tergite 7 ferruginous. Legs brownish fuscous, anterior side of front tibiae and line on middle tibia yellow. Antennae brownish fuscous. Proboscis brownish fuscous, galeae testaceous. Tegulae testaceous. Wings uniformly tinted with pale fuliginous, nervures and stigma testaceous brown, subcosta fuscous.

Head moderately large, broader than thorax and as broad as long; cheeks not receding, as broad as eyes, widest just below middle of eyes, then rapidly narrowed toward base of mandibles. Posterior ocelli their distance apart from occipital margins and somewhat more than twice as far from nearest eye. Facial foveae obscure. Antennae inserted slightly below level of middle of eyes, slender, with middle joints of flagellum longer than thick. Face below level of antennae moderately convex; disk of clypeus about one-half broader again than high; lateral extensions moderately inflexed and appearing as triangular lobes in frontal aspect. Mandibles tapering, acute, strongly curved, and reaching nearly to base of each other. Proboscis rather long, maxillary palpi less than half as long as galeae. Flanks of pronotum rather deeply impressed, emarginating lateral margins of disk, with posterior corners of disk bluntly prominent. Pterostigma about four times longer than wide and two-thirds as wide as first submarginal cell; marginal cell equal in length beneath and beyond stigma, much narrowed toward apex, with metacarpus about three times as long as apical truncation; second submarginal cell narrowed one-half to radius; first and second abscissae of radius subequal. Head and thorax moderately shining; frons and vertex very minutely tessellate and dull, mesonotum dullish; other parts of head and thorax smoother and more shining. Punctures of mesoscutum minute, obscure, and

rather sparse, and those of frons much closer but very obscure. Pubescence pale ochreous, short, fine and erect; rather dense on middle of face and thin on mesonotum; hair of cheeks thin and appressed, but coarser anteriorly, and hair of underparts of thorax longer and coarser. Hair of hind tibiae rather coarse and about as long as greatest width of tibia. Abdomen oval, about twice as long as wide, convex above. Tergite 7 with pygidiform apical lobe, narrowed to obtuse apex, plane, smooth and hairless on disk but hairy on each side. Length: about 5 mm.; anterior wing, 4 mm.

Material examined.—Type male, Mexico, without further particulars, in collection of the Academy of Natural Sciences of Philadelphia. One female, Atlixco, 6,150 feet, Puebla, Mexico, June 29, 1961 (Univ. Kans. Mex. Exped.).

Perdita pubescens, n. sp.

(Plate figs. 1277, 1278, 1342)

This species is closely allied to *mexicanorum* but clearly distinct. The female differs from the putative female of *mexicanorum* in the markings of thorax and abdomen and in the denser puncturation of the mesonotum. It is possible that the females may prove to be races of one species, and that the true female of *mexicanorum* is as yet unknown.

Female.—Head and thorax slightly bluish green, dark part of clypeus blackish. Lateral extensions of clypeus continued narrowly across anterior margin of disk (or reduced to small mark on each side) and lateral marks yellow. Lateral marks broad anteriorly, more or less abruptly narrowed below level of summit of clypeus, and tapering to acute apex, which intrudes between foveae and eyes. Thorax dark except for more or less obsolescent streak across metanotum; collar of pronotum brown at middle. Abdomen brownish fuscous, with small spot on lateral margins of tergite 1 and bands on tergites 2 to 5 yellow. Bands sometimes broadly interrupted to form triangular lateral marks, or entire on tergite 5, narrowly interrupted on tergite 4 and gradually more interrupted on tergites 3 and 2 (band or marks on tergite 5 sometimes concealed or absent). Extension of marks on reflexed ventral part of tergites much less developed than in *mexicanorum*. Legs brownish fuscous, a small yellowish spot at base of front tibiae. Antennae fuscous, flagellum slightly brownish beneath. Mandibles refotestaceous, infuscated at base and red at apex. Proboscis fuscous, galeae brown. Tegulae testaceous, infuscated at base. Wings strongly dusky, nervures and margins of stigma dark brown, subcosta more fuscous; stigma with a central paler streak.

Structural characters in general as described for *mexicanorum*. Proboscis perhaps more elongate, galeae slightly surpassing stipites and fossa in repose. Facial foveae broader, twice as broad as interval between them and eyes. Mesonotum duller, more densely punctured. Pubescence pale ochreous above, whiter on undersurface of head and thorax; hair of mesonotum abundant, rather short, coarse and erect, and that on underside of head and thorax considerably longer. Scopal hair of hind tibiae abundant, long, simple and curved on outer surface, close-set, very long, thickened and somewhat darkened at base on outer margin. Front coxae much broader than long, their fimbria rather short, moderately dense and spread out to rounded outer corners. Length: about 6.5 mm.; anterior wing, 4.2 mm.

Male.—Head and thorax blue green, dark part of clypeus black. Base of mandibles, labrum, clypeus except mark across upper border of disk, and triangular lateral marks, as high as wide and reaching level of antennae, bright yellow. Laminar process of cheeks when present also yellowish at apex. Thorax dark, metanotum blackish, sometimes with traces of yellow mark; collar of pronotum yellow except on posterior margin. Abdomen brownish fuscous, with oblique yellow mark on each side of tergites 2 to 4, reaching lateral margins and passing slightly over on reflexed ventral part of segments. These marks sometimes reduced to a small spot on lateral margins of tergite 3. Pygidial plate reddish. Legs brown, small spot at base of front and middle tibiae yellow. Antennae black, only slightly more brownish beneath. Mandibles infuscated at outer corners of base and red at apex. Proboscis fuscous, galeae reddish brown. Tegulae and wings as in female.

Head a little broader than long; cheeks nearly as wide as eyes, more or less ridged beneath and abruptly narrowed anteriorly or produced into a large laminate, truncate process. Posterior ocelli about their distance apart from occipital margin and more remote from eyes. Facial foveae large for a male, broadly oval, three times longer than wide. Face below antennae strongly and evenly convex; disk of clypeus as broad as high, strongly produced on each side of labrum, appearing acute in frontal aspect and broad and rounded at apex in lateral view, lateral extensions not otherwise visible in frontal aspect. Mandibles robust, dilated on inner margin, acute at apex and reaching slightly beyond far margin of fossa. Flanks of pronotum normal; collar of disk well elevated, with broad posterior rim, triangularly produced in middle. Venation as in female. Frons and vertex smoothly tessellate, dullish, with minute, obscure, moderately close punctures on frons; mesonotum obscurely tessellate and shining, with fine, distinct and moderately close punctures. Pubescence much as in female, but thinner; hair of cheeks short and thin, and that on underside of head very short, thin and erect. Abdomen subdepressed, about twice as long as wide; tergite 7 with pygidiform triangular apical area, subacute at apex and carinate on margins. Subgenital plate as broad as long and broadly rounded at apex, disk with a submarginal row of fine pores across apex, set with fine setae. Caulis of genitalia obliquely quadrate as seen from side, about as deep as broad, and divided dorsally into distinct lobes; parameral lobes slender, inserted low on sides of caulis and gently curved; sagittae compressed fusiform, with basal rods curved inward as well as upward, the fused body divided into tapering rods abruptly hooked outward at apex as seen from above. Length: 5-6 mm.; anterior wing, 3.7-4 mm.

Holotype female and allotype.—Two miles south of Chilpancingo, Guerrero, Mexico, Aug. 7, 1962 (Univ. Kans. Mex. Exped.).

Paratypes.—Six females, 20 males taken with the types.

Types in collection of the University of Kansas, Lawrence; 5 paratypes in collection of the University of California, Riverside.

Perdita schwartzi, n. sp.

(Plate figs. 1279, 1280, 1343, 1355)

This species is named in memory of Herbert F. Schwartz, in recognition of his invaluable studies of anthidiine and meliponine bees. It is very distinct and could be placed in a separate subgroup, together with *mexicanorum* and *pubescens*, as the genital armature is considerably different from that of a typical number of the *marginata* subgroup.

The female runs best in the 1964 key to *fumipennis* and *oaxacana* as the hairs on outer margins of hind tibiae are strongly thickened and darkened, but it differs strongly in markings and in the pale pterostigma with brown margins. The male also runs to *oaxacana* but has the mesonotum more shining and the pterostigma not darkened.

Female.—Head and thorax dark blue green. Basal half of mandibles, labrum, clypeus, triangular lateral marks, subantennal marks and transverse supraclypeal mark yellow. Green of frons descending on each side in a wedge between lateral and subantennal marks, and all marks at least narrowly separated from each other by dark sutures. Clypeus sometimes with two fuscous arcuate stripes on disk, and lateral marks sometimes more or less L-shaped. Thorax dark except for thin yellow line on each side of posterior margin of disk of pronotum, or these marks sometimes absent. Abdomen black, with narrow yellow band at base of tergites 2 to 4, and a broken or evanescent band on tergite 5; band on tergite 2 widened at outer ends where it touches lateral foveae, and narrowly interrupted at middle, that on tergite 3 narrowed at outer ends, almost reaching lateral margins and narrowly interrupted, and that on tergite 4 more abbreviated. Legs black, anterior side of front tibiae with a yellow stripe, broadened in middle, and a very small yellow spot at base of middle tibiae. Antennae blackish, flagellum brownish beneath at apex and scape broadly yellow beneath except on apical third or more. Mandibles red at apex, the yellow extending beyond middle except on margins. Proboscis fuscous, galeae brown. Tegulae

pellucid testaceous, base fuscous. Wings slightly dusky hyaline, nervures testaceous, margins of stigma brown, and subcosta fuscous.

Head somewhat broader than long; cheeks strongly receding, narrower than eyes. Lateral ocelli about their distance apart from occipital margin and distinctly more remote from nearest eye. Facial foveae weakly impressed, much broader than interval between them and eyes, and reaching from level of middle of antennal sockets somewhat more than halfway to level of anterior ocellus. Face below level of antennae strongly convex; disk of clypeus considerably broader than high, well rounded above, gradually inflexed on each side of labrum, with lateral extensions mainly visible in frontal aspect. Mandibles robust, gently curved, and abruptly narrowed on inner margin before blunt apex. Proboscis short, galeae less than half as long as stipites and shorter than maxillary palpi. Pterostigma about four times as long as wide and about two-thirds as wide as first submarginal cell; marginal cell much longer beyond stigma than beneath, with metacarpus three times as long as apical truncation; second submarginal cell narrowed one-fourth to radius. Tarsal claws strongly bifid, inner tooth half as long as outer tooth. Head and thorax shining, frons and vertex smoothly tessellate and slightly dullish, mesonotum weakly tessellate. Punctures except on clypeus minute and rather obscure, close on frons and moderately sparse on mesonotum. Pubescence white, erect, moderately long and abundant, becoming longer at apex of scutellum, on metanotum and sides of thorax. Pronotum nude, except for long hair on tubercles and a short dense fringe on anterior margins of flanks. Hair of front coxae dense but rather short; hair on outer margin of hind tibiae distinctly thickened at base and darkened. Abdomen elongate ovate, more than twice as long as wide; apical fimbria well developed, dense and strongly plumose on sides of tergite 7; venter with thin, rather long hair across apical part of segments. Pygidial plate triangular, carinate on margins; apex acute. Length: about 7 mm.; anterior wing, 4.8 mm.

Male.—Head and thorax dark blue green. Mandibles except red tips, labrum and entire face below level of antenna yellow; upper margin of the yellow concavely arcuate, reaching anterior end of fovea on each side. Head entirely dark beneath. Thorax dark except for short thin line of yellow on each side of disk of pronotum. Abdomen brownish fuscous, with narrow yellow bands at base of tergites 2 to 4, narrowly interrupted except on tergite 3 and not quite reaching lateral margins. Legs fuscous, spot at apex of front and middle femora, anterior side of front and middle tibiae and all tarsi yellow. Scape of antennae yellow except narrowly fuscous above on apical half, pedicel and flagellum brownish fuscous above and pale yellowish brown beneath. Proboscis, tegulae and wings as in female.

Head much broader than long; cheeks evenly rounded and slightly wider than eyes. Ocelli placed as in female, except that they are more remote from margin of eyes. Facial foveae faint, oval, about twice as long as wide. Face below antennae gently convex, anterior ends of parocular areas as broad as intervening part of clypeus; supraclypeal area somewhat broader than high, subantennal plates large, ovate, nearly as broad as supraclypeal area. Disk of clypeus somewhat broader than high, lateral extension strongly inflexed but broadly visible in frontal aspect. Mandibles stout, tapering, acute and reaching far margin of fossa. Proboscis short as in female. Pronotum normal, and wings as in female. Tarsal claws large and strongly bifid. Sculpture and pubescence as in female. Hair of hind tibiae fine, moderately thin and a little longer than greatest width of tibia. Abdomen ovate, convex above, moderately shining, and with apical depressions of tergites broad. Tergite 7 not pygidiform but broadly truncate at apex, with lateral margin before apex strongly arcuate or bulging. Subgenital plate about as broad as long, broadly rounded at apex, with lateral and apical border broadly subhyaline, the central darker area truncate apically and fringed with long fine hairs projecting over the subhyaline border; lateral apodemes acute and recurved, the base broad. Caulis of genital armature quadrate, as broad as long; parameral lobes inserted at mid-elevation on each side, slender, curved and somewhat hooked at apex, with appearance of being slightly knobbed at apex in dorsal view; sagittae robust, abruptly dilated at middle, basal rods short and with rods well separated at apex, and moderately thick and fusiform, nearly straight and acute at apex in lateral view; eversible sac of sagittae with an internal sclerotized structure, knobbed at one end; volsellae with only inferior pair clearly visible in dorsal view, appearing as rounded object on recessed sides of sagittae and minutely tuberculate on outer margin. Length: 4.9 mm; anterior wing, 3.9 mm.

Holotype female and allotype male.—Eight miles northeast of Tehuiztengo, 4,100 feet, Puebla, Mexico, at flowers of *Xanthoxylon*, June 27, 1961 (Univ. Kans. Mex. Exped.).

Paratypes.—Fifteen females, taken with the types.

Types in collection of the University of Kansas, Lawrence; two paratypes in collection of the University of California, Riverside.

Perdita tenebrosa, n. sp.

One female collected at Rustlers' Park, Chiricahua Mountains, Arizona, represents a species near *maerens* in the *marginata* subgroup, and is the first species of its group found north of Mexico. It differs from *maerens* in its smaller size, entirely olive green thorax, narrower pterostigma, with a paler central streak, and in having two short curved spines near apex of hind tibiae.

Female.—Entirely dark, without markings. Head and thorax dark olive green, labrum and clypeus black. Abdomen blackish, pygidial plate red, infuscated at apex. Legs entirely dark. Antennae blackish, flagellum broadly brown beneath toward apex. Mandibles red, basal third black. Proboscis fuscous, galeae pale brown. Tegulae testaceous brown, darker at base. Wings dusky hyaline, nervures and margins of stigma, subcosta black; stigma with narrow central streak somewhat paler than margins.

Head as broad as long; cheeks evenly rounded, about two-thirds as wide as eyes. Posterior ocelli about their distance apart from nearest eye, and half that distance from occipital margin. Facial foveae weakly impressed, close to margins of eyes and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae gently convex across supraclypeal area and depressed on clypeus; disk of clypeus about twice as broad as high, appearing acutely produced on each side of labrum, with lateral extensions short, broad and inflexed. Mandibles thick, strongly curved, with distinct inner tooth. Proboscis rather short, but galeae as long as stipites. Pterostigma slender, about four times as long as wide and one-half as wide as first submarginal cell; marginal cell as long as stigma or first submarginal cell, distinctly longer beyond than beneath stigma, with metacarpus slightly more than twice as long as apical truncation; second submarginal cell narrowed one-half to radius. Head and thorax minutely tessellate and dull, mesoscutum about as dull as frons. Punctures of mesoscutum minute, moderately numerous and well spaced, those of frons about equally sparse and more obscure. Clypeus and sides of labrum with coarse shallow punctures; middle of labrum with smooth concave shining area, narrowed toward apex. Pubescence whitish, fine, moderately long and erect and moderately abundant on face and thorax. Scopal hair of hind tibiae rather thin, slightly longer than greatest width of tibia, moderately curved, longer than elsewhere at base, and hairs on outer margin distinctly thickened and moderately darkened at base. Outer margin of hind tibiae armed with two short spines close to apex, curved toward each other. Tarsal claws distinctly bifid. Antennae rather short, subclavate, joints of flagellum mostly thicker than long. Abdomen ovate, more than twice as long as wide; apical fimbria long, plumose, rather dense; pygidial plate narrowly triangular, subacute at apex, disk plane, with strongly elevated margins. Length: 5 mm.; anterior wing, 3.5 mm.

Holotype female.—Rustlers' Park, 8,500 feet, Chiricahua Mts., Cochise Co., Arizona, Aug. 21, 1964 (C. D. Michener).

Type in collection of the University of Kansas, Lawrence.

DRYMARIAE SUBGROUP

Since the account of this subgroup was completed in 1964 four new species have come to hand and the female of *guerreroensis* has been discovered.

Perdita debilis, n. sp.

(Plate figs. 1281, 1282, 1344)

Only the male of this species is known and it runs to *elimata* (now known as *aculeata*) in the 1964 key. It differs from *aculeata* in the creamy white face marks,

restricted to clypeus and lateral marks, with the lateral marks transverse and no higher than summit of clypeus.

Male.—Head and thorax dark blue green, disk of mesoscutum, scutellum and metanotum black. Basal half of mandibles, labrum, clypeus and transverse lateral marks, about twice as broad as high and not reaching above level of summit of clypeus, creamy white. Thorax entirely dark. Abdomen dark, without markings. Legs blackish, small joints of tarsi more brownish, extreme apex of front femora and stripe on anterior side of front tibiae pale yellow. Antennae black, scape entirely dark, flagellum dull yellowish beneath. Mandibles shading into dark red at apex. Proboscis brown. Tegulae testaceous, hardly paler on outer margin. Wings slightly dusky hyaline, nervures and stigma testaceous brown, margins of stigma and subcosta infuscated.

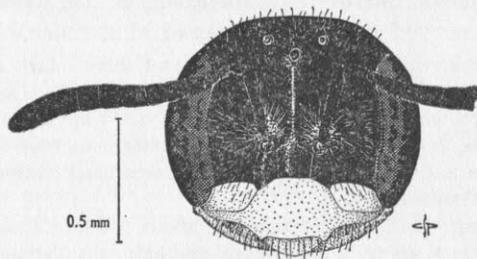


Fig. 19. *Perdita debilis*. Frontal view of head of male.

Head slightly broader than long; cheeks as broad as eyes, widest opposite posterior end of eyes. Posterior ocelli slightly closer together than distance to occipital margin, and more removed from nearest eye. Facial foveae slightly more than twice as long as wide. Face below level of antennae gently convex; disk of clypeus less than twice as broad as high, strongly inflexed on sides of labrum, with lateral extensions visible in frontal aspect. Mandibles tapering, acute and reaching far margin of fossa. Proboscis of medium length, galeae reaching base of stipites. Pronotum normal. Tarsal claws large and strongly bifid. Pterostigma more than three times longer than wide, and about three-fourths as wide as first submarginal cell; marginal cell distinctly longer beneath stigma than beyond, nearly squarely truncate at apex, metacarpus and truncation about equal; second submarginal cell narrowed one-half to radius. Head and thorax shining, frons and vertex smoothly tessellate, mesonotum highly polished. Punctures of frons and vertex fine, but distinct and widely scattered, even on parocular areas below level of eyes, but clypeus very weakly punctured and supraclypeal area and subantennal plates impunctate; punctures of mesonotum fine, sparse and confined mostly to anterior border. Pubescence fine, moderately long, erect and whitish; very thin on face and mesonotum but rather dense on underparts of head and thorax. Abdomen rather broadly ovate, widest at apex of second segment. Tergite 7 rectangularly narrowed to apex. Subgenital plate semi-oval, with apex acute and carinately ridged, lateral apodemes stout and curved distad, and base broad and rounded. Caulis of genitalia nearly globular, parameral lobes inserted at middle of sides, appearing slender and twisted in dorsal view and moderately wide and elbowed in lateral view; sagittae elongate fusi-form, the rods discrete only at base and apex, and as seen from side the apical part becoming very thin.

Holotype male.—Two miles northwest of Tamazulápan, 6,000 feet, Oaxaca, Mexico, on *Physalis*, June 28, 1961 (Univ. Kans. Mex. Exped.).

Paratypes.—Two males, same locality and day, one on *Physalis* and one on *Baccharis*.

Types in collection of the University of Kansas, Lawrence; one paratype in collection of the University of California, Riverside.

Perdita divaricata, n. sp.

(Plate figs. 1283, 1284, 1356, 1358)

This species is very similar to *chihuahua* and difficult to distinguish in the female sex, but the male has the apex of the abdomen peculiarly elongated with divaricate lobes and the genital armature is distinctive.

Female.—Head and thorax green, sides of thorax and propodeum bluish, clypeus, supraclypeal area, disk of mesoscutum and scutellum blackish. Abdomen blackish. No light markings. Legs dark, front tibiae pale yellow on basal half or three-fourths of outer margin, and front tarsi pale

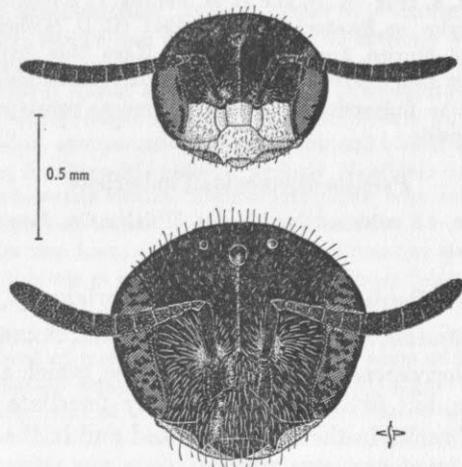


Fig. 20. *Perdita divaricata*. Frontal view of head of male and female.

brownish. Antennae blackish, flagellum hardly paler beneath. Mandibles testaceous, infuscated at base and dark red at apex. Tegulae testaceous hyaline, base brownish. Wings dusky hyaline, nervures testaceous, margins of stigma testaceous brown, subcosta fuscous.

In structural characters including sculpture and pubescence virtually identical with *chihuahua*. Length: about 3–3.5 mm.; anterior wing, 2.3–2.7 mm.

Male.—Head and thorax dark blue green, face more brassy green, flanks of pronotum, disk of mesoscutum and scutellum black or blackish. Abdomen fuscous, or brownish black, without light markings. Legs blackish, front tibiae except behind and all tarsi pale yellow. Antennae dark, flagellum brownish beneath. Tegulae and wings as in female.

Head slightly broader than long, rotund, inner orbits slightly diverging above; cheeks receding, about half as wide as eyes, and with a small laminate anterior process more or less developed. Posterior ocelli nearly twice their distance apart from nearest eye and somewhat closer to occipital margin. Facial foveae faint and about twice as long as wide. Face below level of antennae slightly convex; disk of clypeus nearly twice as broad as high, bluntly produced on each side of labrum, with lateral extensions strongly inflexed and narrowly visible in frontal aspect. Mandibles tapering, acute and reaching far margin of fossa. Proboscis short, galeae much shorter than stipites. Flanks of pronotum rather strongly impressed but posterior corners of disk not prominent. Pterostigma about three times longer than wide and two-thirds as wide as first submarginal cell; marginal cell much shorter beyond than beneath stigma, with metacarpus and apical truncation subequal; second submarginal cell narrowed four-fifths, or more, to radius. Head and thorax shining, frons and vertex smoothly tessellate, only slightly dullish, disk of mesoscutum and scutellum polished. Face and anterior border of mesoscutum with very sparse, minute punctures, with disk of mesoscutum almost impunctate. Pubescence whitish, thin

and short; extremely short and thin on frons, almost none on mesoscutum except anterior border, comparatively abundant on anterior part of face and comparatively long on underside of head. Hair of hind tibiae rather coarse and but slightly longer than greatest width of tibia. Abdomen elongate ovate, convex above; tergite 7 strongly and narrowly produced, with apical lobe strongly depressed and deeply emarginate at apex much like a fishtail. Subgenital plate and genital armature almost as in *chihauhua*. Sternites 6 and 7 both deeply and broadly emarginate, with lateral lobes of sternite 7 acutely bilobate. Length: about 2.5–3 mm.; anterior wing, 2–2.3 mm.

Holotype male and allotype.—Six miles west of Huajuapán de León, 6,000 feet, Oaxaca, Mexico, at flowers of *Euphorbia* sp., June 28, 1961 (Univ. Kans. Mex. Exped.).

Paratypes.—Five males, 4 females, taken with the types; 1 male, 13 females, 3 miles north of Huajuapán de León, Sept. 8, 1959 (R. H. and E. M. Painter); 2 females, 4 miles southwest of Yautipec, 3,700 feet, Morelos, on *Euphorbia*, July 3, 1961 (C. D. Michener); 2 males, 20 miles south of Ixtapan de la Sol, Mexico, Aug. 1, 1962 (Univ. Kans. Mex. Exped.); and 1 female, 14 miles north of Taxco, 4,000 feet, Guerrero, Aug. 4, 1954 (Univ. Kans. Mex. Exped.).

Types in collection of the University of Kansas, Lawrence; paratypes in collection of University of California, Riverside.

Perdita drymariae Timberlake

New record.—One male, 4.8 miles north of Rodeo, Hidalgo Co., New Mexico, on *Tidstromia*, Sept. 4, 1961 (Timberlake).

Perdita guerreroensis Timberlake

Perdita guerreroensis Timberlake, 1964, Univ. Calif. Publ. Entom., 28:210, ♂.

New material of *guerreroensis* includes the female, which agrees best with *lucidella* in the 1964 key, but differs in the smoothly tessellate frons, with distinct punctures in front of ocelli, in the less broad head and in the dark mandibles and legs.

Female.—Head and thorax dark blue, clypeus, supraclypeal area, disk of mesoscutum, scutellum and metanotum black. Entirely without markings, abdomen black. Legs black, tarsi, especially small joints, more brownish, claws reddish. Antennae blackish, flagellum reddened beneath. Labrum and base of mandibles blackish, nearly apical half of mandibles red. Proboscis dark. Tegulae testaceous, base fuscous. Wings slightly dusky hyaline, nervures testaceous, margins of stigma brown, subcosta more fuscous.

Head slightly longer than wide; cheeks rounded, only slightly more than half as wide as eyes. Posterior ocelli approximately their distance apart from nearest eye and closer to occipital margin. Facial foveae well impressed, slightly wider than interval between them and eyes and reaching from upper level of antennal sockets not much more than halfway to level of anterior ocellus. Face below antennae rather strongly convex; disk of clypeus not much higher than wide, anterior margin concavely arcuate, appearing dentate on each side, with lateral extensions strongly inflexed. Mandibles reaching far margin of fossa, subacute or blunt at apex, and narrowed on inner margin before apex. Proboscis moderately long, galeae reaching base of stipites. Pterostigma about three times longer than wide and three-fourths as wide as first submarginal cell; marginal cell as long as stigma, with parts beneath and beyond stigma subequal, and metacarpus somewhat longer than apical truncation. Head and thorax shining, frons, vertex and margins of mesoscutum smoothly tessellate, disk of scutum and scutellum polished. Parocular areas of face with minute rather obscure and moderately well-separated punctures to level of middle of facial foveae; upper part of face with distinct fine punctures opposite anterior ocellus and forming more or less distinct double rows in front of the ocellus; mesoscutum with sparse fine punctures, but disk almost impunctate. Punctured part of parocular areas of face and anterior border of mesoscutum with short, fine, erect and thin whitish pubescence; cheeks and occiput with denser, not much longer hair, that on sides of thorax considerably longer, but hair on mesopectus short and more depressed. Hair of front coxae rather thin and moderately long. Pygidial plate narrowly triangular, obtuse at apex. Length: 4 mm.; anterior wing, 3 mm.

New record.—One male, 18 females, 5.2 miles east of Chilpancingo, 5,700 feet, Guerrero, Mexico, Aug. 8, 1962 (Univ. Kans. Mex. Exped.).

***Perdita irwini*, n. sp.**

(Plate figs. 1285, 1286, 1346)

This is a small species with a white face and tubercles and a reddish abdomen. It is probably as closely related to *obscura* as to any other species, but runs best near *obliqua* and *sidae* in the 1964 key.

Male.—Head and thorax dark blue, but dark part of face except posterior part of vertex, disk of mesoscutum and scutellum black. Anterior border of pronotum and part of prosternum brown. Base of mandibles, labrum and face below level of antennae white; lateral marks with broad and arcuate termination at upper level of antennal sockets. Thorax entirely dark except for white tubercles. Abdomen almost uniformly pale fulvo-ferruginous above and beneath, but base of tergite 1 slightly dusky. Legs fuscous, apex of front femora, anterior side of front tibiae and front tarsi dusky yellow, anterior side of middle tibiae and middle and hind tarsi more dusky yellow. Antennae fuscous, flagellum dull yellowish beneath. Mandibles shading through testaceous to red at apex. Proboscis brownish fuscous. Tegulae subhyaline, base white. Wings dusky hyaline, nervures testaceous, margins of stigma and subcosta fuscous.

Head somewhat broader than long; cheeks and temples as broad as eyes but strongly receding; cheeks with small blunt tubercle at anterior end. Ocelli distinctly behind level of eyes, posterior pair slightly more distant from occipital margin than distance apart and nearly twice their distance apart from nearest eye. Facial foveae faint and punctiform. Antennae slenderly clavate, inserted slightly below level of middle of eyes, with middle joints of flagellum about as broad as long. Face below antennae depressed, with convexity very slight; disk of clypeus broadly truncate at summit, nearly twice as broad as high, broadly inflexed and lobate on each side of labrum, with lateral extension only narrowly visible in frontal aspect. Supraclypeal area broader than high, subantennal plates very small, parocular areas very broad, together covering more than two-thirds of face. Mandibles moderately long and stout, broadly expanded on outer margin at base, and roundly dilated at middle of inner margin, with apex acute. Proboscis rather short, galeae reaching slightly less than halfway to base of stipes. Flanks of pronotum rather deeply creased, with disk of pronotum low and rounded at posterior corners, but deeply furrowed behind and beneath overhanging collar which is concavely arcuate and fringed with ten coarse setae. Pterostigma about three times longer than wide and almost as wide as first submarginal cell; marginal cell as long as stigma, distinctly longer beneath stigma than beyond, with metacarpus and apical truncation subequal; second submarginal cell narrowed nearly two-thirds to radius. Tarsal claws strongly curved and bifid. Head and thorax shining, almost entirely polished and virtually impunctate. Pubescence white; rather coarse, subdepressed and thin on lower face, long and erect on undersurface of head, and short, erect and very thin on mesonotum; frons, vertex and temples nude, except for a few short erect hairs behind ocelli; propodeum almost nude, hair on lateral ridges thin and short; hair of hind tibiae abundant, coarse and somewhat longer than greatest width of tibia. Abdomen ovate, about twice as long as wide. Tergite 7 not produced medially but rather broadly truncate at apex. Subgenital plate nearly twice as long as wide, narrowed to rounded apex, disk convex, almost nude, but with fine short setae on apical border; lateral apodemes thick, blunt and obliquely inclined to base; base moderately large and broad in comparison with *divaricata*. Caulis of genital armature quadrate as seen from above; parameral lobes slender, twisted at apex with well-developed fringe of hair on outer margin; sagittae with slender, well-separated rods in apical half and appearing thinly fusiform and bowed in lateral view; volsellae short, the black tubercles on inferior pair prominent. Length: about 3 mm.; anterior wing, 2.3 mm.

Holotype male.—Fourteen miles south of Las Mochis, Sinaloa, Mexico, on prostrate *Euphorbia*, Jan. 29, 1964 (M. E. Irwin).

Type in collection of the University of California, Riverside.

***Perdita paula*, n. sp.**

(Plate figs. 1287, 1288, 1347, 1357, 1359)

Only the male of *paula* is known and it is similar to *divariacata*, but differs in the two short blunt lobes at apex of the abdomen.

Male.—Head and thorax dark green, propodeum and sides of thorax bluish, disk of mesoscutum and scutellum black. Anterior edge of gular region, mandibles except red tips, labrum and face below level of antennae yellow; lateral marks extending on orbits slightly above middle of eyes. Tubercles yellow, thorax otherwise dark. Abdomen brown or fuscous, more or less broadly marked with yellow along lateral margins and across junction of tergites 1 and 2. Legs fuscous, apex of coxae, trochanters, apex of femora, front and middle tibiae and anterior side and all tarsi yellow. Antennae fuscous, dull yellowish beneath. Proboscis brownish fuscous. Tegulae testaceous hyaline, small yellow spot at base. Wings dusky hyaline, nervures testaceous brown, margins of stigma and subcosta fuscous.

Head distinctly broader than long; cheeks somewhat narrower than eyes, widest opposite summit of eyes, very narrow anteriorly, but sometimes with a small, subacute process. Posterior ocelli their distance apart from occipital margin and nearly twice as far from nearest eye. Facial foveae very small, but longer than wide. Face below antennae gently and evenly convex; disk of clypeus much broader than high and broadly truncate across summit, lateral extensions broadly visible in frontal aspect; supraclypeal area broader than high and parocular areas each as broad as intervening space. Mandibles tapering, acute, and reaching far margin of fossa. Proboscis short, galeae reaching less than halfway to base of stipites. Flanks of pronotum normal. Pterostigma about two-thirds as wide as first submarginal cell; marginal cell as long as stigma, slightly longer beneath than beyond stigma, with metacarpus somewhat longer than apical truncation. Head and thorax moderately shining, frons and vertex minutely tessellate and dullish, mesoscutum polished on disk but delicately tessellate on margins and anterior borders. Punctures of face sparse, very minute and obscure. Pubescence thin, short and erect, denser on face than on mesonotum; cheeks nearly bare, but underside of head with long erect hair. Abdomen ovate, broadest at junction of tergites 2 and 3, recurved ventrad at apex. Opening of genital cavity large, but partly closed by recurved apical process of tergite 7, which is short, broad, and emarginate at apex to form two short blunt lobes. Subgenital plate somewhat longer than wide, widest at middle, thence narrowed to broad truncate apex. Caulis of genital armature globular; parameral lobes inserted dorsally, long, slender, almost straight, slightly dilated before acute apex and invested with rather long hair nearly to the base; volsellae small; sagittae elongate fusiform, thin in lateral view, the rods separated apically and tapering to very acute points. Length: about 3.5 mm.; anterior wing, 2.6 mm.

Holotype male.—Sixteen miles north of Chilpancingo, Guerrero, Mexico, Aug. 7, 1902 (N. Marston).

Paratypes.—Three males, 18 miles north of Chilpancingo, 3,100 feet, on euphorbiaceous plant, Aug. 7, 1962 (Univ. Kans. Mex. Exped.).

Types in collection of the University of Kansas, Lawrence; one paratype in collection of the University of California, Riverside.

OBLIQUA SUBGROUP

Perdita dispar Timberlake

New record.—One female, 20 miles southeast of Rio Grande City, Starr Co., Texas, on *Prosopis*, March 27, 1946 (C. D. Michener).

LEUCOSTICTA SUBGROUP

One new species from Arizona is closely allied to the six species previously known of this subgroup.

***Perdita veris*, n. sp.**

(Plate figs. 1289, 1290, 1348)

In the key to the species of the *sphaeralceae* group (1964) the female of *veris* runs out near *mimosae* and *confusa* (couplet 93) and the male, according to whether the supraclypeal mark is present or absent, runs near *eremica* or *leucosticta*. Actually it is probably nearer *cuspidata* than any of the other species of the subgroup, but the female has the apex of the abdomen fulvous and the light bands interrupted. Like *cuspidata* it collects pollen from the flowers of *Nama*.

Female.—Head and thorax bluish green, with dark part of clypeus, the supraclypeal area, sub-antennal plates and disk of mesoscutum, scutellum and metanotum black. Labrum and narrow

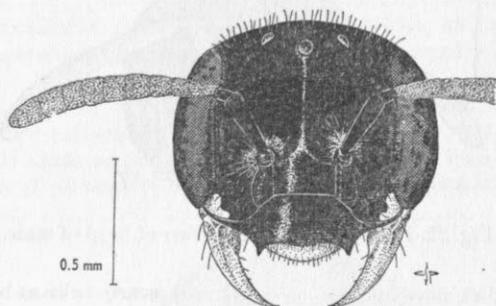


Fig. 21. *Perdita veris*. Frontal view of head of female.

anterior margin of clypeus testaceous; upper half of disk of clypeus dark, but anterior border including lateral extensions white or more or less testaceous brown (sometimes only a small median pale spot and one on each side). Lateral face marks white, rather small, triangular, no higher than wide and barely reaching level of antennae. Thorax entirely dark. Abdomen black, with tergites 5 and 6 and ventral segments 4 to 6 orange fulvous, pygidial plate ferruginous. Tergites 1 to 4 each with rather narrow and even white band, interrupted medially; that on tergite 1 reduced to short transverse marks well separated from each other and distant from lateral margins and in about half of known specimens evanescent or absent; band on tergite 2 abbreviated and well interrupted medially, and those on tergites 3 and 4 narrowly interrupted, narrowed at outer ends, and reaching, or almost reaching, lateral margins. Legs black, extreme apex of front femora, front tibiae except behind and front tarsi testaceous yellow; middle and hind knees, streak on outer side of middle tibiae usually broad except at base, and middle tarsi testaceous or brownish yellow; hind tarsi brownish fuscous. Antennae fuscous, flagellum broadly yellowish brown beneath. Mandibles testaceous, red at apex and a small white spot at base. Proboscis fuscous, galeae pale brown. Tegulae testaceous hyaline, base fuscous narrowly margined with yellowish. Wings dusky hyaline, nervures testaceous, margins of stigma testaceous brown, subcosta fuscous.

Head subquadrate, slightly broader than long and broader than thorax; cheeks rounded, moderately receding and about three-fourths as wide as eyes. Posterior ocelli equidistant from each other and nearest eye and much closer to occipital margin. Facial foveae well impressed, a little wider than interval between them and eyes, and reaching from level of middle of antennal sockets about halfway to level of anterior ocellus. Face below antennae evenly convex; disk of clypeus nearly twice as broad as high, lateral extensions strongly inflexed and not much visible in frontal aspect. Mandibles rather robust, strongly curved and simple. Proboscis moderately long, not exceeding fossa in repose, galeae almost reaching base of stipites. Pterostigma about three times longer than wide and three-fourths as wide as first submarginal cell; marginal cell slightly

longer than stigma, with parts equal beneath and beyond it, and metacarpus somewhat longer than apical truncation. Head and thorax shining, mesonotum polished, frons smoothly tessellate and with sparse minute punctures; punctures of clypeus rather coarse, but shallow and sparse; disk of mesoscutum impunctate. Pubescence whitish, fine, thin, erect, becoming denser on cheeks and underside of thorax; hair of face short and thin and that of mesoscutum mostly restricted to anterior border; hair of front coxae long and dense. Abdomen oval, depressed, pygidial plate very narrow, disk slightly convex and recurved to acute apex. Length: 4–4.5 mm.; anterior wing, 2.6–3 mm.

Male.—Head and thorax dark blue or blue green; subantennal plates, disk of mesoscutum and metanotum black. Base of mandibles, clypeus, lateral and supraclypeal marks white; lateral marks triangular, no higher than wide, or even a little wider than high, not reaching level of

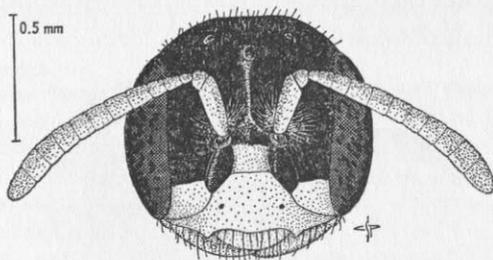


Fig. 22. *Perdita veris*. Frontal view of head of male.

antennae, and rounded at inner ends; supraclypeal mark nearly twice as broad as high, sometimes broken into two spots, or entirely absent, in which case supraclypeal area and two spots or streaks across summit of clypeus black. Thorax entirely dark. Abdomen black, tergite 7, apical part of tergite 6 and corresponding part of venter orange fulvous; tergites 1 to 5 each with narrow, yellowish-white band, narrowly interrupted medially, that on tergite 1 reduced to two small spots, that on tergite 2 much abbreviated; others reaching lateral margins and broadly emarginate behind on each side, or sometimes interrupted on each side on tergites 4 and 5. Sometimes markings much reduced, leaving two marks on tergite 2 and four on tergite 3. Legs black, apex of front and middle femora, front tibiae except beneath, anterior side of middle tibiae, front and middle tarsi and base of hind tibiae pale yellow; hind tarsi brown, paler at base. Scape of antennae fuscous, white beneath, pedicel fuscous; flagellum brown, more or less dull whitish beneath. Labrum testaceous. Mandibles testaceous, red at apex. Proboscis, tegulae and wings about as in female.

Head nearly as in female, but more rotund and about as broad as long. Ocelli nearly as in female. Facial foveae oval, twice as long as wide. Face below antennae evenly convex; disk of clypeus nearly twice as broad as high, lateral extensions inflexed but well exposed in frontal view. Mandibles tapering, acute and reaching far margin of labrum. Flanks of pronotum normal. Pterostigma and venation as in female. Sculpture much as in female, except frons more strongly tessellate, duller and with close fine punctures; face below antennae nearly impunctate. Pubescence similar but denser, especially on face, and slightly longer on mesonotum. Abdomen oval, moderately convex, not recurved at apex. Subgenital plate quadrate, nearly as long as wide, broadly truncate and slightly emarginate at apex, with short marginal fringe of setae. Genital armature much as in *cuspidata*, but sagittae broader and angulate on each side before apex. Length: about 3–3.75 mm.: anterior wing, 2.3–2.9 mm.

Holotype female and allotype.—From 8–12 miles north of Tucson, Pima Co., Arizona, on *Nama hispidum*, April 11, 1963 (G. I. Stage).

Paratypes.—ARIZONA. Pima Co.: 7 females, 29 males, taken with types; 1 male, 45 miles southwest of Tucson, on yellow composite, March 20, 1961 (J. C. Bequaert); 1 female, 1 male, 2 miles west of Sells, on *Teucrium cubense depressum*, April 13, 1963 (Timberlake).

Types in collection of the University of California, Riverside; paratypes in collection of G. I. Stage and the University of Arizona.

FLORISSANTELLA SUBGROUP

The California species *imberbis* is apparently closely allied to *florissantella* and is placed here with some confidence although the male is unknown.

Perdita imberbis, n. sp.

The female of *imberbis* runs to couplet 99 in the 1964 key with *oreophila* and *florissantella*. An amplification of the couplet will distinguish *imberbis* as follows:

- 99. Frons tessellate, impunctate; cheeks almost without pubescence99a
- Frons strongly tessellate, rather dull and distinctly punctured between the broadly linear foveae; cheeks and occiput conspicuously hairy although posterior orbits are narrowly smooth and hairless; abdominal bands more broadly interrupted on tergites 3 and 4 than on tergites 1 and 2.....*oreophila* Timberlake
- 99a. Lateral face marks triangular, reaching anterior end of foveae; abdominal bands more or less broadly interrupted except on tergite 1; pygidial plate narrowly triangular and acute at apex*florissantella* Cockerell
- Lateral face marks oblique not passing above level of clypeus except for slender extension close to margin of eyes; abdominal bands narrowly interrupted, although slightly more so on tergites 3 and 4; cheeks almost hairless, but undersurface of head with fringe of short hair along margins of proboscival fossa and on rims of occipital cavity; pygidial plate obtuse at apex*imberbis*, n. sp.

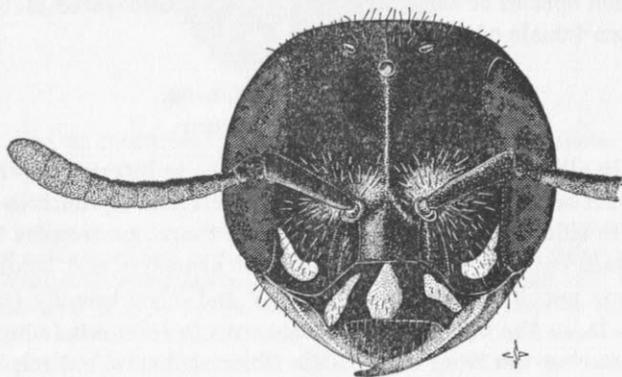


Fig. 23. *Perdita imberbis*. Frontal view of head of female.

Female.—Head and thorax dark green. Base of mandibles, clypeus except for two broad brown stripes converging from anterior corners of disk to middle of summit, small transversely oblique lateral marks, with slight extension upward on orbits, collar of pronotum, small spot on posterior corners of disk and tubercles white. Abdomen dark fuscous, almost black, with a white band on tergites 1 to 4; bands narrowly interrupted in middle, enlarged at outer ends on tergites 2 to 4, curved backward on tergites 3 and 4 and not quite reaching lateral margins on all segments. Pygidial plate rufotestaceous. Legs fuscous, apex of femora, front and middle tibiae and tarsi, and base of hind tibiae pale yellow. Antennae fuscous, flagellum brown beneath. Labrum brown, median third paler. Proboscis fuscous, galeae brownish. Tegulae subhyaline, and white at base. Wings rather strongly dusky hyaline, but yellowish white at extreme base, nervures testaceous, margins of stigma brown, subcosta dark fuscous.

Head large, somewhat broader than long; cheeks almost as broad as eyes, moderately inflexed and widest opposite end of anterior two-thirds of eyes. Posterior ocelli about their distance apart from occipital margin and more remote from nearest eye. Facial foveae linear, their own width from margin of eyes and reaching from level of middle antennal sockets about two-thirds of

distance to level of anterior ocellus. Antennae of usual length, scape not quite reaching to level of anterior ocellus. Face below level of antennae evenly convex; disk of clypeus rather less than twice as broad as high, with lateral extensions broadly inflexed and hardly visible in frontal aspect. Mandibles simple, tapering, but blunt at apex, and nearly reaching far margin of labrum. Proboscis of usual length, galeae slightly exceeding stipites. Flanks of pronotum slightly impressed and posterior corners of disk subacute and rather prominent. Pterostigma rather small, shorter than first submarginal cell and about two-thirds as broad; marginal cell with part beyond stigma slightly longer than part beneath; second submarginal cell narrowed somewhat more than three-fourths above, and receiving first recurrent nervures about one-fifth of its length from base. Tarsal claws with distinct inner tooth. Head and thorax shining, frons, vertex and propodeum minutely tessellate. Face below antennae with a few weak punctures, frons and vertex almost impunctate, and mesonotum with minute punctures on anterior part of scutum. Pubescence whitish, short, fine, erect and very sparse; face and mesonotum almost nude; cheeks nude except for a few fine weak hairs, but margins of proboscis fossa and margins of occipital cavity with fringe of short hair. Hair of front coxae rather short and moderately dense. Abdomen ovate, moderately convex; apical fimbria short and sparse. Pygidial plate about twice as long as wide, with sides converging to moderately narrow ogival apex. Length: 4.5 mm.; anterior wing, 3 mm.

Holotype female.—Satteley, Sierra Co., California, July 13, 1962 (R. M. Bohart).

Type in collection of the University of California, Riverside.

TORTIFOLIAE SUBGROUP

Two additional species of this subgroup have been discovered and also the previously unknown female of *trinotata*.

Perdita cruciferarum, n. sp.

(Plate figs. 1291, 1292, 1349)

This is closely allied to *tortifoliae* and may prove to intergrade with *tortifoliae* or *fremonti* when better known. The female may be entirely dark or have a small spot adjacent to sides of clypeus and transverse marks on tergites 2 and 3. The male has the face entirely white below level of antennae and bands on tergites 1 to 5, which are usually interrupted medially and often broadly emarginate behind on each side. In the 1964 key the female runs to *fremonti* (couplet 24 or 37) and differs in having the front and middle tibiae and tarsi entirely clear yellow, wings dusky hyaline, with darker nervures, and pygidial plate more acute at apex. The male runs out near *leucosticta* (couplet 210) if abdominal bands are entire, or to *fremonti* (couplet 213 or 218), and differs from *fremonti* in having apex of abdomen more or less yellow, apex of femora and all tibiae and tarsi yellow, and markings of abdomen usually more extensive.

Female.—Head and thorax dark green, clypeus and supraclypeal area blackish. Base of mandibles, small spot adjacent to sides of clypeus and extreme apex of tubercles yellowish white. Abdomen black, with abbreviated and well-interrupted yellow band at base of tergites 2 and 3; or sometimes light markings of face, thorax and abdomen lacking. Pygidial plate ferruginous. Legs black, apex of all femora, and all tibiae and tarsi yellow, except for infuscation on posterior side of hind tibiae and on hind tarsi. Antennae fuscous, scape black, and flagellum dull yellowish beneath. Apical margin of clypeus brown, labrum testaceous yellow. Mandibles shading into dark red on apical third. Proboscis fuscous, galeae brown. Tegulae testaceous hyaline, base white. Wings dusky hyaline, nervures and margins of stigma dilute fuscous, subcosta brown.

Head broader than long; cheeks receding, slightly more than half as wide as eyes. Posterior ocelli their distance apart from nearest eye and somewhat closer to occipital margin. Facial

foveae broader than interval between them and eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below level of antennae gently convex; disk of clypeus nearly twice as broad as high, lateral extensions inflexed but visible in frontal aspect. Mandibles tapering, acute, and reaching far margin of fossa. Proboscis moderately short, galeae shorter than stipites. Pterostigma about three times as long as wide and two-thirds as wide as first submarginal cell; marginal cell as long as stigma, with parts beneath and beyond stigma equal and metacarpus slightly longer than apical truncation; second submarginal cell narrowed about one-half to radius. Head and thorax shining; mesonotum polished, frons and vertex smoothly tessellate. Lower face with sparse distinct punctures, frons obscurely punctured between foveae and antennal sockets and mesonotum almost impunctate. Pubescence whitish, short and thin, very sparse on face, with most of frons, vertex and mesonotum almost nude. Abdomen oval, depressed; pygidial plate narrow, acute at apex. Length: 3.3–3.9 mm.; anterior wing, 2.6–2.8 mm.

Male.—Head and thorax blue green. Mandibles except red tips, labrum and face below level of antennae creamy white; the white on sides of face reaching to or slightly above, middle of

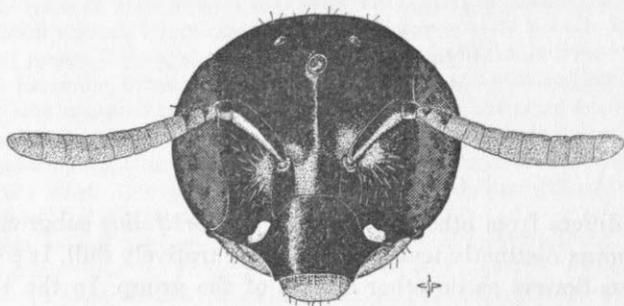


Fig. 24. *Perdita cruciferarum*. Frontal view of head of female.

eyes. Tubercles and sometimes a spot on posterior corners of disk of pronotum white. Abdomen black, with pale yellow bands on tergites 1 to 6; band on tergite 1 reduced to two oval spots, that on tergite 2 abbreviated and very narrowly interrupted, those on following segments successively more widely interrupted and broadly emarginate behind on each side, with that on tergite 6 mostly concealed in type. In one paratype, bands entire except on tergite 1, reaching lateral margins on tergites 3 to 5 and broadly emarginate behind, and tergites 6 and 7 yellow. In another paratype, tergite 1 entirely dark, tergites 2 and 3 with two transverse marks on disk, tergites 3 to 5 with subapical transverse mark far to each side, and tergite 7 and mark across middle of apex of tergite 6 yellow. In a third paratype median interruption of bands lacking, or faint, on tergites 3 to 5, but band on tergites 4 and 5 interrupted on each side. Legs yellow, with front femora fuscous behind except at apex and at base in front, middle femora dark behind except at apex and on basal half of dorsal margin, and hind femora dark except at apex and beneath. Antennae fuscous, flagellum broadly dull yellowish beneath and scape white except for dark streak nearly to base on dorsal margin. Proboscis, tegulae and wings as in female.

Head rotund, slightly broader than long; cheeks rounded, about two-thirds as wide as eyes. Posterior ocelli about three-fourths as far from nearest eye as their distance apart, and one-half their distance apart from occipital margin. Facial foveae about twice as long as wide. Face below level of antennae gently convex; disk of clypeus somewhat less than twice as broad as high, with lateral extensions visible in frontal aspect; supraclypeal area quadrate, slightly broader than high. Mandibles tapering, acute and reaching far margin of fossa. Antennae rather short, joints of flagellum no longer than wide. Sculpture and pubescence about as in female, but frons and vertex strongly tessellate and dull. Abdomen narrowly oval, moderately convex above and recurved at apex; tergite 7 narrowed to acute point at apex. Subgenital plate as broad as long, moderately narrowed to emarginate apex and with short, thin apical fringe

of hair. Genital armature about as in *tortifoliae*. Length; 3–3.2 mm.; anterior wing, 2.3–2.5 mm.

Holotype female and allotype.—Battle Mountain, Lander Co., Nevada, at flowers of Cruciferae, June 12, 1962 (G. E. Bohart).

Paratypes.—Three females, 4 males, taken with the types.

Types in collection of the University of California, Riverside; paratypes in collection of G. E. Bohart.

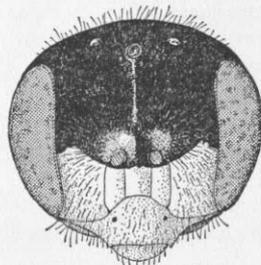


Fig. 25. *Perdita cruciferarum*. Frontal view of head of male.

***Perdita greggiae*, n. sp.**

(Plate figs. 1293, 1294, 1350)

This species differs from other members of the *tortifoliae* subgroup in having the head and thorax distinctly tessellate and comparatively dull. It collects pollen from cruciferous flowers as do other species of the group. In the 1964 key the female runs to couplet 68 and agrees better with *leucogastra* than with *compta*. It has a trilobed clypeal mark, transverse lateral marks and broad marks on each side of tergites 1 to 5 yellowish white or pale yellow. The male is similar but has the face all pale yellow below level of the antennae.

Female.—Head and thorax dark green. Anterior border of clypeus (bilobed on inner margin, with lobes sometimes acute and almost reaching summit of disk) and supra-clypeal area piceous or black. Labrum more or less piceous. Trilobed mark on disk of clypeus and transverse lateral marks not reaching above level of summit of clypeus yellowish white or pale yellow. Small spot at posterior corners of disk of pronotum and tubercles yellowish white. Abdomen black, with broad yellowish white mark on each side of tergites 2 to 5, and small spot close to lateral margins of tergite 1; the marks large, successively less broadly separated toward apex, the longest one (transversely) on tergite 3 and the broadest one on tergite 2, all reaching close to lateral margins of segments. Venter entirely dark; pygidial plate ferruginous. Legs blackish, middle and hind tibiae more brownish; apex of femora, anterior side of front and middle tibiae and front tarsi yellow. Antennae black, flagellum brownish yellow beneath. Mandibles yellow at base, shading through testaceous to red on apical half and along inner margin. Proboscis fuscous, galeae pale brown. Tegulae pale testaceous, base fuscous. Wings slightly dusky hyaline, nervures and margins of stigma brown, subcosta fuscous.

Head broader than long; cheeks rounded, about as broad as eyes. Posterior ocelli slightly more than their distance apart from nearest eye, and considerably closer to occipital margin. Facial foveae linear, more than their own width from margin of eyes and reaching from upper level of antennal sockets about two-thirds of the distance to level of anterior ocellus. Face below level of antennae moderately convex; disk of clypeus large, much broader than high, with lateral extensions strongly but gradually inflexed and partly visible in frontal aspect. Mandibles tapering, acute and simple. Proboscis moderately long, galeae almost reaching base of stipites. Pterostigma about four times longer than wide and two-thirds as wide as first submarginal cell; marginal cell as long as stigma, with parts beneath and beyond stigma equal, and meta-

carpus nearly twice as long as apical truncation. Frons, vertex and mesonotum strongly tessellate, moderately dull and obscurely, sparsely punctured. Pubescence pale ochreous, moderately abundant, long, erect and fine, becoming shorter on face than elsewhere. Tarsal claws with small inner tooth. Abdomen about twice as long as wide, subdepressed, with apical fimbria long and thin. Pygidial plate as long as basal width, narrowed to distinctly notched apex. Length: 5 mm.; anterior wing, 3.5 mm.

Male.—Head and thorax dark green. Mandibles except red tips, labrum and face below level of antennae pale yellow; upper margin of the yellow almost horizontal and touching anterior margin of antennal sockets, but inner margin of lateral marks ending slightly below the general level; supraclypeal mark varying from as broad as high to slightly broader than high. Marks on thorax as in female, those on abdomen also similar but less broad and two marks often present on tergite 6. Pygidiform apex of tergite 7 ferruginous. Legs and antennae as in female, except middle tarsi and scape broadly beneath yellow. Proboscis, tegulae and wings as in female.

Head somewhat broader than thorax, but at most only slightly broader than long; cheeks evenly rounded, as broad as eyes. Position of posterior ocelli as in female. Facial foveae very faint, about twice as long as wide. Face below antennae moderately convex; disk of clypeus about one and one-half times broader than high, with lateral extensions partly visible in frontal aspect. Pronotum normal. Wings, sculpture and pubescence as in female. Abdomen moderately convex above; tergite 7 triangularly narrowed into a pygidiform process, obtuse at apex. Subgenital plate somewhat broader than long, with deep rounded emargination at apex, apical part of disk with sparse very fine setae. Caulis of genital armature ovate, with basal orifice very large and circular; parameral lobes very short, broad at base but subacute at apex and apparently hairless; sagittae appearing slender and fusiform in both dorsal and lateral views, with basal rods short, divaricate and unusually thick; volsellae well exposed in dorsal view. Length, about 3.45–4.5 mm.; anterior wing, 3.1–3.4 mm.

Female holotype and allotype.—Twenty-nine miles northwest of Pecos, Reeves Co., Texas, at flowers of *Nerisyrenia* (or *Greggia*) *camporum*, April 15, 1965 (Timberlake).

Paratypes.—Thirteen females, 22 males, taken with types on *Nerisyrenia*, and 6 females, 5 males at same place on *Lepidium montanum*; 1 female, 11 miles northwest of Pecos, on *Baileya multiradiata*; and 1 male, 7 miles south of Malaga, Eddy Co., New Mexico, on *Lesquerella gordanii*, April 15 (Timberlake).

Types in collection of the University of California, Riverside.

Perdita tortifoliae tortifoliae Cockerell (new status)

It seems best after studying new material from Nevada and Utah to consider *tortifoliae* and *fremonti* as conspecific.

The series recorded below from Llaves, New Mexico, is very variable as to markings but agrees best with *tortifoliae*. One female entirely lacks markings and goes to *fremonti* in the key (1964); while four agree closely with *tortifoliae*. The sixth female has more extensive markings and runs to *mimosae* var. (couplet 100). Most of the males agree better with *fremonti* than *tortifoliae*.

New record.—NEW MEXICO: 6 females, 14 males, Llaves, Rio Arriba Co., at cruciferous flowers, Aug. 2, 1962 (D. C. Heninger).

Perdita tortifoliae fremonti Timberlake (new status)

Perdita fremonti Timberlake, 1964, Univ. Calif. Publ. Entom., 28:250 (pl. figs. 1011, 1012, 1149), ♀, ♂.

Some of the females recorded below are entirely dark and agree with *fremonti*, others have a white spot on sides of face and the abdomen dark as in *tortifoliae*, and a few have the transverse marks on second and third tergite as in some specimens of *fremonti*. The males have the face white, or nearly all white, below level of antennae.

New records.—UTAH. Washington Co.: 6 females, 7 males, Santa Clara, on *Lepidium fremontii*, May 4, 1963 (Bohart and Bromley); 20 females, 23 males, St. George, on *Lepidium*, May 4, 1963 (G. E. Bohart). NEVADA. Clark Co.: 3 females, 3 males, Mountain Springs Pass, west of Las Vegas, on *L. fremontii*, May 5, 1963 (G. E. Bohart); 9 females, 9 males, 10 miles northwest of Mountain Springs, May 5, 1963 (Bohart and Bromley).

Perdita trinotata Timberlake

Perdita trinotata Timberlake, 1964, Univ. Calif. Publ. Entom., 28:249, plate figs. 1009, 1010, 1148, ♂.

This species was described from one male from Rankin, Texas. Additional material from Texas includes both sexes, and the name proves to be more appropriate for the female than it does for the male, since the clypeus of the male is frequently entirely white, or dark only across the summit of disk. The female has three small white face marks, one on middle of the clypeus and one near anterior corner of face, on each side.

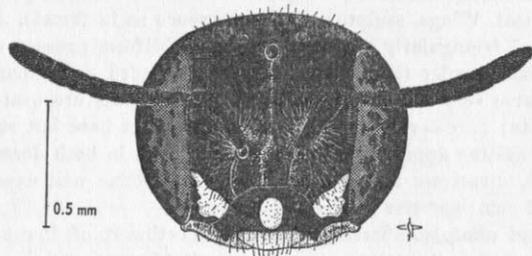


Fig. 26. *Perdita trinotata*. Frontal view of head of female.

Female.—Head and thorax dark bluish green, clypeus, supraclypeal area, disk of mesoscutum, scutellum and metanotum black. Base of mandibles, small spot on middle of clypeus and small mark, more or less obliquely transverse between clypeus and eye on each side, white. Thorax entirely dark, or apex of tubercles more or less whitened. Abdomen black, with creamy white band on tergites 1 to 4, narrowly interrupted at middle; band on tergite 1 reduced to small transverse spots, close together and widely separated from lateral margins; band on tergite 2 narrow and abbreviated; those on tergites 3 and 4 narrowed at outer ends and reaching lateral margins. Pygidial plate ferruginous; venter dark. Legs blackish, extreme apex of femora, front and middle tibiae except beneath, hind tibiae except for infuscation covering most of apical three-fifths, and all tarsi testaceous yellow. Antennae fuscous, pedicel and flagellum dull yellowish beneath. Labrum testaceous. Mandibles shading through testaceous to red at apex. Proboscis fuscous, galeae brown. Tegulae testaceous hyaline, spot at base whitish. Wings rather strongly dusky hyaline, nervures testaceous, margins of stigma and subcosta brown.

Head broader than long; cheeks rounded, nearly two-thirds as wide as eyes. Posterior ocelli only slightly closer to nearest eye than distance apart and still closer to occipital margin. Facial foveae well impressed, wider than the narrow interval between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae gently convex; disk of clypeus nearly twice as broad as high, lateral extensions not much visible in frontal aspect. Mandibles rather robust, tapering, acute and reaching far margin of fossa. Proboscis moderately long, not exceeding fossa, galeae reaching base of stipes. Pterostigma somewhat more than three times longer than wide, and about three-fourths as wide as first submarginal cell; marginal cell equally long beneath and beyond stigma, metacarpus somewhat longer than apical truncation; second submarginal cell narrowed about one-half to radius. Head and thorax shining, mesonotum highly polished, frons and vertex distinctly but smoothly tessellate. Punctures of face and mesonotum minute and very sparse,

disk of mesoscutum impunctate. Pubescence white, fine, erect and generally thin, disk of mesoscutum nude; hair of face and anterior border of mesoscutum short, that on sides of thorax long and thin; hair of front coxae long, but only moderately dense. Abdomen oval, subdepressed; pygidial plate narrowly triangular and obtuse at apex, disk plane.

New records.—TEXAS. Ward Co.: 7 females, 20 males, 6 miles south of Monahans, April 17, 1961 (Rozen and Schrammel). Pecos Co.: 5 females, 11 males, 20 miles west of Sanderson, on *Lesquerella gordani*, April 12, 1965 (Timberlake). Terrell Co.: 3 females, 1 male, 14 miles east of Sanderson, at least one female on *Nama hispidum*, April 12, 1965 (R. C. Dickson). Reeves Co.: 1 male, 29 miles north of Pecos, on *Nerisyrenia camporum*, April 15, 1965 (Timberlake).

Perdita wilmattae Cockerell

It is necessary to reduce the newly described *stanleyae* to a variety or subspecies of *wilmattae*. The three named forms of *wilmattae* are distinguishable in the female sex as follows:

1. Clypeus more or less dark, and sometimes entirely, supraclypeal mark absent and lateral marks sometimes small and oblique 2
 Clypeus entirely, or nearly all white, as well as two supraclypeal spots and triangular lateral marks reaching level of antennae; white bands of abdomen very broad and reaching lateral margins *wilmattae wilmattae* Cockerell
 2. Lateral marks of face often small and oblique, leaving anterior corners of face dark; clypeus often wholly dark; white bands on tergites 1 and 2 enclosed or nearly so; hind tibiae yellow only on basal fourth *wilmattae miricornis* Cockerell
- Lateral marks of face triangular, reaching level of antennae; anterior part of clypeus with three white marks; light bands of abdomen broad and reaching lateral margins on all segments; hind tibiae yellow, with dark blotch in front and behind on apical half

wilmattae stanleyae Timberlake

Perdita wilmattae stanleyae Timberlake (new status)

Perdita stanleyae Timberlake, 1964, Univ. Calif. Publ. Entom., 28:253 plate figs. 1017, 1018, 1152, ♀, ♂.

New record.—CALIFORNIA. Inyo Co.: 1 male, Antelope Springs, Aug. 24, 1960 (M. E. Irwin).

EXIMIA SUBGROUP

The two new species *insequens* and *modestissima*, known only in the female sex, are so similar to *eximia* that they are placed in the same subgroup with much confidence. Both species run near *eximia* in the 1964 key to the species of the *sphaeralceae* group and couplet 36 may be modified as follows:

36. Disk of scutum and scutellum not or only very slightly blackish 36a
 Mesonotum highly polished and black on disk of scutum and scutellum; head barely longer than wide; pygidial plate about as long as wide at base, narrowed slightly more than half to rounded apex; abdomen with broad, enclosed yellow bands, more or less increasing in width toward apex, those on tergites 1 to 3 sometimes narrowly interrupted and that on tergite 5 covering most of disk or breaking through to apical margin across middle

eximia Timberlake

- 36a. Face with usual convexity; mandibles simple 36b
 Face depressed; rather close punctures of frons more distinct than those of clypeus; mandibles slender, with distinct inner tooth; abdomen with narrow, even whitish bands on tergites 2 to 4, notched medially or slightly interrupted and not reaching lateral margins; tergites 5 and 6 fulvo-ferruginous; pygidial plate large and broad, with ogival apex

vanduzeei Cockerell

- 36b. Pygidial plate narrowly triangular, obtuse at apex; frons sparsely and minutely punctured; narrow lateral margins of disk of clypeus and small orbital spot on each side of face white; abdomen with broad yellow bands, increasing in width toward apex, those on tergites 2 and 3 slightly interrupted, and tergite 5 nearly all fulvous colored except for basal corners and slightly infuscated subapical spot on each side; wings slightly dusky

insequens, n. sp.

Pygidial plate large, with rather narrow, bluntly rounded apex; head and thorax dark green, without light markings; head large, slightly broader than long, frons closely punctured opposite foveae; mesonotum weakly tessellate, shining, minutely punctured; abdomen with enclosed pale yellow bands, divided into transverse marks on tergite 1, interrupted also on tergite 5 and more fulvous tinted; wings somewhat whitish hyaline

modestissima, n. sp.

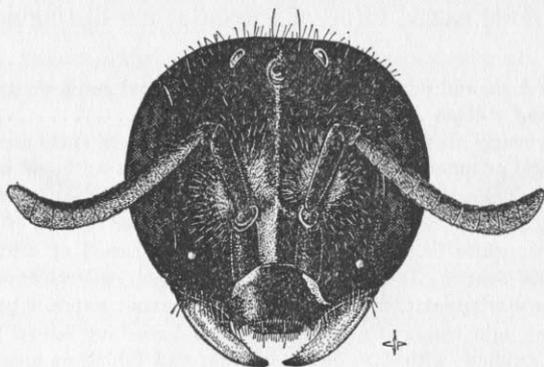


Fig. 27. *Perdita insequens*. Frontal view of head of female.

Perdita insequens, n. sp.

The type of *insequens* was included as a paratype in the type series of *eximia*, but differs in the shape of the pygidial plate, in the delicately tessellate sculpture of the mesoscutum and in the slightly dusky wings.

Female.—Head and thorax dark green, mesonotum almost verging into black; anterior corners of face black, disk of clypeus and labrum brown. Base of mandibles, narrow streak on lateral margins of disk of clypeus and very small spot close to margin of eye above level of summit of clypeus and only on left side in type, white. Thorax entirely dark. Abdomen fuscous, tergite 1 entirely dark; tergites 2 to 4 with pale yellow bands, not reaching lateral margins and increasing in width toward apex, those on tergites 2 and 3 narrowly interrupted in middle and those on tergites 3 and 4 oblique at outer ends. Tergite 5 pale fulvous, more yellowish toward base, with basal corners fuscous and subapical spot on each side slightly infuscated. Venter pale yellow, three basal segments somewhat infuscated. Pygidial plate rufotestaceous. Legs blackish, anterior side and outer margin of front tibiae and streak on anterior side of middle tibiae yellow; front tarsi yellowish and hind legs entirely dark. Antennae dark, flagellum fuscous browner beneath, scape black. Mandibles shading through testaceous to red at apex. Proboscis fuscous, galeae brown. Tegulae subhyaline, small spot at base yellowish. Wings dusky hyaline, nervures testaceous, margins of stigma and subcosta brown.

Head slightly broader than long; cheeks evenly rounded and about two-thirds as wide as eyes. Posterior ocelli their distance apart from occipital margin and slightly more remote from nearest eye. Facial foveae well impressed, their own width from margin of eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Mandibles tapering, acute and reaching far margin of fossa. Proboscis moderately long, galeae as long as

stipites and maxillary palpi about two-thirds as long as galeae. Pterostigma three times as long as wide and about two-thirds as wide as first submarginal cell; marginal cell as long as stigma and slightly longer beyond than beneath it; second submarginal cell narrowed slightly less than half to radius. Head and thorax shining, but not polished; mesonotum delicately tessellate, with sparse minute punctures; frons and vertex strongly tessellate, dullish and punctured like mesonotum; lower face more shining, punctures of clypeus comparatively coarse but shallow. Pubescence short, erect, whitish, thin on face and mesonotum and comparatively dense on cheeks and lateral ridges of propodeum. Hair of front coxae rather short and dense. Abdomen narrowly ovate, widest at junction of tergites 3 and 4. Apical fimbria short and sparse. Pygidial plate narrowly triangular, with apex narrowly obtuse, disk plane. Length: 5 mm.; anterior wing, 3.2 mm.

Holotype female.—Just south of Piute Butte, Los Angeles Co., California, on *Chaenactis brachypappa*, May 12, 1944 (Timberlake).

Type in collection of the University of California, Riverside.

Perdita modestissima, n. sp.

The female of *modestissima* differs from *eximia* in the dark green, instead of black mesoscutum, and in having the abdominal bands uniform in width from segment to segment, instead of becoming successively broader toward apex.

Female.—Head and thorax dark green, without light markings. Abdomen black, venter less deeply colored, middle of each segment and apical one almost entirely reddened; pygidial plate rufotestaceous. Tergites 1 to 4 with moderately wide, pale yellow bands, all nearly uniform in width, not quite reaching lateral margins, notched medially in front and behind and that on tergite 1 almost interrupted; tergite 5 with two broadly oval marks, almost touching each other and more testaceous than yellow. Legs black, apex of front femora, anterior side of front and middle tibiae, and their tarsi pale yellow. Antennae fuscous, scape black, flagellum dull yellowish beneath. Mandibles testaceous, more yellowish at base and red on apical third. Proboscis fuscous, with galeae much paler. Tegulae subhyaline, base brownish, with narrow yellowish margin. Wings whitish hyaline, nervures pale testaceous, margins of stigma and subcosta brown.

Head large, slightly broader than long and broader than thorax; cheeks rounded, about one-half as wide as eyes. Posterior ocelli less than their distance apart to nearest eye and half as far from occipital margin. Facial foveae moderately impressed, slightly widened toward anterior end, close to margin of eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below level of antennae moderately and evenly convex; disk of clypeus nearly twice as broad as high, lateral extensions but little visible in frontal aspect. Mandibles moderately thick and tapering, blunt at apex. Proboscis moderately short, galeae about equaling stipites and maxillary palpi nearly as long as galeae. Pterostigma rather small, not quite three times longer than wide and about half as wide as first submarginal cell; marginal cell as long as stigma, parts beneath and beyond it about equal, with metacarpus slightly longer than apical truncation. Head and thorax shining, mesonotum almost polished, frons and vertex minutely but distinctly tessellate and moderately dull, face below antennae slightly dullish. Punctures minute and sparse, but much closer on frons between foveae and antennal sockets, and stronger on face below level of antennae and rather close on clypeus. Pubescence white, erect and rather short; sparse on face, shorter, sparser and coarser on mesonotum, with middle of disk of scutum almost bare, and denser than usual on cheeks and lateral ridges of propodeum. Hair of front coxae of usual length and density. Scopal hair of hind tibiae denser than usual but hardly longer than greatest width of tibia. Abdomen oval, about twice as long as wide and moderately convex above; apical fimbria poorly developed. Pygidial plate longer than wide at base, apex rather narrowly rounded and disk slightly convex. Length: 4.5 mm.; anterior wing, 3.1 mm.

Holotype female.—Battle Mountain, Lander Co., Nevada, on undermined species of Cruciferae, June 12, 1962 (G. E. Bohart).

Type in collection of the University of California, Riverside.

ZEBRATA SUBGROUP

This assemblage of species was formerly placed in the *zonalis* group, but recently recognized as having more affinity to the *sphaeralceae* group. The species generally have the abdomen yellow with dark bands and the mandibles of the female tapering, simple and acute. Three additional species are described herewith.

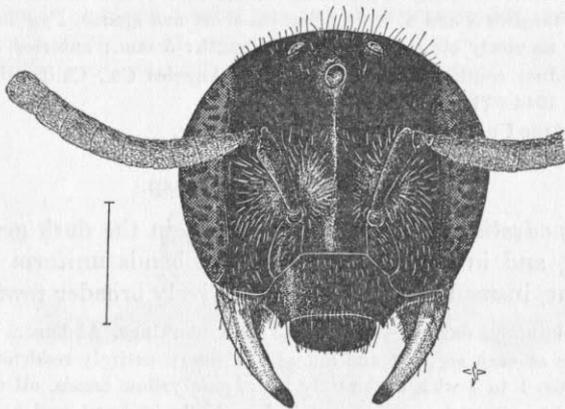


Fig. 28. *Perdita modestissima*. Frontal view of head of female.

Perdita heliotropii heliotropii Cockerell

New record.—One male, St. George, Washington Co., Utah, June 13, 1961 (G. E. Bohart).

The male of *heliotropii* was omitted by oversight from the 1964 key. It runs best near *leucosticta* and *propinqua* in couplet 168, and differs in having the abdominal bands usually enclosed, and more or less obsolescent except on tergites 2 to 4, with apical segments being more or less diffused with yellow, and especially in the peculiar labial palpi.

Perdita planifrons, n. sp.

Apparently *planifrons* is closely allied to *zebrata* to which the female runs in the key to the *sphaeralceae* group (1964). It differs from *zebrata* in the more flattened and densely hairy frons, the yellow subantennal marks, broader disk of clypeus and less-developed bands on tergites 1 and 2.

Female.—Head and thorax dark green. Mandibles except red tips, labrum and most of face below level of antennae yellow. Lateral marks obliquely narrowed above and reaching level of anterior end of foveae, the green of frons descending between them and subantennal mark at first broadly, and finally very narrowly to margin of clypeus. Collar of pronotum, band on posterior margin of disk confluent with mark on tubercles yellow. Abdomen yellow; ground color of tergites 1 and 2, base of tergite 3, broad band at junction of tergites 3–4, and narrow band at junction of tergites 4–5 fuscous. Yellow band on tergite 1 very narrow and broken into four small spots; that on tergite 2 subbasal, narrowly interrupted in middle, with each half straight, rounded at both ends, and with a slender oblique extension to lateral margins just in front of apical depression of segment. Yellow bands on tergites 3 and 4 broad, bent backward and slightly narrowed at outer ends. Tergites 5 and 6 almost entirely and venter yellow. Legs yellow, front coxae dark, and apex of hind femora, hind tibiae and tarsi fuscous. Antennae fuscous, scape yellow except for dark streak above, narrowed basad, and flagellum rather

broadly yellow beneath. Proboscis fuscous, galeae testaceous brown. Tegulae testaceous hyaline, yellowish at base. Wings milky hyaline, nervures and stigma concolorous, subcosta slightly testaceous.

Head somewhat broader than long; cheeks evenly rounded and about half as wide as eyes. Posterior ocelli somewhat more than half their distance apart from nearest eye and occipital margin. Facial foveae well impressed, slightly curved and narrowed above, close to margin of eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face very gently convex below level of antennae and depressed above. Disk of clypeus much broader than high, broadly rounded across summit, and lateral extensions visible in frontal aspect. Supraclypeal area slightly broader than high (the yellow much rounded above and intruding between antennal sockets). Subantennal plates strongly oblique and converging above. Mandibles tapering, acute and simple. Proboscis moderately short, galeae probably reaching base of stipites (but crumpled in type, with palpi concealed). Pterostigma large, about as wide as first submarginal cell and emitting radius well beyond middle; parts of marginal cell about equal beneath and beyond stigma, with metacarpus somewhat longer than apical truncation. Head and thorax shining, mesonotum polished, frons and vertex smoothly tessellate and dullish. Punctures of frons minute, rather dense but obscure; those of mesoscutum minute, distinct and widely spaced. Pubescence white, rather short, depressed and abundant on frons, and thin, moderately erect and rather coarse on mesonotum. Abdomen oval, depressed; pygidial plate longer than wide, narrowed about one-half to slightly retuse apex. Length: about 4.5 mm.; anterior wing, 3.6 mm.

Holotype female.—Seven miles east of Bodie, Mono Co., California, July 2, 1964 (P. Rude). In collection of the University of California, Riverside.

Perdita replicans, n. sp.

This is another species that is astonishingly similar to *zebrata*, but the female is slightly smaller, with antennae shorter, femora dark except at apex and wings dusky instead of whitish hyaline. In the key to the *sphaeralceae* group (1964) it runs to couplet 107 where it agrees better in some respects with *leucogastra* than with *zebrata*.

Female.—Head and thorax dark bluish green. Base of mandibles, clypeus, lateral face marks, collar of pronotum, slightly interrupted band on hind margin of disk and tubercles white. Two brown stripes on disk of clypeus, not reaching posterior margin and widening anteriorly. Lateral marks twice as high as wide and intruding between foveae and eyes. Labrum brown, lateral margins whitish. Abdomen yellow, with broad band at junction of tergites 1-2 to 4-5 fuscous. Dark area at base of tergites 2 to 5 extending backward at outer ends and almost enclosing the yellow on tergite 4. Tergite 1 also with small fuscous streak on each side of summit of basal declivity, and a dark streak in median crease. Tergite 5 with partly developed subapical fuscous band across middle half. Venter without dark markings. Legs fuscous, apex of femora (hind pair more narrowly), front tibiae except pale brown mark beneath, middle tibiae except large pale brown mark beneath and behind, and front tarsi pale yellow; middle tarsi pale brown. Antennae fuscous, scape broadly pale yellow beneath, and flagellum pale brownish yellow beneath. Mandibles shading through testaceous to red at apex. Proboscis fuscous. Tegulae testaceous hyaline, base white. Wings dusky hyaline, nervures testaceous, margins of stigma and subcosta brown.

Head rotund, as broad as long; cheeks half as wide as eyes. Posterior ocelli about their distance apart from nearest eye and slightly closer to occipital margin. Facial foveae well impressed, wider than interval between them and eyes, widening below and reaching from level of upper margin of antennal sockets hardly more than halfway to level of anterior ocellus. Antennae rather short, middle and terminal joints of flagellum no longer than wide. Face below level of antennae evenly and moderately convex; disk of clypeus about twice as broad as high, lateral extensions well exposed in frontal aspect. Mandibles moderately thick, tapering, simple, but blunt at apex. Proboscis moderately short, galeae nearly reaching base of stipites, maxillary

palpi about four-fifths as long as galeae. Pterostigma about three times as long as wide and as wide as first submarginal cell; parts of marginal cell beneath and beyond stigma nearly equal and metacarpus slightly longer than apical truncation; second submarginal cell receiving both recurrent nervures and narrowed about four-fifths to radius. Tarsal claws small, with minute inner tooth. Head and thorax shining, frons and vertex distinctly tessellate and moderately dullish; mesonotum polished. Punctures of face below antennae shallow, indistinct, those of frons sparse, scattered and minute; of mesoscutum sparse, mostly restricted to anterior third of disk, posterior middle of disk almost impunctate. Pubescence white, thin, moderately long and erect, face nearly bare except for patch of hair on each side between foveae and antennal sockets. Abdomen oval, moderately convex above; apical fimbria rather long and abundant. Pygidial

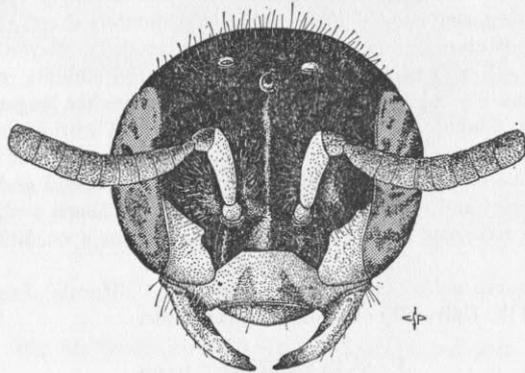


Fig. 29. *Perdita replicans*. Frontal view of head of female.

plate about as long as wide at base, sides converging to emarginate apex, tooth on each side of notch equaling emargination. Length: 4.5 mm.; anterior wing, 2.9 mm.

Holotype female.—Five miles northeast of Santa Margarita, San Luis Obispo Co., California, June 24, 1963 (G. I. Stage).

Type in collection of the University of California, Riverside.

***Perdita zebrata* Cresson, var.**

(Plate figs. 1295, 1296, 1351)

Certain male specimens of *Perdita*, that exhibit the characters enumerated in couplet 54 of the preceding key, were at first thought to be a separate species but seem to be certainly only a variety of *zebrata*. They differ from typical specimens of *zebrata* in having the yellow markings of the abdomen reduced, with tergite 1 entirely dark and the bands on tergites 2 to 4 enclosed, the black marking on the legs less extensive, with the middle femora in some specimens entirely yellow, and the subantennal plates more or less broadly black at anterior end.

Specimens of this variety examined as follows: UTAH: 1 male, Thompsons, Grand Co., May 24, 1960 (G. F. Knowlton); 2 males, Logan Canyon, Cache Co., May 16, 1965 (R. W. Rust). NEVADA: 1 male, Nixon, Washoe Co., June 22, 1962 (F. D. Parker).

SIDAE SUBGROUP

Perdita ovaliceps Timberlake

Perdita ovaliceps Timberlake, 1964, Univ. Calif. Publ. Entom., 28:265, fig. 52, ♂.

Perdita luctuosa Timberlake, 1964, Univ. Calif. Publ. Entom., 28:266, fig. 53, ♀ (new synonymy).

The discovery of the female of the closely related *tessellata* and the differences between the sexes in that species corresponding to those between *ovaliceps* and *luctuosa* convinces me that *luctuosa* must represent the female sex of *ovaliceps*.

New records.—One female, Furnace Creek, Death Valley, Inyo Co., California, April 18, 1949 (O. Bryant); 2 males, Truckhaven, Imperial Co., April 3, 1946 (A. L. Melander); 1 female, 7 miles northwest of Hope, Eddy Co., New Mexico, April 12, 1965 (M. E. Irwin).

Perdita sulphuripes Timberlake

This species has been known from only one male collected near Palm Springs, California. Another male from the Slate Range, Inyo County, 13.8 miles northeast of Trona, on *Malacothrix*, April 17, 1962 (C. A. Toshi) differs from the type in somewhat whiter wings and having the face entirely white below level of antennae.

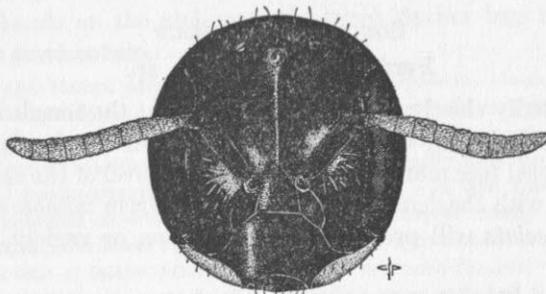


Fig. 30. *Perdita tessellata*. Frontal view of head of female.

Perdita tessellata Timberlake

Perdita tessellata Timberlake, 1964, Univ. Calif. Publ. Entom., 28:264, plate figs. 1027, 1028, 1157, ♂.

Only the male of *tessellata* has been known from Idaho, but additional material from Idaho and Nevada includes the female. The female runs to *luctuosa* in the key to the *sphaeralceae* group (1964) but has the head less elongate and the mesonotum distinctly although rather weakly tessellate instead of being highly polished.

Female.—Head and thorax aeneous green, meso- and metanotum black, propodeum bluish. Clypeus more or less brown anteriorly; labrum testaceous or brown. No light markings on head or thorax. Abdomen blackish, with interrupted abbreviated creamy-white bands on tergites 1 to 4, the transverse marks on successive segments more widely separated, those on tergite 2, or tergites 2 and 3, the largest. Venter dark, pygidial plate ferruginous. Legs fuscous, anterior side of front and middle tibiae, and their tarsi yellow (middle legs entirely dark in Nevada female). Antennae fuscous, flagellum broadly dull yellowish beneath. Mandibles testaceous, apex red. Proboscis fuscous. Tegulae testaceous hyaline, base darker. Wings hyaline, nervures testaceous, subcosta brown.

Head slightly longer than wide; cheeks rounded, about two-thirds as wide as eyes. Posterior ocelli slightly less than their distance apart from nearest eye and about half as far from occipital margins. Facial foveae well impressed, narrow, about their own width from margin of eyes and reaching from level of middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Face below level of antennae strongly convex; disk of clypeus much broader than high, with lateral extensions concealed in frontal aspect. Mandibles thick, tapering, acute, simple, and strongly curved on outer margin. Proboscis rather long, galeae as long as stipites. Tarsal

claws small, with distinct but small inner tooth. Pterostigma about three times as long as wide and two-thirds as wide as first submarginal cell; marginal cell slightly longer beyond than beneath stigma, with metacarpus slightly longer than apical truncation. Head and thorax shining, frons and vertex strongly tessellate and dullish, mesonotum smoothly tessellate (in Nevada female frons and vertex nearly as weakly tessellate as mesonotum). Punctures fine and sparse, most distinct on face below antennae, obscure on frons and very sparse on mesonotum, middle of mesoscutum almost impunctate. Pubescence white, fine, erect; rather short and sparse on face and still thinner on mesonotum; longer and denser on cheeks and occiput, and longer but thin on sides of thorax. Abdomen ovate, depressed, twice as long as wide; pygidial plate narrowly triangular, much longer than wide and acute at apex. Length: about 4 mm.; anterior wing, 2.7 mm.

New records.—IDAHO. Elmore Co.: 1 female, 1 male, 18 miles west of Mountain Home, 3,138 feet, on *Tetradymia*, June 16, 1955 (W. F. Barr). NEVADA. Lander Co.: 2 females, 2 males, Battle Mountain, on *Chaenactis*, June 12, 1962 (G. E. Bohart).

SONORENSIS SUBGROUP

Perdita albofasciata, n. sp.

This is undoubtedly closely related to *mimosae*, but the female has the abdomen more strongly banded with white, the mesoscutum more closely punctured and hairy, and the lateral face marks not reaching above level of the summit of clypeus. Two males taken with the females are not distinct from *mimosae* so that it seems likely that *albofasciata* will prove to be a subspecies, or variety, when more adequately known.

Female.—Head and thorax dark bluish green, disk of clypeus broadly black. Basal third of mandibles, lateral extensions of clypeus, confluent with narrow stripe on lateral margins of disk, and small lateral marks, not reaching above level of clypeus, white. Lateral marks oblong and oblique, leaving anterior corners of face black. Two small supraclypeal marks sometimes present. Thorax entirely dark except for white tubercles. Abdomen nearly black, with white bands on tergites 2 to 5; band on tergite 2 very narrowly interrupted and almost reaching lateral margins, others successively becoming more abbreviated, that on tergite 5 nearly concealed by preceding segment. Apex of abdomen beneath and pygidial plate brownish testaceous. Legs fuscous, extreme apex of front and middle femora, anterior side of front and middle tibiae and front tarsi yellow; hind knees testaceous. Antennae fuscous, scape narrowly white beneath and flagellum dull yellowish beneath. Labrum fuscous, but more or less testaceous brown at apex. Mandibles shading through testaceous to red at apex. Proboscis fuscous, galeae brown. Tegulae testaceous hyaline, base white. Wings almost clear hyaline, nervures testaceous, margins of stigma ferruginous, subcosta brown.

Head broader than long; cheeks rounded and narrow. Posterior ocelli distinctly closer to nearest eye than their distance apart, and about half the distance from occipital margin. Facial foveae narrow, about their own width from margin of eyes and reaching from level of middle of antennal sockets somewhat more than halfway to level of anterior ocellus. Face below level of antennae evenly convex; disk of clypeus broadly rounded above and broader than high, with lateral extensions broadly visible in frontal aspect. Mandibles simple, tapering, acute. Proboscis moderately short, galeae reaching base of stipites. Pterostigma slightly more than three times as long as wide and about two-thirds as wide as first submarginal cell; marginal cell distinctly longer beyond than beneath stigma, with metacarpus about twice as long as apical truncation. Head and thorax shining, frons and vertex delicately tessellate and mesonotum polished. Punctures fine and distinct; rather close on frons between foveae, sparse on vertex and moderately close on mesoscutum, but sometimes becoming more widely separated on posterior middle of disk. Pubescence whitish, fine, moderately long and erect; rather abundant on head and thinner on mesonotum; tuft of hair on front coxae moderately long and dense. Pygidial plate mainly concealed in type, with apex moderately wide and rounded or subtruncate. Length: about 4.5 mm.; anterior wing, 3.1 mm.

Holotype female.—Santa Fe, Santa Fe Co., New Mexico, on *Tamarix gallica*, July 11, 1963 (D. C. Heninger).

Paratypes.—Three females, taken with the type.

Type in collection of the University of California, Riverside; paratypes in collection of G. E. Bohart.

MARTINI SUBGROUP

Perdita impressa, n. sp.

In the key to the *sphaeralceae* group (1964) the female of *impressa* runs as well to *euzonata* as elsewhere, although presence of a supraclypeal mark might force it to fall near *macswaini*. It differs from *euzonata* in the face markings, the development of four instead of five light bands on abdomen, and in having the frons and vertex more polished. From *macswaini* it differs in the smaller face marks, with the supraclypeal mark transverse and almost divided into two spots, in the four instead of five bands on the abdomen, the much darker legs and in the sparser punctures of the mesoscutum.

Female.—Head and thorax somewhat brassy green, propodeum bluish. Base of mandibles, clypeus, lateral and supraclypeal marks pale yellow or almost yellowish white. Labrum and two stripes on disk of clypeus fuscous; the stripes confluent with dark anterior margin and uniting above at summit, leaving margins of upper half of disk broadly light and enclosing triangular light mark. Lateral marks triangular, slightly higher than wide and reaching anterior end of foveae at level of antennal sockets. Supraclypeal mark transverse, nearly divided into quadrate spots. Pronotum yellow, with lower half of flanks and small spot at middle of hind margin of disk dark, and sutural crease of flanks infuscated. Abdomen brownish fuscous, with broad pale yellow band on tergites 1 to 4; band on tergite 1 narrowed at outer ends and linearly interrupted by median crease; bands on tergites 2 and 3 even, almost as wide as dark intervals, and that on tergite 4 somewhat narrower; and those on tergites 3 and 4 narrowed at outer ends by dark spot at basal corners of segments. Venter dark except for largely pallid reflexed ventral parts of tergites. Pygidial plate ferruginous. Legs fuscous, apex of femora, anterior side of front and middle tibiae and their tarsi pale yellow. Antennae fuscous, scape narrowly pale yellow beneath, flagellum dull yellowish beneath. Mandibles shading into red on apical half. Proboscis fuscous. Tegulae testaceous hyaline. Wings whitish hyaline, nervures pale testaceous, margins of stigma more tinged with orange, subcosta brownish except for pallid base.

Head distinctly broader than long; cheeks rounded, slightly more than half as wide as eyes. Posterior ocelli about two-thirds their distance apart from nearest eye and one-half from occipital margin. Facial foveae strongly impressed, moderately wide, very close to margin of eyes and reaching from level of middle of antennal sockets two-thirds of distance to level of anterior ocellus. Face below level of antennae gently and evenly convex; disk of clypeus nearly twice as high as wide, broadly truncate at summit, and with lateral extension largely visible in frontal aspect. Mandibles simple, tapering, acute. Proboscis moderately long, galeae about three-fourths as long as stipites. Pterostigma about four times longer than wide and about half as wide as first submarginal cell; marginal cell as long as stigma, with parts beneath and beyond it equal and metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed about two-thirds to radius. Tarsal claws small, inner tooth obscure. Head and thorax shining, mesonotum polished, and frons and vertex almost polished. Punctures fine but strong, close on frons and moderately sparse on mesonotum. Pubescence white, erect and rather abundant; moderately long on face and mesonotum and coarser on mesonotum than elsewhere; longer and denser on cheeks, and still longer on metanotum and lateral ridges of propodeum. Hair of front coxae moderately long and dense. Abdomen almost twice as long as wide, depressed; pygidial plate not well exposed in type, but triangular, with apex narrowly rounded. Length: about 4.2 mm.; anterior wing, 3.2 mm.

Holotype female.—Twelve miles west of Navajo, Apache Co., Arizona, on *Eriogonum aureum*, Sept. 10, 1959 (G. I. Stage).

Type in collection of the University of California, Riverside.

EXCLAMANS SUBGROUP

***Perdita weneri*, n. sp.**

(Plate figs. 1297, 1298, 1352)

This is an anomalous species, but the characters of the male agree better with the *exclamans* subgroup than elsewhere. In the key to the *sphaeralceae* group (1964) the male runs to *salicis* (couplet 260), but differs in the markings as well as having the mesonotum polished and the genital armature very distinctive.

Male.—Head and thorax dark green. Anterior part of genal area and cheeks to level of middle of eyes, proboscis, mandibles except red tips, labrum and face to level of foveae yellow; green of frons descending on each side to antennal sockets, with median yellow extension on frons arrowhead-shaped. Narrow mark on hind margin of disk of pronotum, tubercles and flanks of pronotum except narrow median dark streak descending halfway, prosternum and T-mark on mesopectus yellow; arms of T-mark expanded laterally and covering more than anterior half of mesopleura; a yellowish mark on flanks of propodeum. Abdomen blackish, with moderately wide and even yellow bands on tergites 2 to 6, reaching lateral margins except on tergite 2; interrupted narrowly on tergite 2 and notched medially behind on other segments; venter yellow. Legs yellow; spot at apex of hind femora on outer side, outer margin of hind tibiae and basitarsi and small joints of hind tarsi fuscous. Antennae yellow, with pedicel and flagellum fuscous above. Tegulae pale testaceous hyaline, base yellow. Wings almost clear hyaline, nervures and margins of stigma fuscous.

Head slightly broader than long; cheeks rounded and about three-fourths as wide as eyes. Posterior ocelli somewhat closer to nearest eye than their distance apart, and still closer to occipital margin. Facial foveae small and obscure. Face below level of antennae moderately convex; disk of clypeus less than twice as broad as high, well rounded at summit, with lateral extensions strongly inflexed and only partly visible in frontal aspect. Antennae rather long but thick, joints 6 to 10 of flagellum as broad as long. Mandibles tapering, acute, and reaching far margin of fossa. Proboscis rather short, galeae hardly reaching more than halfway to base of stipites. Flanks of pronotum normal. Pterostigma about as long and wide as first submarginal cell and emitting radius at middle; marginal cell nearly as long as stigma, with parts beneath and beyond it equal, and metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed less than one-fourth to radius. Head and thorax shining, frons and vertex minutely tessellate and dullish, mesonotum polished, with anterior and lateral margin of scutum slightly tessellate; supraclypeal area more roughened by shallow punctures than clypeus; punctures of frons minute and obscure and those of mesoscutum sparse. Pubescence whitish, rather long, erect and thin on face and mesonotum, and longer and denser on cheeks. Abdomen oval, only slightly more than twice as long as wide; tergite 7 produced into an apical lobe, more depressed than disk, nearly as long as wide at base, and narrowed to rounded apex. Subgenital plate about as long as wide, but becoming very broad at lateral apodemes, which curve slightly basad; disk of plate slightly emarginate at apex and with fine setae which fringe lateral margins more strongly than apex. Genital armature strongly depressed, caulis in dorsal view as long as wide, with dorsal lobes merging into parameral lobes which taper from broad base to densely fimbriate apex; sagittae very thick, fused, cylindrical and blunt at apex, but with a narrow more sclerotized part at apex which comes to a sharp point, beneath which in lateral view is a rather deep recess. Length: about 3.75 mm.; anterior wing, 3.6 mm.

Holotype male.—Springerville, Apache Co., Arizona, June 25, 1957 (Butler and Werner).

Type in collection of the University of California, Riverside (but with stipulation recorded in Part VI, page 125).

SPECIES OF UNCERTAIN AFFINITY

Included here are species too poorly known and too anomalous to be placed with assurance in any of the preceding assemblages of species.

Perdita ancoralis, n. sp.

The female of *ancoralis* is similar in many ways to *masoni*, to which it runs in the key to the *sphaeralceae* group (1964). Both have the hair of front coxae long and dense and the scopal hair of hind tibia very long and almost straight. It differs from *masoni* in having an anchor-shaped pale mark on the clypeus, abdominal markings more sharply defined, the pygidial plate compressed and very acute at apex, and the wings not whitened, but with the margins of stigma and subcosta pale brown.

Female.—Head and thorax dark green, supraclypeal area, dark part of clypeus, disk of mesoscutum and scutellum black. Rather narrow median stripe on clypeus, more narrow and strongly arcuate band at summit of clypeus, large triangular lateral marks, ending rather broadly at anterior end of foveae, collar of pronotum, cuneate marks on hind corners of disk of pronotum and tubercles yellowish white. Abdomen fulvous yellow, clearer yellow on tergites 1 and 2; margins of tergites 1 to 3 rather broadly fuscous, changing to brown at junction of segments except toward lateral margins; tergite 4 pale fuscous at basal corners and brownish across apex, and tergites 5 tinged with brown; pale mark on tergite 1 semi-oval, with erose margins and emarginated in front by dark median crease; pale bands on tergites 2 and 3 broad and oblique at outer ends, and that on tergite 4 similar but more suffused; pygidial plate dark red. Venter entirely pale, except infuscation at base. Legs blackish, apex of front femora and front tibiae except on posterior side pale yellow; front tarsi pale brown. Antennae fuscous, scape black, flagellum more brownish toward apex and dull yellowish beneath. Labrum brownish fuscous, tinged with red at apex. Mandibles yellowish white at base and shading through testaceous to red at apex. Proboscis fuscous. Tegulae testaceous hyaline, yellowish white at base and on inner margin. Wings clear hyaline, nervures testaceous, margins of stigma and subcosta brown.

Head as broad as long; cheeks receding, about two-thirds as wide as eyes. Posterior ocelli about their distance apart from nearest eye and distinctly closer to occipital margin. Facial foveae broad, narrowly separated from margin of eyes and reaching about two-thirds of distance from level of middle of antennal sockets to level of anterior ocellus. Face below level of antennae strongly convex; disk of clypeus slightly broader than high, with lateral extensions strongly inflexed and not much visible in frontal aspect. Mandibles evenly curved, abruptly narrowed on inner margin close to acute apex. Proboscis moderately long, galeae as long as stipites and maxillary palpi about three-fourths as long as galeae. Pterostigma nearly four times longer than wide, widest beyond middle and about three-fourths as wide as first submarginal cell; marginal cell slightly longer beneath than beyond stigma, with metacarpus and apical truncation subequal; second submarginal cell narrowed two-thirds to radius. Tarsal claws moderately large, with distinct but small inner tooth. Head and thorax moderately dull, with distinct tessellation on frons, vertex and mesonotum; face below antennae smooth and shining; punctures fine, sparse on clypeus, close but obscure on frons, and moderately close on anterior border of mesoscutum but widely separated on middle of disk. Pubescence white, fine and erect; moderately abundant on face and mesonotum; denser and longer on cheeks, and longer but thin on sides of thorax. Tuft of hair on front coxae long and dense. Abdomen oval, about twice as long as wide, subdepressed; pygidial plate triangular, very acute at apex. Length: about 5 mm.; anterior wing, 3.5 mm.

Holotype female.—Boyd Desert Research Center, 4 miles south of Palm Desert, Riverside Co., California, April 10, 1963 (G. Tamaki).

Type in collection of the University of California, Riverside.

Perdita atrovirens, n. sp.

This species is based on a female of uncertain affinity, but presumably belonging in the *sphaeralceae* group and possibly in the *drymaniae* subgroup. It is entirely without light markings and in the key to the *sphaeralceae* group (1964) it runs

to *eysenhardtiae* and *pulla* in couplet 28. It differs in the broad pygidial plate, with apex moderately narrow and rounded, and in the comparatively slender form, with narrow head and abdomen. I am indebted to Helen K. Sharsmith of the Berkeley Herbarium for identification of the *Boerhaavia* from which the specimen was collected.

Female.—Head and thorax dark green; labrum, clypeus, anterior corners of face, disk of mesoscutum and scutellum black; metanotum black with a greenish tinge. Abdomen black. No light markings. Legs black, tarsi more brownish toward apex; apical part of front tarsi pale brown, with reddish claws. Antennae dark, scape black, flagellum fuscous above and brown beneath. Mandibles black at base and shading through testaceous to red at apex. Proboscis fuscous. Tegulae testaceous hyaline, base fuscous. Wings dusky hyaline, nervures and margins of stigma fuscous, subcosta blackish.

Head slightly longer than wide; cheeks rounded, receding, hardly two-thirds as wide as eyes. Posterior ocelli equidistant from each other and nearest eye and about one-half as far from occipital margin. Antennae moderately short, flagellum slightly clavate, middle joints as broad as long. Facial foveae parallel to margin of eyes, slightly wider than narrow interval between them and eyes, and reaching from just below level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae strongly convex; disk of clypeus somewhat broader than high, with lateral extensions hardly visible in frontal aspect. Parocular areas with a slight bulge adjacent to sides of clypeus. Mandibles short and robust, but worn, the right mandibles showing remnant of inner tooth or else it was abruptly narrowed before apex. Proboscis long, but not exceeding fossa in repose, galeae as long as stipites. Pterostigma slightly more than three times longer than wide and about two-thirds as wide as first submarginal cell; marginal cell as long as stigma, distinctly longer beyond than beneath stigma, with metacarpus about twice as long as apical truncation; second submarginal cell narrowed one-half to radius. Tarsal claws small, with distinct inner tooth. Head and thorax shining, mesonotum polished, frons and vertex smoothly tessellate; punctures minute, most distinct on clypeus, moderately close on frons, and sparser on mesonotum, becoming widely separated on posterior middle of disk. Pubescence white, fine and erect; rather short and moderately abundant on face and mesonotum, and longer and denser on cheeks. Hair of front coxae long, but thinner than usual. Abdomen narrowly oval, more than twice as long as wide; pygidial plate triangular, as wide at base as long, apex rounded, disk plane. Length: about 4.5 mm.; anterior wing, 3 mm.

Holotype female.—Seventeen miles south of Navajoa, Sonora, Mexico, at flowers of *Boerhaavia xantii*, Aug. 18, 1964 (Timberlake).

Type in collection of the University of California, Riverside.

Perdita humilis, n. sp.

This is still another entirely dark species that agrees better with the *sphaeralceae* group than anywhere else. In the 1964 key it runs to *pumila* (couplet 14), but differs in many ways but especially in the mandibles, facial foveae and the duller more strongly tessellate sculpture. As it was taken in the region where Cockerell worked when preparing his report on *Perdita* (1896) it is interesting to note where it runs in his key. It runs out at couplet 20 and agrees in size only with *aenifrons* and *phymatae*, but neither of these are entirely dark, and *aenifrons* has a polished black mesonotum and *phymatae* has simple mandibles.

Female.—Head and thorax dark blue green, anterior corners of face and clypeus black, without light markings. Abdomen blackish, without markings, junction of middle segments narrowly brownish; pygidial plate fuscous. Legs entirely blackish. Antennae dark, scape black, flagellum brown. Labrum black. Mandibles black, apical half rufotestaceous, with apex redder. Proboscis fuscous, galeae more brownish. Tegulae testaceous hyaline, base fuscous. Wings hyaline, nervures brown, margins of stigma and subcosta fuscous.

Head rotund, as broad as long; cheeks evenly rounded, about half as wide as eyes. Facial foveae weakly impressed, linear, about their own width from margin of eyes and reaching from level of upper margin of antennal sockets nearly to level of anterior ocellus. Face below level of antennae rather strongly convex; disk of clypeus nearly twice as broad as high, strongly inflexed on each side of labrum, with lateral extensions largely concealed in frontal aspect. Mandibles gently curved, moderately tapering and abruptly narrowed before apex to form inner tooth. Proboscis moderately long, galeae reaching base of stipites. Pterostigma rather small, not much more than twice as long as wide and nearly two-thirds as wide as first submarginal cell; marginal cell as long as stigma, part beyond stigma slightly longer than part beneath, with metacarpus moderately longer than apical truncation; second submarginal cell narrowed one-half to radius. Tarsal claws of usual size, with distinct inner tooth. Head and thorax strongly tessellate and dull, but clypeus smooth and shining, with rather close shallow punctures; punctures of frons and mesoscutum excessively minute and obscure. Pubescence abundant, fine, short, erect and white, densest on cheeks and sides of propodeum. Hair of front coxae rather short and thin. Abdomen oval, about two and one-half times longer than wide, widest at base of segment 3, and lineolate and dullish; apical fimbria dense but rather short; pygidial plate mostly concealed in type, but evidently triangular, with apex narrowly obtuse. Length: about 4 mm.; anterior wing, 2.7 mm.

Holotype female.—Four miles east of Mesilla Park, Dona Ana Co., New Mexico, on *Dithyrea wislizeni*, Sept. 5, 1961 (Timberlake).

Type in collection of the University of California, Riverside.

Perdita impigra, n. sp.

In the key to the *sphaeralceae* group (1964) the female of *impigra* runs out at couplet 75 and differs from both *dammersi* and *obliqua* in having the face marks small, in form of a short median stripe on clypeus and short slender orbital stripes; the abdomen black with narrow and interrupted yellow bands on tergites 2 to 4, and the proboscis short, with galeae not reaching base of stipites.

Female.—Head and thorax dark green; mandibles except red tips, median stripe on clypeus, slender orbital stripes to level of antennae, and small spot at posterior corners of disk of pronotum yellow. Abdomen black, with narrow yellow band, interrupted medially and not quite reaching lateral margins at base of tergites 2 to 4; pygidial plate rufotestaceous. Legs black, extreme apex of front and middle femora, anterior side of front tibiae, streak on antero-inferior edge of middle tibiae and front and middle tarsi yellow. Antennae black, scape yellow beneath and at base, flagellum narrowly dull yellowish beneath. Proboscis fuscous. Tegulae testaceous, base fuscous. Wings hyaline, nervures yellowish testaceous, margins of stigma a little darker, subcosta fuscous.

Head slightly broader than long; cheeks receding, about two-thirds as wide as eyes. Posterior ocelli a little less than their distance apart from nearest eye and about one-half as far from occipital margin. Facial foveae well-impressed, elongate oval, narrowed toward upper end, very close to margin of eyes and reaching from level of middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Face below antennae evenly convex; disk of clypeus large, nearly twice as broad as high, with lateral extensions broadly inflexed and not much visible in frontal aspect. Mandibles thick, gently curved, weakly tapering and abruptly narrowed close to apex to form inner tooth. Proboscis retracted in type, short, galeae not exposed and much shorter than stipites. Pterostigma large, more than three times longer than wide, nearly as long and as wide as first submarginal cell; marginal cell broad, with parts equal beneath and beyond stigma, and metacarpus somewhat longer than oblique apical truncation; second submarginal cell narrowed one-half to radius; first recurrent nervure received by first submarginal cell before apex. Head and thorax shining, disk of mesoscutum polished, but frons tessellate and rather dull, anterior and lateral margin of scutum and the scutellum delicately tessellate. Punctures of face below antennae fine but strong and moderately close, those of frons comparatively weak and sparse, those of mesoscutum fine and rather remote on middle of disk but closer an-

teriorly, and those of scutellum rather close around the margins. Pubescence whitish, thin, short and erect, but moderately long on cheeks and underparts. Hair of front coxae moderately long and much thinner than usual. Abdomen oval, depressed; apical fimbria moderately dense; pygidial plate large, broader at base than long, with sides converging to moderately wide and rounded apex. Length: about 5.8 mm.; anterior wing, 4.4 mm.

Holotype female.—Oakhurst, San Jacinto Co., Texas, May 10, 1952 (Cazier, Gertsch and Schrammel).

Type in collection of the American Museum of Natural History, New York.

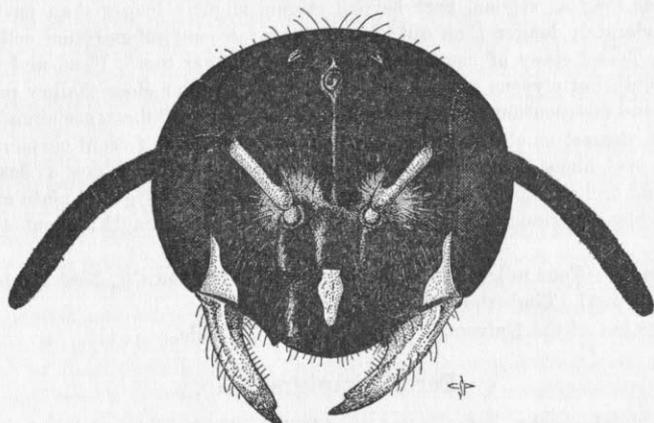


Fig. 31. *Perdita impigra*. Frontal view of head of female.

Perdita nigroaenea, n. sp.

The female of *nigroaenea* is rather large and robust and has been placed provisionally in the *sphaeralceae* group, but its true position is uncertain without the male. In the key to the *sphaeralceae* group (1964) it goes to couplet 61 but differs from any form of *sphaeralceae* in the more robust form, larger mandibles, much broader facial foveae, shorter hair on the mesonotum and in the maculation.

Female.—Head and thorax dark green, propodeum bluish, supraclypeal area, dark part of pronotum, disk of mesoscutum and scutellum black. Clypeus testaceous yellow, with submedian, somewhat nubilous fuscous stripes, converging above but not meeting or reaching upper margin. Lateral face marks large and yellow, broad below, about twice as high as wide and intruding between foveae and eyes almost to middle of foveae. Narrow line on collar of pronotum, large cuneate marks on hind margin of disk and tubercles yellow. Abdomen black; tergites 3 to 5 with apical depression reddened, especially on tergite 5; tergites 1 to 4 each with enclosed yellow band, that on tergite 1 oval, rather abbreviated, acute at outer ends and with quadrate lobe in front on each side of narrow median notch, those on tergites 2 and 3 somewhat wider than dark intervals, that on tergite 4 perhaps as broad but more concealed, and all ending rather far from lateral margins. Pygidial plate fuscous, with reddish tinge. Venter black, two apical segments red. Legs black, apex of front femora, anterior side of front tibiae and front tarsi yellow, middle tarsi brownish, base and apex of middle and hind tibiae narrowly reddened. Antennae fuscous, rather narrowly yellow beneath. Labrum testaceous. Mandibles shading into testaceous at base. Proboscis fuscous, galeae testaceous. Tegulae pale testaceous, base yellow. Wings whitish hyaline, nervures pale testaceous, margins of stigma and subcosta pale ferruginous.

Form robust, head large, slightly broader than long; cheeks rounded, receding and about as wide as eyes. Posterior ocelli a little closer together than distance to nearest eye and more remote from occipital margin. Facial foveae strongly impressed, twice as wide as interval between them and eyes, and reaching from level of middle of antennal sockets somewhat more than two-thirds

of distance to level of anterior ocellus. Face below level of antennae moderately convex; disk of clypeus large, as broad as high, strongly rounded across summit, lateral extensions fully visible in frontal aspect. Mandibles robust, acute at apex and with strong, acute inner tooth. Proboscis moderately long, galeae nearly as long as stipites. Wings ample; pterostigma rather narrow, half as wide as first submarginal cell; marginal cell with parts beneath and beyond stigma equal and metacarpus a little longer than apical truncation; second submarginal cell narrowed slightly more than one-half to radius. Tarsal claws with strong inner tooth. Head and thorax moderately shining; frons, vertex and mesonotum strongly but smoothly tessellate; face below antennae more shining than other parts and sparsely punctured. Punctures of frons minute, moderately close across upper part in front of ocelli and in broad median area halfway to level of antennae; those of mesonotum very sparse. Labrum polished, disk hairless, although two hairs lie across its face from extreme apical margin of clypeus. Pubescence sparse, fine and erect; face hairless except opposite foveae and between ocelli; cheeks without hair, and hair of occiput and mesopleura very thin; mesoscutum with very short, erect hair set in punctures, that of scutellum longer. Hair of front coxae silky, long and dense. Scopal hair of hind tibiae somewhat longer than greatest width of tibia, that on inferior edge still longer and that on outer edge shorter, with very short dense plumosity. Abdomen (in contracted condition) less than twice as long as wide, widest at base of tergite 3 and somewhat broader than thorax; apical fimbria of normal density. Pygidial plate longer than wide, with sides converging to narrowly obtuse apex, disk plane. Length: 5.5 mm.; anterior wing, 4.5 mm.

Holotype female.—Sixteen miles west of Glen Canyon, Kane Co., Utah, on *Gutierrezia microcephala*, Sept. 23, 1964 (Timberlake).

Type in collection of the University of California, Riverside.

Perdita obliquenotata, n. sp.

This Mexican species disagrees strongly from other known species from that country and in the *sphaeralceae* key (1964) it runs out at couplet 64 with species that occur in California. It differs from *emarginata* and the two following species in the key in having the abdominal markings in the form of more or less oblique lateral marks on tergites 2 to 4.

Female.—Head and thorax dark green, becoming slightly bluish on sides of thorax and propodeum. Base of mandibles, labrum, somewhat less than anterior half of disk of clypeus and lateral extensions yellow. Very small lateral marks also present at anterior corners of face and mostly orbital. In paratype clypeus dark only across summit and lateral marks larger. Thorax entirely dark. Abdomen brown, more blackish on tergite 7, with rather large, triangular or oblique mark on each side of tergites 2 to 4, and small spot on lateral margins of tergite 1 yellow; these marks passing over onto reflexed ventral part of tergites, and a similar mark on reflexed part of tergite 5, but extending only obscurely on dorsal surface. Legs brownish fuscous, front and middle knees and anterior side of front tibiae yellow. Antennae blackish, hardly paler beneath. Apex of mandibles red. Proboscis fuscous, galeae brown. Tegulae testaceous hyaline, base broadly yellow. Wings dusky hyaline, nervures and margins of stigma testaceous brown, subcosta fuscous.

Head much broader than long, and broader than thorax; cheeks strongly receding and half as wide as eyes. Posterior ocelli about their distance apart from occipital margin and more remote from nearest eye. Facial foveae strongly impressed, slender, curved, about their own width from margin of eyes, but diverging from margin anteriorly, and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below antennae evenly and rather strongly convex, with subantennal sutures faint; disk of clypeus large, somewhat broader than high, lateral extensions gradually inflexed and visible in frontal aspect. Mandibles slightly dilated on inner margin, narrowed before apex and reaching far margin of fossa. Pterostigma slightly more than three times longer than wide and about three-fourths as wide as first submarginal cell; parts of marginal cell beneath and beyond stigma about equal, with metacarpus a little longer than apical truncation; second submarginal cell narrowed somewhat more than

half to radius. Tarsal claws with small inner tooth. Head and thorax moderately dull; frons, vertex and mesonotum distinctly tessellate but lustrous; sides of thorax and face below antennae smoother and more shining. Both frons and mesonotum so minutely punctate as to appear impunctate. Pubescence whitish, short, erect and minutely plumose, abundant on all parts of face and mesonotum, longer and denser on cheeks, and thinner and somewhat longer on sides of thorax. Hair of front coxae long and moderately dense. Abdomen about twice as long as wide and depressed; apical fimbria well developed; pygidial plate triangular, carinate on margins, and acute at apex. Length: 6 mm.; anterior wing, 2.8 mm.

Holotype female.—Sixteen miles north of Chilpancingo, Guerrero, Mexico, 2,250 feet, at light, Aug. 13, 1962 (Univ. Kans. Mex. Exped.).

Paratype.—One female, same locality, Aug. 7, 1962 (Univ. Kans. Mex. Exped.).

Type in collection of the University of Kansas, Lawrence; paratype in collection of the University of California, Riverside.

Perdita rufiventris (Friese) (new status)

Panurginus rufiventris Friese, 1916, Stett. ent. Zeit. 77:172, ♂.

Through the kindness of Dr. Eberhard Königsmann of the Zoologisches Museum, Berlin, I have been able to examine Friese's type of *rufiventris*. Without removing and studying the genital armature the position of *rufiventris* is uncertain, but I believe that it belongs in the typical subgenus of *Perdita*. I place it provisionally in the *sphaeralceae* group, but when it becomes more fully known it may require separate grouping. The paired tubercles at apex of the abdomen described by Friese are small, inconspicuous but very distinctive.

Male.—Head and thorax blue green, with undertones of brown, supraclypeal area, vertex, cheeks and occiput distinctly brown, posterior half of mesoscutum and scutellum blackish. Mandibles at base, labrum, clypeus and lateral marks yellow. Lateral marks transverse, twice as broad as high, truncate at inner end, more or less emarginate above, with short extension on orbits halfway to level of antennae. Supraclypeal area with slight suffusion of yellow on each side of anterior border. Thorax entirely dark, tubercles brownish. Abdomen ferruginous, tergite 1 slightly infuscated and tergites 2 to 6 with distinct but somewhat nubilous yellow markings. Tergites 2 and 3 with enclosed yellow line at base; tergites 2 to 4 with narrow subapical yellow band just in front of apical depression and broadly interrupted on each side; tergite 5 with similar but much broader band, only subinterrupted; a slight infuscation close to lateral margins on tergites 2 to 4; and tergites 6 and 7 yellow except on apical depression or apical margin. Venter with segment 1 infuscated, 2 entirely yellow and following segments increasingly tinged with ferruginous except laterally. Legs brown, anterior side of front tibiae and front tarsi yellow, middle tarsi pale brown. Antennae brown, narrowly infuscated above and yellowish beneath, scape narrowly yellow beneath. Mandibles rufotestaceous on outer margin and red on apical third. Proboscis brown, galeae much paler. Tegulae testaceous brown, hyaline on outer margin. Wings slightly dusky hyaline, nervures testaceous, margins of stigma and subcosta brown.

Head broader than long; cheeks rounded, somewhat broader than eyes. Posterior ocelli distinctly more than their distance apart from occipital margin and much more remote from nearest eye. Facial foveae rather large, somewhat more than twice as long as wide. Face below level of antennae moderately convex, supraclypeal area ridged above and more prominent than other parts; disk of clypeus somewhat broader than high, with lateral extensions broadly inflexed but visible in frontal aspect. Mandibles stout, tapering, acute and reaching short distance beyond far margin of fossa. Proboscis moderately long, not exceeding fossa, with galeae nearly reaching base of stipites. Flanks of pronotum slightly impressed, posterior corners of disk rounded but rather prominent. Pterostigma about four times as long as wide, nearly as long and about two-thirds as wide as first submarginal cell; marginal cell as long as stigma, much longer beyond than beneath it, with metacarpus slightly more than twice as long as oblique apical truncation; second submarginal cell narrowed one-half to radius and receiving first recurrent nervures one-

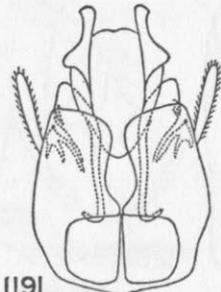
fourth of length from base. Tarsal claws bifid at apex. Head and thorax moderately shining; posterior half of mesoseutum and scutellum smooth and nearly polished; broad anterior part of scutum tessellate, frons and vertex very minutely shagreened, and cheeks and anterior part of face smooth and shining. Punctures most distinct but sparse on parocular areas of face, on ridge of supraclypeal area and on cheeks; very minute and obscure on frons and mesonotum. Pubescence whitish, short and erect; rather dense but very short on frons, very thin on mesonotum, longer, coarser, but thin on cheeks and underparts of thorax. Hair of hind tibiae rather coarse and moderately long, but exceeding in part greatest width of tibia. Abdomen ovate, rather turgid and convex above, shining, impunctate. Tergite 7 short, narrowed to moderately wide and truncate apex, armed on each side by very small tubercle, disk plane. Venter strongly emarginate at apex; emargination filled with what must be the exposed disk of subgenital plate; disk rather convex or gibbous, covered with short erect hair and armed at apex with two blunt tubercles, about as long as wide at base and separated by a shallow emargination. Length: 6 mm.; anterior wing, 4.4 mm.

Male type.—Labeled "Mexico, Jacubaya, 1900." The locality is Tacubaya in Mexico City. Type in Zoologisches Museum, Berlin, Germany.

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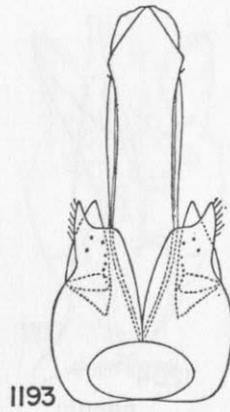
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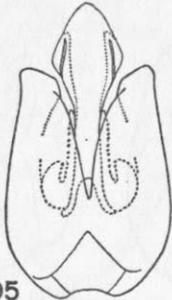
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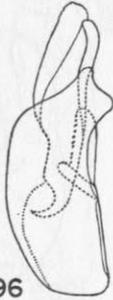
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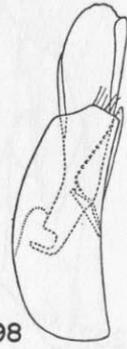
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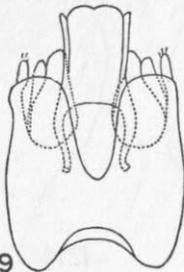
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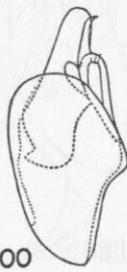
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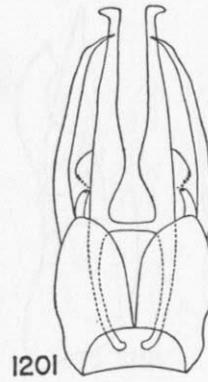
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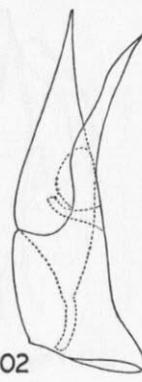
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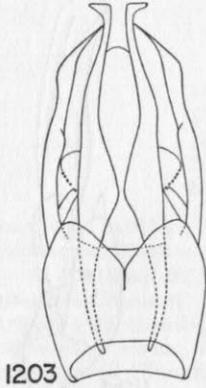
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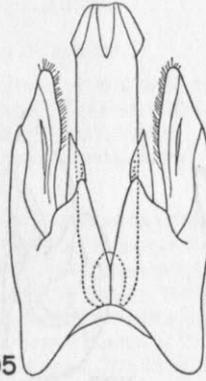
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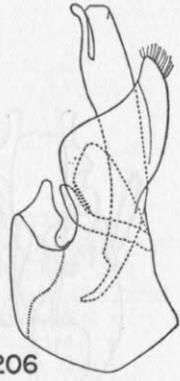
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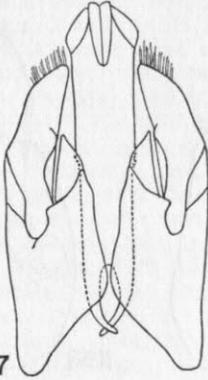
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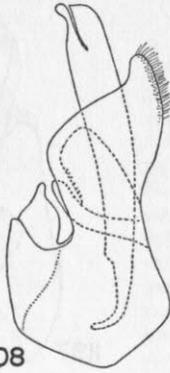
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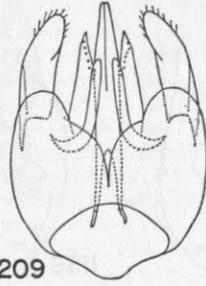
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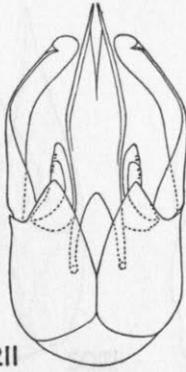
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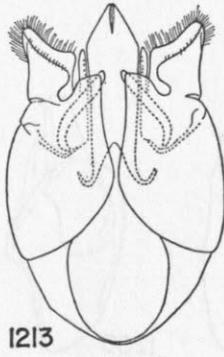
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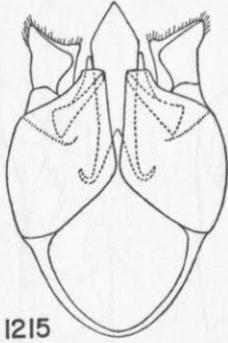
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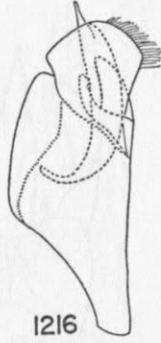
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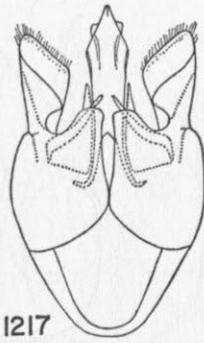
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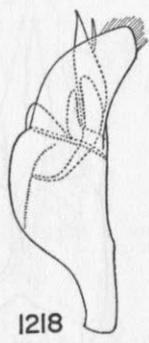
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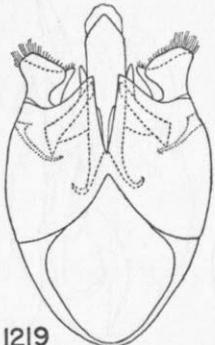
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1217
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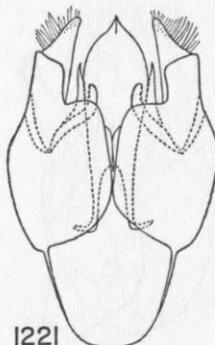
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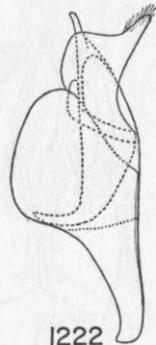
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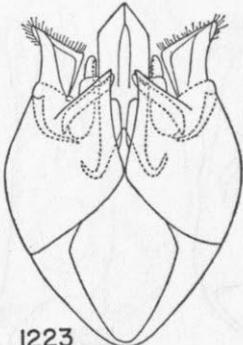
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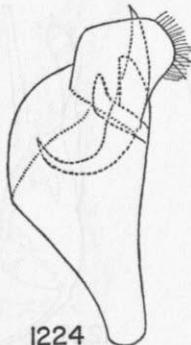
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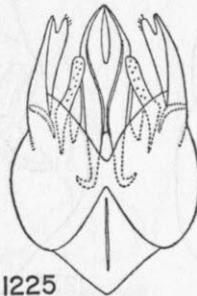
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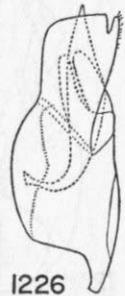
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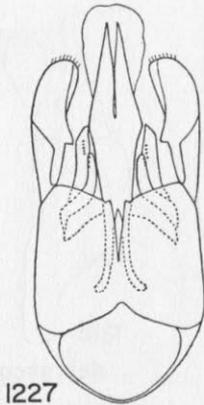
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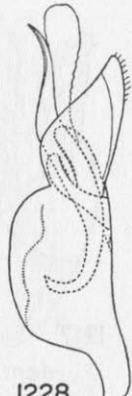
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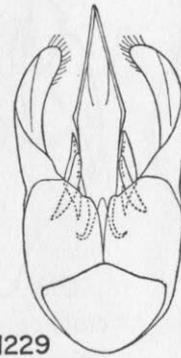
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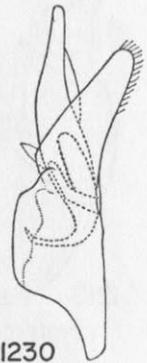
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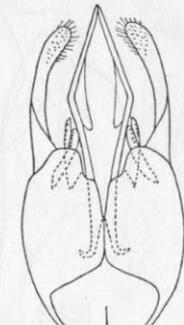
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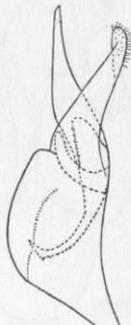
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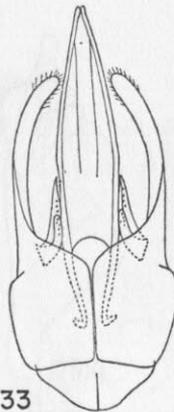
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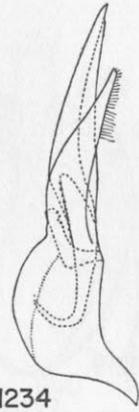
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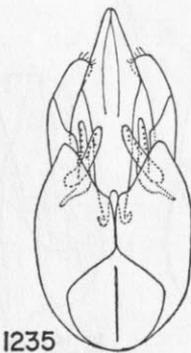
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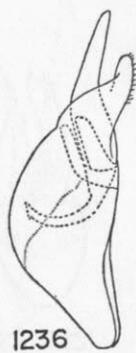
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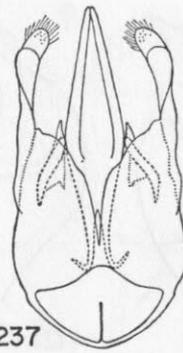
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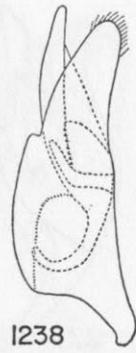
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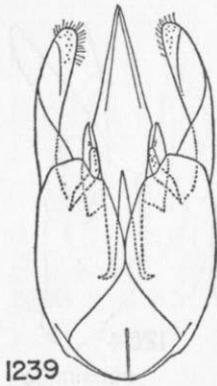
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1237
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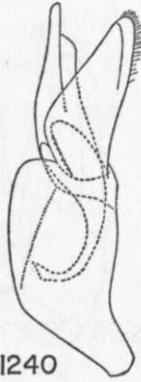


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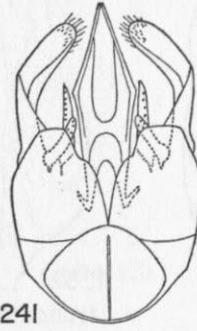
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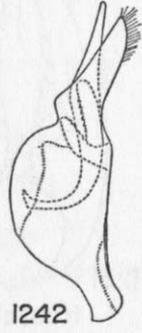
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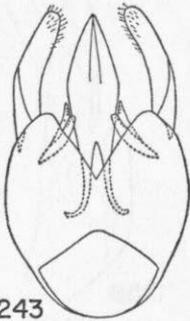
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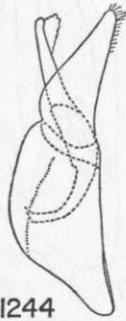
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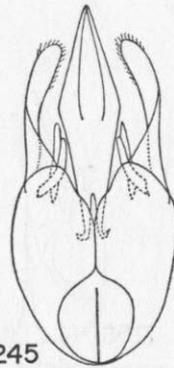
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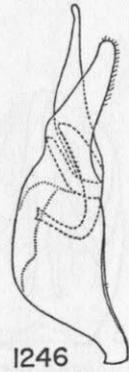
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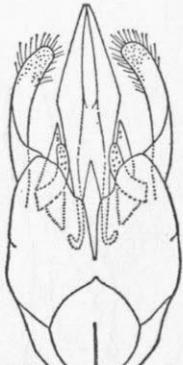
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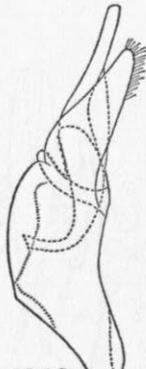
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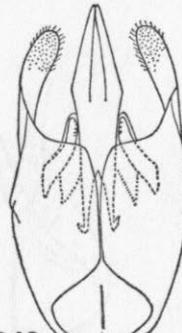
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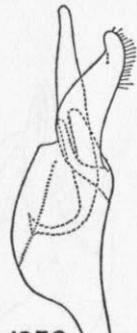
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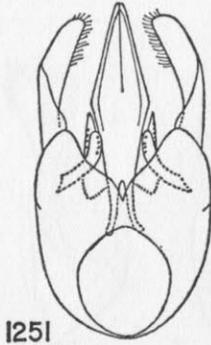
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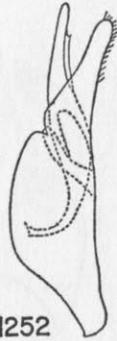


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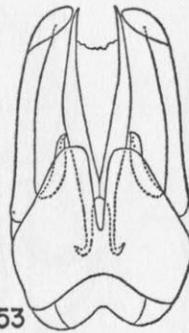
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1251
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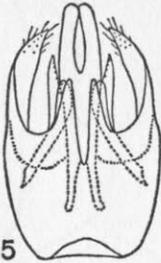
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1253
consimilis



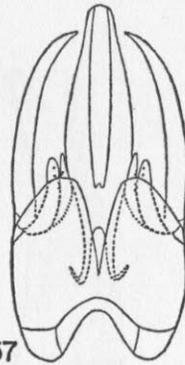
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1255
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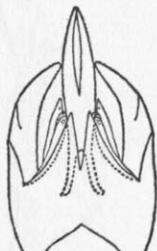
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1257
stabilis



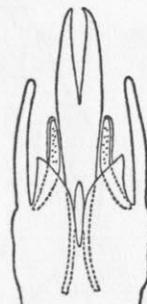
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1259
stagei



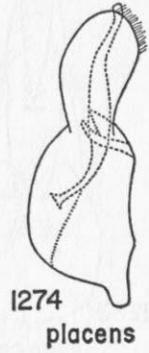
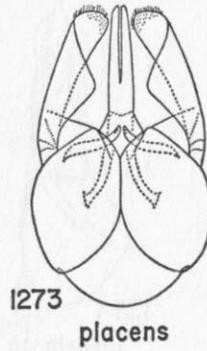
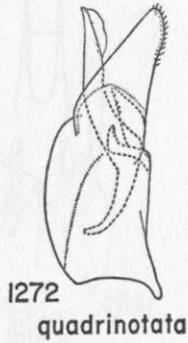
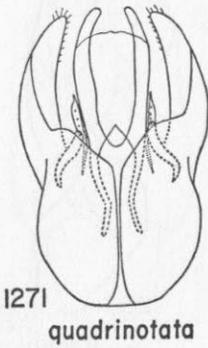
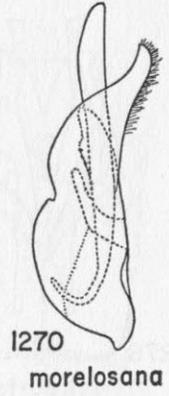
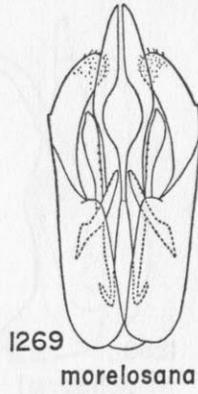
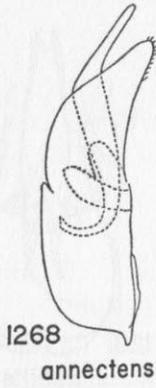
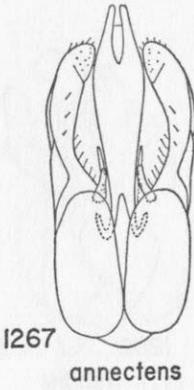
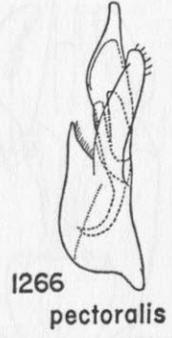
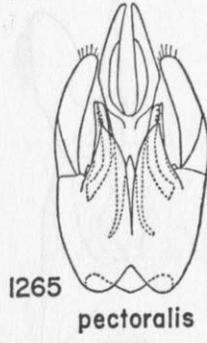
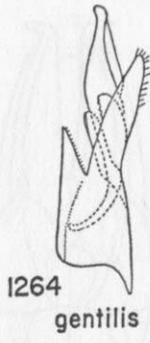
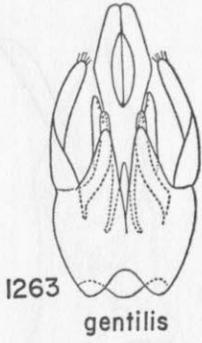
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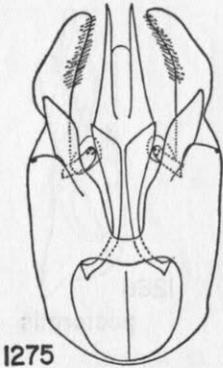


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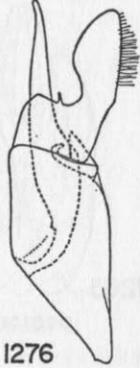


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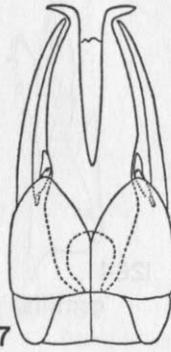




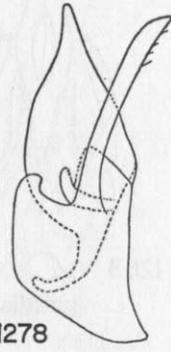
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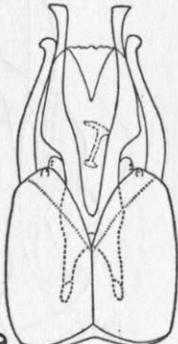
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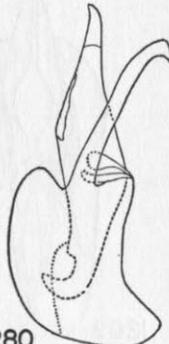
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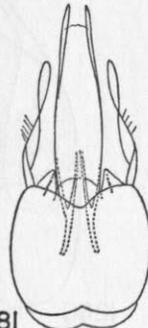
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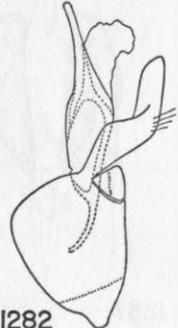
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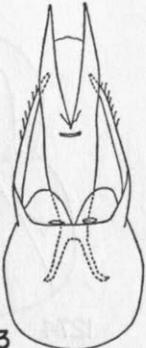
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1281
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1282
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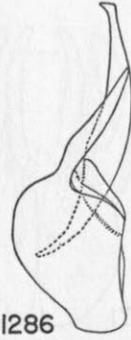
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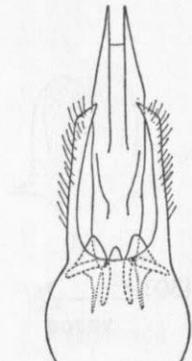
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1285
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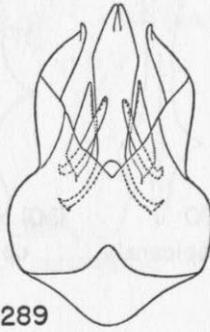
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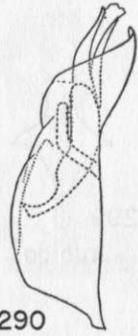
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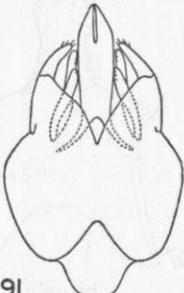
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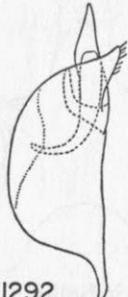
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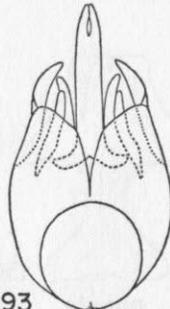
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1291
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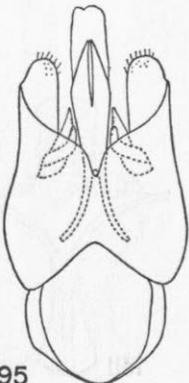
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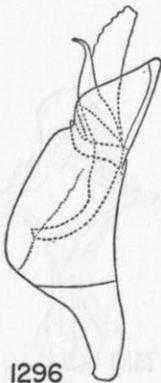
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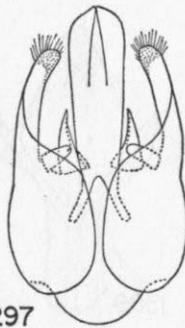
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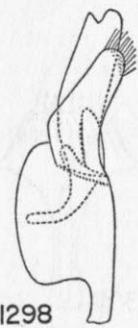
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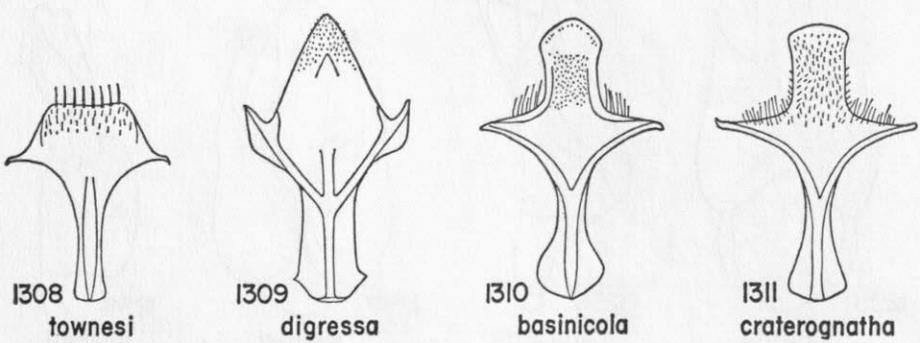
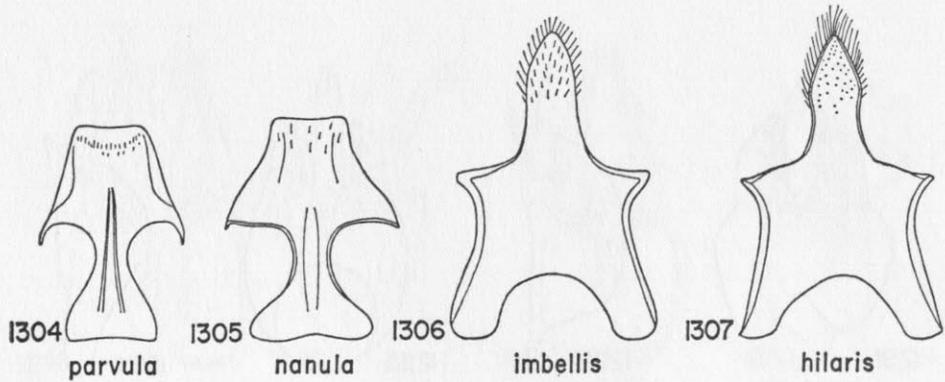
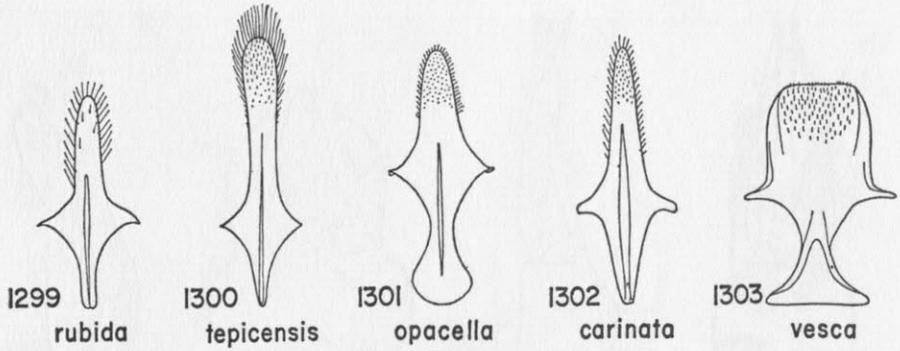
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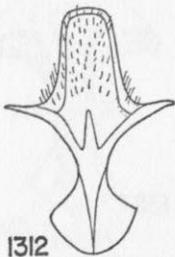


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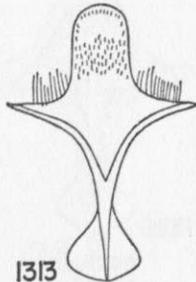


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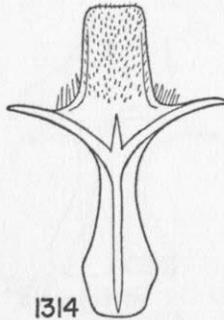




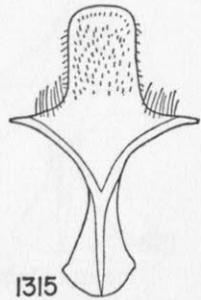
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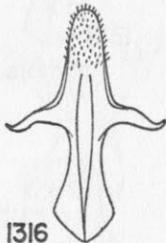
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socia



1314
subvestita



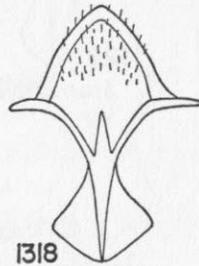
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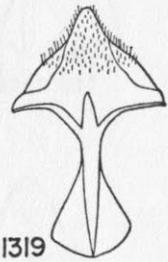
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1317
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1318
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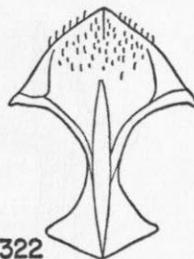
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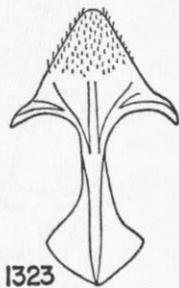
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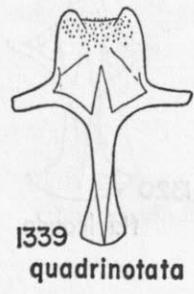
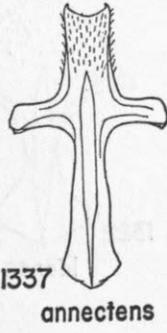
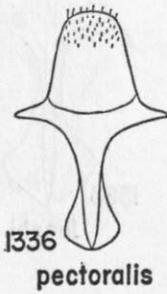
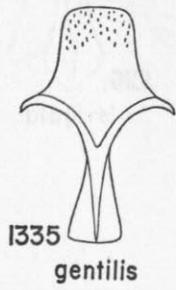
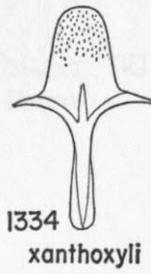
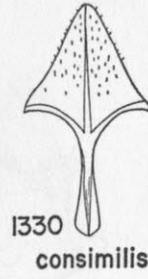
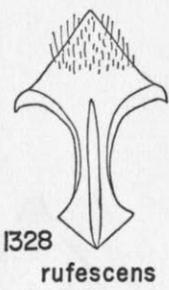
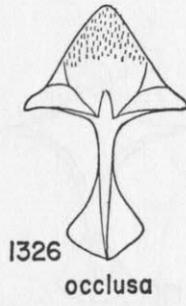
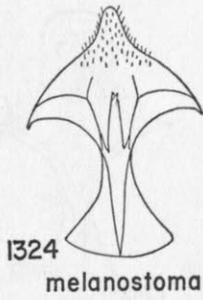
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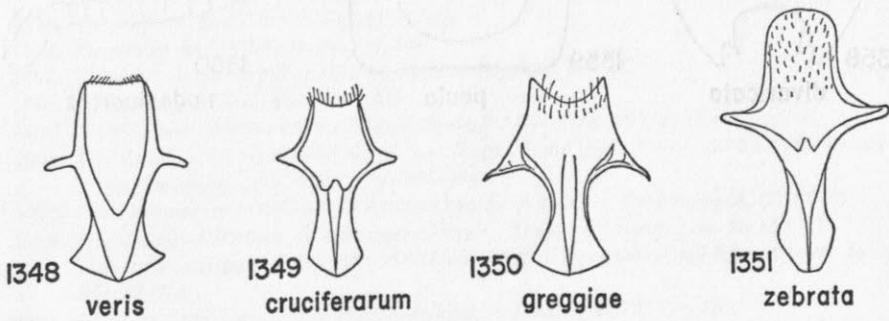
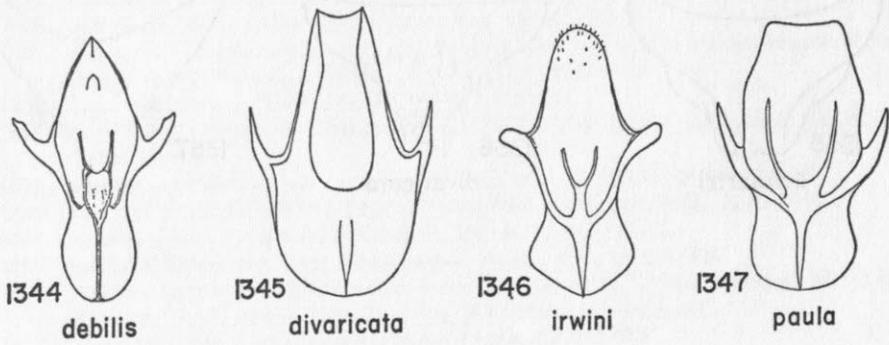
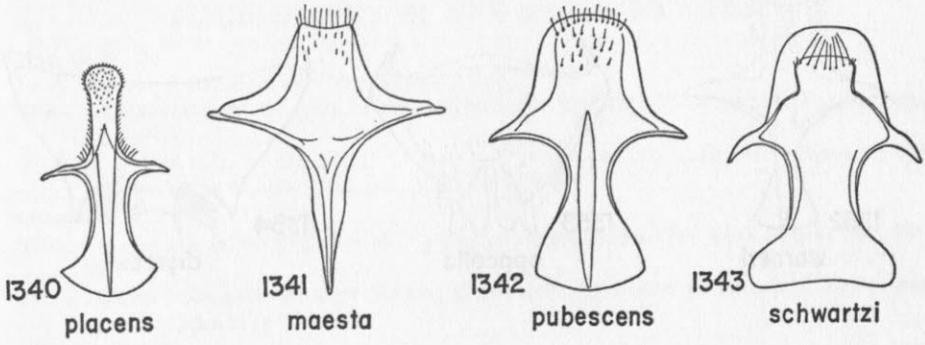


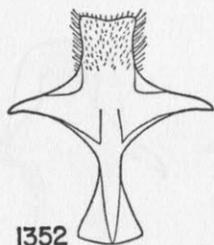
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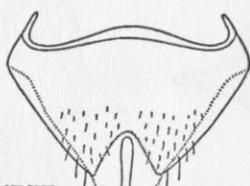
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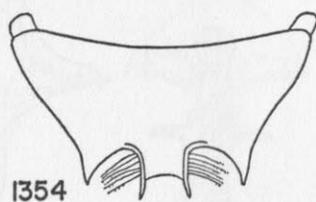




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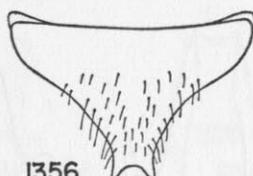
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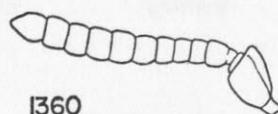
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ERRATA AND CORRIGENDA
TO PARTS I TO VI

Part I. Vol. 9, pp. 345-432

PAGE

- 385 Line 2. For *Chamaeraracha* read *Chamaesaracha*.
391 Line 3 from bottom. For 48:9 read 48:99.
397 Line 17. For ♂ read ♀.
400 Line 21 from bottom. For 48:10 read 48:105.
401 Line 8 from bottom. For in press read 1953 and add 35:984, ♀, ♂.

Part II. Vol. 11, pp. 247-350

- 253 Line 15 from bottom. Add the before female.
256 Near middle. For Lutz read Lutz.
Line 21 from bottom. For D. and M. Townes read H. and M. Townes.
258 At middle. For Canad. Ent., 47 read Canad. Ent., 46.
264 Near middle. For *Aphomostephus* read *Aphanostephus*.
274 Line 5 from bottom. For 1938 read 1928.
277 Line 3 from bottom. For 17 read 19.
282 Line 8 from bottom. Delete an.
283 Couplet 73. For 75 read 74.
Couplet 76. For 2 and 5 read 2 to 4.
297 Line 21. For (holotype) read (paratype).
307 Near middle. Add n. sp. after *duplonotata*.
318 Line 2. For E. T. Schlinger read E. I. Schlinger.
Line 3. For J. S. MacSwain read J. W. MacSwain.
318 Line 10. For 43 miles read 42 miles; after Klamath add Falls, Klamath Co., July 24,
1930 (H. A. Scullen); 1 female, Griffen Creek, Jackson Co., June 17, 1952.
323 Bottom line. For Coconimo read Coconino.
328 Near middle. For couplets 39-45 read couplets 39-43.
330 Line 25 from bottom. For of read to.
Line 14 from bottom. For (12) 4 read (4) 12.

Part III. Vol. 14, pp. 303-410

- 306 Line 9. For or read on.
307 Line 14 in couplet 30. For marked read developed.
334 Line 17. For *accidentalis* read *occidentalis*.
Line 18. For *veneta* read *venetus*.
343 Line 8 from bottom. For 1877 read 1879.
356 Line 18 at end. For 572 read 512.
Line 19. For (9) 7 read (7) 7.
Line 20. For 325 read 335.
362 Line 20 from bottom. For E. L. Schlinger read E. I. Schlinger.
365 Line 10. For Warner read Werner.
367 Couplet 11. Between stipites and maxillary in first line add missing words: 12
head generally not broader than long
Proboscis rather short, the galeae about three-fourths as long as the stipites;
368 Below middle. For *Sphaeralcea* read *Oenothera*.
369 Line 13 from bottom. Transpose R. H. after Michener.
370 Bottom line. For C. J. Ainslie read C. N. Ainslie.
371 Line 3. For *Phyllis* read *Physalis*.
Line 2 from bottom. For 1905 read 1903.
396 Line 9. For M. Cory read Cary.

Part IV. Vol. 17, pp. 1-156

- 2 Couplet 4. For mesontoum read mesonotum.
 4 Lines 7, 11, and 12. For *flavicanda* read *flavicauda*.
 15 Line 2. Delete 5.
 20 Line 13 from bottom. For ending read sending.
 21 Line 16 from bottom. For anterior read posterior.
 26 At middle. For Benalillo read Bernalillo.
 Below middle. For J. I. Zimmer read J. T. Zimmer.
 70 Below middle. For couplet 45 read couplet 52.
 75 Bottom line. For Costella read Costilla.
 104 Line 12 from bottom. For *prionopsidis* read *prionopsidis*.
 113 Line 10. For Beautenmuller read Beutenmuller.

Part V. Vol. 28, pp. 1-124

- 14 Line 7. For *similutea* read *semilutea*.
 23 Lines 12 and 13. For Entom. 30 read Entom. 38.
 36 At middle. For San Miguel Co. read Valencia Co.
 50 Line 5 from bottom. For (7)20:13 read (7)20:131.
 55 Line 18 from bottom. For (7)14 read (7)19.
 118 Figs. 823, 824. For *X. deficiens* read *X. discrepans*. (See p. 84.)
 123 Fig 890. For *X. deficiens* read *X. discrepans*.

Part VI. Vol. 28, pp. 125-388

- 146 Line 5 from bottom. For couplet 299 read couplet 229.
 Line 17 from bottom. For couplet 213 read couplet 212.
 151 Line 10. For 215 read 214.
 Line 13. For later read lateral.
 154 Couplet 233. For 233, 234 read 234, 235.
 179 Line 1. For no read on.
 180 Line 8 from bottom. For those read that.
 211 Line 3. Italicize *evansi*.
 254 Fig. 48 legend. For *stanleyi* read *stanleyae*.
 277 Line 8 from bottom. For *conioides* read *coniodes*.
 301 Line 4. For *Chemopodium* read *Chenopodium*; for *Sueada* read *Suaeda*.
 316 At middle. For tergite 1 read tergite 2.
 320 At middle. For (7)18 read (7)3; for (19)10 read (9)10.
 324 Line 12 from bottom. For (7)8 read (7)3.
 328 Line 9. For Cockerell, 1898 read Cockerell, 1899.
 340 Lines 5 and 6 from bottom. For Cockerell, 1911, Ent. News, 17:39 read Cockerell, 1901, Ent. News, 12:39.
 342 Line 11 from bottom. For Canad. Entom. 20 read Canad. Entom. 30.

INDEX TO PARTS I TO VII

- Part I = Univ. Calif. Publ. Entom. 9:345-432.
Part II = Univ. Calif. Publ. Entom. 11:247-350.
Part III = Univ. Calif. Publ. Entom. 14:303-410.
Part IV = Univ. Calif. Publ. Entom. 17:1-156.
Part V = Univ. Calif. Publ. Entom. 28:1-124.
Part VI = Univ. Calif. Publ. Entom. 28:125-388.
Part VII = Univ. Calif. Publ. Entom. 49:1-196.

INDEX TO PARTS I TO VII

Numbers in parentheses indicate position in keys;
synonymous, preoccupied, and misapplied names are in italics.

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