

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 IV

BY

P. H. TIMBERLAKE

UNIVERSITY OF CALIFORNIA PRESS
BERKELEY AND LOS ANGELES

1960

UNIVERSITY OF CALIFORNIA PUBLICATIONS IN ENTOMOLOGY
EDITORS (BERKELEY): E. G. LINSLEY, R. F. SMITH, E. A. STEINHAUS, R. L. USINGER

Volume 17, No. 1, pp. 1-156, plates 1-17

Submitted by editors December 12, 1958

Issued March 18, 1960

Price, \$3.00

UNIVERSITY OF CALIFORNIA PRESS
BERKELEY AND LOS ANGELES
CALIFORNIA



CAMBRIDGE UNIVERSITY PRESS
LONDON, ENGLAND

PRINTED IN THE UNITED STATES OF AMERICA

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PART IV

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P. H. TIMBERLAKE

THIS IS A CONTINUATION of my study of the bees of the genus *Perdita*. In the first two parts the species belonging to the nontypical subgenera were treated. In the third part a beginning was made on the treatment of the very numerous species belonging to the typical subgenus. Of necessity the species belonging there have been separated into several groups designated by the typical or oldest species; the *zonalis* group, including the *zebrata* section, and the *halictoides* group have been treated in Part III. In the present part the numerous species of the *octomaculata* group are described and, as in preceding parts, a supplement is given to groups previously treated based on material that has been collected or submitted to me recently, or on types recently examined at Philadelphia and Washington.

Subg. *Perdita* F. Smith
OCTOMACULATA GROUP

The frons and mesonotum in this group are typically tessellate and dull, even opaque in some species, but sometimes the sculpture becomes more or less weak on the mesonotum, which becomes more or less shining or polished. The color pattern is variable, ranging from almost entirely yellow to entirely dark, but most of the species have a dark green or blue head and thorax, with well-developed light face marks, and a dark abdomen with light markings. In the male, as is general in *Perdita*, the face markings are usually much more extensive than in the female, and both face and abdominal markings are often more yellow than in the female.

Female.—Mandibles simple and tapering, and the proboscis of moderate length. Facial foveae slender, usually about their own width from margin of eyes and moderately elongate. Pterostigma moderately large and broad, usually not equaling the width of first submarginal cell. Pygidial plate broad, usually obtuse or rounded at apex, and generally with a more or less definite median notch.

Male.—Head never much, if any, enlarged, the cheeks moderately wide and simple. Mandibles usually somewhat longer and more acute than in female. Pronotum normal, the flanks never much furrowed and the disk not abbreviated. Caulis of aedeagus moderately depressed, and longer than wide, with basal orifice large and exposed in dorsal view, the dorsal lobes spreading apart at apex and but little produced beyond the base of parameral lobes; the latter more or less long and slender, especially as they appear in dorsal view; fused body of the sagittae fusiform, acute, or moderately obtuse at apex and often more or less strongly angulate on each

side near the middle as seen from above. Subgenital plate generally triangular and acute at apex, but sometimes with the lateral margin more or less convexly arcuate and the apex consequently more rounded.

The species of the *octomaculata* group are visitors of the flowers of Compositae from which the females collect pollen, but the following genera of various other orders of plants are visited by certain species of these bees and in most cases for pollen: *Sphaeralcea*, *Petalostemum*, *Monarda*, *Dalea*, *Salix*, *Melilotus*, *Polygonella*, *Euphorbia*, *Croton*, *Prosopis*, *Amorpha*, and *Gerardia*. There are also records from *Stanleya*, *Eriogonum*, and *Cleome*, but perhaps these flowers were visited only for nectar. There are records of these bees from the flowers of the following genera of compositae: *Gutierrezia*, *Aplopappus*, *Chrysothamnus*, *Aster*, *Helianthus*, *Pectis*, *Zinnia*, *Palafoxia*, *Stephanomeria*, *Pluchea*, *Grindelia*, *Solidago*, and *Chrysopsis*; also from *Hymenoxys*, *Helenium*, *Erigeron*, *Geraea*, *Baccharis*, *Hymenothrix*, *Boltonia*, *Liatris*, *Heterotheca*, and *Verbesina*, some of which were perhaps visited only for nectar.

KEY TO SPECIES

1. Females 2
Males 100
2. Yellow, or almost entirely yellow, or yellowish white species 3
Notum of thorax at least partly dark green or blue, or black 8
3. Mesonotum more or less shining, with fine short inconspicuous hair, or sometimes with rather long, erect but sparse hair on anterior half of scutum; pygidial plate weakly notched or entire at apex, or if strongly notched the points on each side of notch rather blunt 4
Mesonotum dull, with an extremely fine, dense sculpture; hair of mesonotum short, erect and mosslike; pygidial plate sharply bidentate and acutely notched at apex 7
4. Mesoscutum with short fine appressed hair, or with sparse erect hair on anterior half 5
Mesoscutum almost nude; more orange-yellow species, the facial and abdominal foveae black; frons about as shining as the mesonotum *luteola* Cockerell
5. Hair of mesonotum fine, short, and appressed 6
Anterior half of mesoscutum with sparse, rather long, erect hair; colored much like *luteola*, but with a rounded fuscous patch on each side of mesopectus; pygidial plate with a small rounded notch at apex *xanthodes*, n. sp.
6. Yellow, except the pale-brown or reddish-brown foveae of face and second tergite; flagellum pale brown above; pygidial plate not notched at apex *xanthochroa*, n. sp.
Pale yellow, the face below antennae creamy white; often a small black mark on frons above each antenna and a large blackish mark on mesopectus; mesonotum with very short reclinate hair; pygidial plate notched, the points on each side subacute
perpallida perpallida Cockerell
7. Moderately bright yellow, the marks on frons as in *perpallida*, but with a greenish tinge; mesoscutum sometimes with two faint or even well-developed longitudinal green marks; abdomen generally with very narrow, pale-brown bands *gerhardi gerhardi* Viereck
Similar to *gerhardi*, but entirely yellow except for the dark foveae of face and second tergite; perhaps not always distinguishable from *gerhardi* when not associated with the male, but occurring in Texas and Kansas (*gerhardi* known only from Illinois, Indiana, and Wisconsin) *variegata pura*, n. subsp.
8. Mesonotum more or less yellow, or marked with yellow or white; or pale markings of face extending above antennae in median line, or the frons with a median light spot 9
Dorsum of thorax entirely dark, except the usual marks on pronotum and tubercles, and light marks of face not extending onto frons except at sides 17
9. Pterostigma blackish and broadened on apical half and whitish at base 10
Pterostigma normal in color and shape 11
10. Head and thorax yellow, with marks on frons, vertex, and each side of mesosternum greenish; mesoscutum entirely yellow, or often with a small spot on anterior middle and two abbreviated discal stripes blackish; abdomen yellow with a laterobasal black spot on each

side of tergites 1 to 5 and two oval subapical black spots on tergites 1 to 6, but those on tergites 1 to 3 connected by a narrow dark band; length, about 5 mm.

maculigera maculigera Cockerell

Head and thorax dark green; face below antennae mainly yellow; mesoscutum with two narrow longitudinal yellow stripes; abdomen fuscous, with yellow bands, usually interrupted medially *maculigera* var. *bilineata* Timberlake

11. Thorax more or less light besides the markings on pronotum and tubercles 12

Thorax dark, except on pronotum and tubercles and sometimes on apical margin of scutellum; frons more or less light in median line or light straight across for a short distance above antennae 14

12. Head and thorax mainly dark green, the mesonotum with short, erect, mosslike hair; apex of pygidial plate bifid 13

Head and thorax mainly very pale yellow or creamy white, the sternum of thorax and undersurface of head black and sometimes two dark stripes on mesoscutum; abdomen light with four narrow dark bands; length, 6.7 mm. *perpallida citrinella* Graenicher

13. Head and thorax dark green, the face with white markings below level of antennae, including a supraclypeal mark; an interrupted band on hind margin of pronotum and tubercles white; mesoscutum often with two narrow and sometimes interrupted longitudinal white lines on disk, and sometimes scutellum narrowly white across the apex; length, about 5 mm.

variegata variegata, n. subsp.

Head and thorax yellow, the face below antennae pallid; mark on each side of frons adjacent to the foveae, short band across ocelli, and cuneate stripes on mesoscutum green; a brown blotch on each side of mesosternum and a narrow brown band at junction of tergites 1-2 to 4-5; length, about 5-5.5 mm. *gerhardi gerhardi* Viereck, var.

14. Abdomen yellow or creamy white, with dark spots on each side of tergites 1 to 4 or 5 15

Abdomen yellow with well-developed dark bands, or dark with pale-yellow enclosed bands. 16

15. Face to a short distance above antennae creamy white, with a narrow orbital extension on each side around summit of eye; abdomen creamy white with two to four brown spots on tergites 1 to 5; thorax dark, with appressed, almost dense, white pubescence; wings milky hyaline, the nervures pallid; length about 5.5 mm. *bridwelli*, n. sp.

Face and abdomen yellow, the yellow of face extending in median line often to anterior ocellus and the orbital extensions to summit, or above the summit, of the foveae; tergites 1 to 4 each with a faint apical band, expanded and intensified into a transverse oval mark on each side; apical margin of scutellum narrowly yellow; pubescence of head and thorax comparatively sparse and erect; wings hyaline, the nervures and stigma yellow; length about 4.5 mm. *luteiceps* Cockerell

16. Head and thorax dull green, the face marks white, sometimes including a small spot on middle of frons or two short lines forming a very narrow V-shaped mark; abdomen blackish, becoming ferruginous on apical segment and with an abbreviated pale yellow band on tergites 1 to 4 or 5; length, about 5.5 mm. *variegata variegata*, n. subsp.

Head and thorax dark green, mandibles except red tips, labrum, clypeus, large lateral marks, supraclypeal mark, and a small spot on middle of frons yellow; abdomen yellow with a rather narrow dark band at junction of tergites 1-2 to 4-5, and a less-developed band at apex of tergite 5; pygidial plate rounded at apex; wings whitish hyaline, the nervures testaceous yellow; length, 4-4.5 mm. *rectangulata* Cockerell

17. Abdomen ferruginous or yellow, with dark markings evanescent or lacking 18

Abdomen fuscous or blackish, usually with light marks or bands, or if mainly light having well-developed dark markings 23

18. Abdomen yellowish 19

Abdomen ferruginous or reddish 21

19. Face below level of antennae mainly pale yellow or whitish; mesonotum with rather dense and coarse, mosslike, white pubescence; length, about 6 mm. 20

Clypeus, lateral marks, and sometimes a supraclypeal mark white, the face otherwise dark below level of antenna; mesonotum faintly tessellate, shining and with sparse short erect

- hair; abdomen pale yellowish ferruginous or faintly orange color, sometimes with pale brown bands, which are usually represented by a small oval spot on each side of tergites 1 to 4; length, about 4.5 mm. *abdominalis*, n. sp.
20. Face entirely pale yellow, or probably whitish in life, below level of antennae, except a faint pair of dots on clypeus; legs and abdomen almost entirely yellow, the first tergite with two faint fuscous dots on each side of disk and a narrow dark line in the median crease; wings whitish hyaline, the nervures pallid. *flavicanda flavicanda*, n. subsp.
Face whitish below antennae with two black oblique stripes on upper half of disk of clypeus and the oblique lower margin of subantennal plates also broadly dark; legs pale yellow, the coxae except apical half of hind pair and a mark on basal half of femora black; abdomen yellow, with the markings of *flavicanda* more accentuated and the extreme base of tergites 2 to 5 infuscated. *flavicanda formosa*, n. subsp.
21. Smaller species; labrum light and normal; clypeus with broadly reflexed lateral extensions; pygidial plate notched at apex 22
Labrum dark, obtusely pointed at apex and with a smooth median area; clypeus rather prominently and obtusely dentate on each side of base of labrum; pygidial plate entire at apex; base of mandibles, clypeus, large lateral marks, and sometimes a supraclypeal mark yellowish white; length, about 5 mm. *polygonellae* Timberlake
22. Mandibles except red tips, labrum, clypeus except two dark stripes on disk, lateral marks, and two supraclypeal spots yellow; abdomen with a suffused yellowish band on tergites 1 to 2 or 3; wings clear hyaline, the nervures testaceous brown; length, about 4 mm.
dilecta, n. sp.
Similar, but dark stripes on clypeus usually lacking, supraclypeal mark large and notched above, and sometimes small subantennal marks present; abdomen without yellowish bands; wings slightly dusky, the nervures and margins of stigma brown; length, about 4 mm.
labergei, n. sp.
23. Abdomen light, with no more than four dark bands at junction of segments; apical segments of abdomen often red or orange fulvous. 24
Abdomen, if mainly light, having more than four dark bands, with the light and dark bands about equal, or abdomen sometimes dark with the light bands evanescent or absent. 38
24. Fuscous or blackish markings of abdomen restricted to the first two or three segments. 25
Abdomen with brown or fuscous bands on tergites 1 to 4. 35
25. Basal segments marked with yellow, and brownish fuscous or black. 26
Basal segments mainly white or marked with white. 27
26. Base of abdomen black or brownish fuscous, with two obpyriform marks on tergite 1 and a broad enclosed band on tergite 2 pale yellow; following segments more orange or ferruginous with two oval, subapical brown marks on tergite 3; head and thorax green, the mandibles, three marks on clypeus, and large, almost quadrate lateral marks yellow; wings whitish hyaline *vittata* Cockerell
Basal half of abdomen yellow, with a broad band at junction of tergites 1-2 and 2-3 brownish or fuscous, and the apex of tergite 3 and following segments ferruginous; head and thorax blue-green, rather dull, the mandibles, clypeus, supraclypeal and large lateral marks yellow; wings whitish hyaline. *picturata*, n. sp.
27. Mesonotum at most faintly tessellate, shining, and with rather close minute punctures and fine erect hairs 28
Mesonotum distinctly tessellate and rather dull 33
28. Wings whitish hyaline, the nervures nearly colorless, with subcoasta and margins of stigma at most pale brownish 29
Wings nearly clear or somewhat dusky hyaline, the nervures testaceous or pale brownish. . 30
29. Tergites 1 to 3 black, each with a moderately narrow white band, the apical segments orange fulvous; clypeus generally white, except the usual pair of dots, the lateral marks nearly in the form of equilateral triangle. *crotonis lucoptera*, n. subsp.
Similar but head and thorax shining blue; dark color of first three tergites brown (darker on basal segment), or sometimes inclining to pale orange, like apical segments; a whitish

- band sometimes present across disk of tergite 4.....*crotonis titusi*, n. subsp.
30. Tergite 4 whitened at base or with a more or less distinct white band; white bands of abdomen at least as broad as the dark intervals between them; wings nearly clear hyaline31
 Tergite 4 reddish or orange fulvous, like following segments, and sometimes infuscated across basal margin32
31. Lateral face marks higher than wide and almost reaching foveae; oblique white subantennal marks generally present and separated from the clypeus and lateral marks by a green interval; white of hind border of pronotum continuous from tubercle to tubercle although narrowed medially; dark bands of tergites 1 to 3 narrow; wings slightly whitened
crotonis cucullata, n. subsp.
 Lateral face marks higher than wide or in the form of equilateral triangles; subantennal plates always green; white marks on hind border of disk of pronotum separated from each other and from the white tubercles; white and dark bands of basal tergites subequal
crotonis dilucida, n. subsp.
32. White bands on tergites 1 to 3 broad, generally distinctly broader than the dark intervals, with the dark area at base of tergite 1 often in the form of a broad-angled V, or sometimes reduced to a small W-shaped mark; apical margin of tergite 3 typically fulvous like following segments*crotonis crotonis* Cockerell
 White bands on tergites 1 to 3 narrower than the dark intervals, that on tergite 1 much narrower, and that on tergite 3 pointed at outer ends and enclosed; apical margin of tergite 3 infuscated; clypeus with two broad black stripes, the lateral marks unusually small, and the supraclypeal area black.....*crotonis undecimalis* Cockerell
33. White bands at least as broad as the dark intervals between them; wings nearly clear hyaline, or only slightly dusky.....34
 Abdomen with four white bands, which are narrower than the blackish intervals between them, that on tergite 4 somewhat abbreviated and interrupted medially; wings more strongly dusky than in other races of *crotonis*, the nervures brownish yellow, the subcoasta and margins of stigma fuscous; mesonotum moderately dullish
crotonis australis, n. subsp.
34. White bands of abdomen about equal to the dark intervals, that on tergite 1 much broadened in middle, and that on tergite 2 even and enclosed; dark band at junction of tergites 3 and 4 well developed; supraclypeal mark of face often absent and marks on disk of pronotum small and widely separated from the white tubercles; wings nearly clear hyaline
crotonis subnitens, n. subsp.
 White area on tergite 1 extending to the base, with an oblique dark mark on each side, the white bands on tergites 2 and 3 subequal to the dark intervals; tergites 4 to 6 orange, the basal half of tergite 4 almost whitish; clypeus, small triangular lateral marks and quadrate supraclypeal mark white; wings slightly dusky hyaline, the nervures and margins of stigma yellowish brown*crotonis decipiens*, n. subsp.
35. Small species, the mesonotum more or less strongly tessellate and base of tergite 1 broadly dark36
 Abdomen white, with a broad blackish band at junction of tergites 1-2 to 4-5, a dark mark on each side of base of tergite 1, and a triangular dark mark in the median crease; clypeus and L-shaped lateral marks white; mesonotum polished, with rather close, fine punctures; hair of thorax white, erect, abundant, becoming rather dense in a prescutellar band and on scutellum and metanotum; length, about 7.5 mm.....*indioënsis*, n. sp.
36. Clypeus, lateral marks, and usually large marks on pronotum white or pale yellowish...37
 Clypeus and supraclypeal area black with a small white spot on middle of the former; collar of pronotum and the tubercles white; white and black bands on tergites 1 to 4 about equal, the white band on tergite 1 narrowly interrupted in middle; length, about 5 mm.
knowltoni, n. sp.
37. Mesonotum strongly tessellate and rather dull; upper margin of disk of clypeus usually with two dark marks; abdomen white with brownish bands, the last two or three seg-

- ments tinged with orange; length, about 5 mm. *rhodura* Cockerell
- Mesonotum more weakly tessellate and rather shining; clypeus with one or two dark marks on upper part of disk besides the usual pair of dots; disk of pronotum pale yellow; abdomen white with blackish bands, the apical segment ferruginous; pygidial plate broadly truncate at apex; length, 5.5 mm. *mimula*, n. sp.
38. Light bands of abdomen entire, or very narrowly interrupted on usually not more than one or two segments 39
- Light bands of abdomen more generally, more distinctly and more constantly interrupted, or sometimes evanescent, or absent 67
39. Mesonotum polished or faintly tessellate 40
- Mesonotum more or less distinctly tessellate 45
40. Head hardly longer than wide; frons duller than the mesonotum 41
- Head distinctly longer than wide; frons weakly tessellate and shining; head and thorax dark blue, the clypeus and lateral marks white, but upper half of disk of clypeus and the supraclypeal area black; abdomen with five white bands, which are sometimes notched medially or slightly interrupted; wings milky white, with pallid nervures; length, 5 mm. *elegans*, n. sp.
41. Head about as long as wide, the frons with close distinct punctures 42
- Head broader than long, the frons with fine, moderately close and rather obscure punctures; head and thorax dark olive green, the clypeus, large lateral marks, supraclypeal mark, small subantennal spots and five broad bands on abdomen yellowish white; wings somewhat whitish, the nervures yellowish; length, nearly 6 mm. *fasciata*, n. sp.
42. Abdominal bands more or less yellow, the face marks creamy white 43
- Abdominal bands and face marks creamy white 44
43. Head and thorax dark green, the clypeus and supraclypeal area black; one or three small marks on clypeus and narrow lateral marks white; abdominal bands rather narrow and yellow, that on tergite 2 bent sharply backward at outer ends, those on tergites 3 and 4 strongly arcuate and that on tergite 5 evanescent; wings slightly dusky, the nervures testaceous brown *hirticeps hirticeps*, n. subsp.
- Similar, but head smaller, no broader than long; face marks a little larger, the three marks on clypeus almost confluent; abdominal bands broader and paler yellow and that on tergite 5 well developed; wings a little paler but more opaque, the nervures yellowish, the subcosta pale brown *hirticeps luteocincta*, n. subsp.
44. Dark blue, the face marks white, the abdominal bands creamy white or very pale yellow; markings about the same in extent as in *luteocincta*, but band on tergite 5 sometimes evanescent or lacking; head about as wide as long; wings whitish hyaline the nervures pale yellowish, the subcosta and margins of stigma pale brown. *hirticeps apicata*, n. subsp.
- Similar to *apicata*, but markings nearly if not quite pure white and band on tergite 5 abbreviated and interrupted; head smaller, no wider than long; wings milky hyaline, the nervures pallid, margins of stigma yellowish, the subcosta pale brownish
..... *hirticeps candidipennis*, n. subsp.
45. Pterostigma, uniformly brown except at base; mesonotum rather weakly tessellate and shining 46
- Pterostigma more or less pallid centrally or uniformly pale 47
46. Head and thorax dark green, the clypeus, lateral and supraclypeal marks white; labrum and two stripes on disk of clypeus black, the stripes usually not involving the lateral dots; abdomen dark, with a white band on tergites 1 to 5, the bands on middle segments broad, even, and reaching lateral margins. *numerata numerata* Cockerell
- Similar but stripes on disk of clypeus much broadened, sometimes dividing the white into three marks, the supraclypeal mark sometimes divided or almost absent; abdominal bands narrow, not reaching lateral margins, and that on tergite 1 represented by two transverse marks *numerata hesperia*, n. subsp.
47. Much smaller species, except *plucheae*, with mandibles tapering and acute at apex 48
- Large species, about 8 mm. long, with head a little broader than long, and mandibles

- massive, dilated on inner margin and subacute at apex; frons opaque, the mesonotum tessellate but shining; head and thorax dark green, the clypeus black, a median mark on clypeus and small lateral marks creamy white; abdomen dark, with five moderately broad white bands *trimaculata*, n. sp.
48. Mesonotum more or less weakly tessellate and more shining than the frons..... 49
 Frons and mesonotum generally about equally dull and more or less strongly tessellate. 53
49. Clypeus and supraclypeal area black, the lateral marks white; mesonotum weakly tessellate, and with fine punctures and erect white hair; the hair across apex of tergite 5 more flaring than usual 50
 Clypeus at least partly white 51
50. Head and thorax dark blue-green, the mesonotum more greenish; abdomen dark, with five white bands, those on tergites 3 and 4 broadened at outer ends, and that on tergite 5 involving nearly the whole disk except a blackish quadrate mark subapically on each side; wings slightly whitish, the nervures pale testaceous, the subcosta and margins of stigma slightly brownish *chloris*, n. sp.
 Head and thorax dark blue, the disk of mesoscutum and scutellum black; face sometimes with traces of a supraclypeal mark; white bands of abdomen narrow, more arcuate than in *chloris*, that on tergite 5 abbreviated and strongly arcuate; wings nearly clear hyaline, the nervures and margins of stigma pale brown, the subcosta fuscous.... *paroselae*, n. sp.
51. Smaller species; pygidial plate comparatively small, about as long as wide at base.... 52
 Large species, about 7 mm. long; pygidial plate large and broadly rounded at apex; head and thorax dark olive green, the middle of mesoscutum blackish; clypeus except two broad dark stripes on disk, lateral marks, a supraclypeal mark or two spots, and small subantennal spot adjacent to the antennal sockets, white; disk of pronotum and five bands on abdomen pale yellow, the band on tergite 1 very broad but interrupted, and that on tergite 5 not reaching lateral margins..... *plucheae*, n. sp.
52. Pygidial plate with a narrow, sharply notched apex; mesonotum rather delicately tessellate and much more shining than the frons; clypeus, large triangular lateral marks, and two supraclypeal spots white; abdominal bands broad and white, that on tergite 5 not reaching lateral margins and sometimes evanescent; wings whitish hyaline, the nervures testaceous brown, the subcosta more ferruginous..... *bigeloviae* Cockerell
 Pygidial plate with a broad truncate or concavo-truncate apex; head and thorax dark blue-green; clypeus and rather small lateral marks white, the clypeus usually with two black stripes on disk, or often mainly black with median white mark and two smaller sublateral marks; abdomen dark with a more or less broad white band, sometimes slightly interrupted, on tergites 1 to 4, and sometimes a partly developed band on tergite 5
media, n. sp.
53. Pygidial plate with the sides converging straight to the rather narrow apex, which is sharply bidentate and acutely notched in middle; supraclypeal mark large and sometimes intruding between antennal sockets or with an enclosed dark spot at the summit of the intrusion 54
 Pygidial plate more or less convexly arcuate on each side and rounded at apex, the median notch more or less small, or evanescent, with the points enclosing it more or less obtuse. . 55
54. Head and thorax dark green, minutely lineolate and subopaque; base of mandibles, clypeus, lateral and supraclypeal marks white, the labrum testaceous yellow; abdomen dark, with an enclosed yellow band on tergites 1 to 4, or 5, that on tergite 5 when present usually interrupted; wings nearly clear hyaline, the nervures pale testaceous brown (some specimens of *gerhardi dallasiana* Cockerell hardly distinguishable from *monardae*, but many have abdomen entirely dark. Cf. couplet 98)..... *gerhardi monardae* Viereck
 Similar to *monardae* and barely distinguishable in its dark phase, but supraclypeal mark not intruding between antennal sockets and lateral marks more truncate at upper end; frons and mesonotum sometimes with small maculations (cf. couplet 13)
variegata variegata, n. subsp.
55. Head about as broad as long 56

- Head considerably longer than wide; head and thorax minutely and densely lineolate, dull and bronzy-green; an oval or subpyriform mark on middle of clypeus, often an oblique streak on each side of anterior margin of disk, small and usually more or less L-shaped lateral marks, and sometimes a supraclypeal mark, yellow; abdomen with a broad yellow band on tergites 1 to 5; wings milky hyaline, the nervures pale yellowish
laticincta Swenk and Cockerell
56. Light bands of abdomen narrower than the dark intervals.....57
Light bands at least as broad as the dark intervals.....58
57. Light bands of abdomen restricted to tergites 1 to 4, narrowly interrupted on tergites 1 and 4 and all falling slightly short of the lateral margins; head and thorax dark green, the face below antennae mainly black, with small, pale-yellow lateral marks adjacent to the clypeus, and sometimes a small median spot on clypeus
melanostoma Swenk and Cockerell
- Abdomen with white bands on tergites 1 to 5, which tend to be notched or weakly interrupted, and those on tergites 2 to 4 bent backward at outer ends; head and thorax dark green, the clypeus, lateral marks, and two small supraclypeal spots white, the clypeus with two blackish stripes on disk and the lateral marks sometimes not reaching above level of summit of clypeus; mesonotum finely tessellate, dull, and with fine rather close punctures and abundant short erect hair*hirsuta* Cockerell
58. Frons and mesonotum moderately shiny and rather distinctly and finely punctured....59
Frons and mesonotum duller, less distinctly or obscurely punctured.....62
59. Supraclypeal mark lacking, the clypeus with two dark stripes on disk, or sometimes mainly dark60
Supraclypeal mark usually well developed and dark stripes on disk of clypeus tending to be broken or reduced to a small spot on each side of disk; white bands on tergites 1 to 5 broad and even; pygidial plate about as long as broad at base, narrowed about one half to the rounded apex, which bears a small but distinct notch....*gutierreziae* Cockerell
60. White bands on tergites 1 to 4 or 5, moderately wide, and sometimes one or two narrowly interrupted, those on tergites 2 and 3 more or less widened and bent backward at outer ends; pygidial plate rounded at apex, with the median notch evanescent or absent....61
Abdomen with four, broad, even white bands, notched medially behind; clypeus except two brown stripes on disk and small oblique lateral marks, not going above level of summit of clypeus, white; mesonotum and frons moderately dull, the frons with sparse faint punctures; pygidial plate distinctly notched at apex.....*albocincta*, n. sp.
61. Head and thorax dark green, the supraclypeal area black; black stripes on clypeus complete or clypeus sometimes black except for a small median white mark; tergites 1 to 4 with a white band, that on tergite 1 sometimes interrupted, and traces of a band sometimes present on tergite 5; wings nearly clear hyaline, the nervures fuscous
scitula scitula, n. subsp.
- Similar, but clypeus always white, with two black stripes; abdomen with a white or pale yellowish band on tergites 1 to 5, those on tergites 1 and 2 often narrowly interrupted; wings somewhat dusky hyaline*scitula antiochensis*, n. subsp.
62. Abdomen yellow or whitish, with five or six dark bands.....63
Abdomen dark, with four or five light bands.....65
63. Lateral marks of face abruptly narrowed at lower end of foveae and with a spur intruding between the foveae and eye64
Lateral marks usually ending more or less acutely above and not intruding between the foveae and eye; clypeus yellowish white or pale yellow, with a blackish mark on each side of summit of disk; abdomen pale yellow with five or six dark bands, which are usually narrower than the light intervals; head and thorax brassy or yellowish green, the frons dull with obscure punctures.....*aridella*, n. sp.
64. Face and abdominal markings yellow, including a supraclypeal mark and spot on middle of frons; scape of antennae entirely yellow; tergite 1 yellow with an apical dark band and a spot on middle of the lateral margins, or basal half of the basal declivity dark;

- wings hyaline, the nervures and stigma pale yellow; pygidial plate rounded and entire at apex (cf. couplet 16).....*rectangulata* Cockerell
- Similar, but markings perhaps more whitish, the supraclypeal mark and spot on frons lacking, and scape of antennae dark above; wings slightly dusky hyaline, the subcosta and margins of stigma slightly tinged with brown; pygidial plate distinctly notched at apex.....*snowii* Cockerell
65. Supraclypeal area black.....66
 Head and thorax dark green, the clypeus, lateral and supraclypeal marks white; dark stripes on disk of clypeus lacking or represented by two spots; abdomen generally with five broad white bands; pygidial plate as long as broad at base, the apex rounded, with the points on each side of the median notch obtuse.....*lasiogastra* Timberlake
66. Clypeus and lateral marks yellowish white, the anterior border of clypeus and two stripes on disk black; abdomen with five broad pale-yellowish bands, those on tergites 2 to 4 broad at outer ends, narrowed and notched behind medially, and that on tergite 5 represented by two irregular transverse marks; wings hyaline, with a whitish caste, the nervures testaceous; length about 6 mm.....*electa*, n. sp.
 Head and thorax dark green, the labrum, clypeus and supraclypeal area black; broad median stripe on disk of clypeus and lateral marks pale yellow; abdomen black, with five white bands, which are somewhat narrower than the dark intervals, and all slightly notched medially behind; wings hyaline, the nervures brownish fuscous; mandibles stout and abruptly narrowed near the apex.....*retusa*, n. sp.
67. Mesonotum less strongly tessellate and more or less shining, or sometimes polished.....68
 Mesonotum minutely and densely tessellate, and more or less dull, the dullness approaching or equaling that of frons.....76
68. Mesonotum distinctly although sometimes more or less weakly tessellate.....69
 Mesonotum polished on disk and with moderately close fine punctures and short erect hair; supraclypeal area and clypeus black, with three marks on clypeus and triangular lateral marks white; tergites 1 to 4 each with an interrupted and arcuate white band; length, about 4-4.5 mm.....*pectidis* Cockerell
69. Abdomen entirely dark, or with a narrow, interrupted and abbreviated band at base of tergite 2 and traces of a band on tergite 3.....70
 Abdomen with lateral marks or an interrupted band on three or more segments.....71
70. Head, thorax, and abdomen black; clypeus and triangular lateral marks pale yellow suffused with pale brownish, a spot adjacent to clypeus on each side and a spot on middle of clypeus more whitish; base of mandibles and tubercles yellowish-white; pygidial plate rounded at apex; wings hyaline, the nervures testaceous yellow; length, 4.5 mm.
halli, n. sp.
 Head and thorax dark green, the clypeus and supraclypeal area black; face markings generally lacking, but sometimes a small yellow spot on middle of clypeus, and base of mandibles and tubercles yellowish-white; abdomen brown or blackish, rarely with a narrow interrupted white band at base of tergite 2 and traces of a band on tergite 3; pygidial plate with arcuate margins and a slightly retuse apex; length, about 5 mm.
phymatae Cockerell
71. Pterostigma normal and the marginal cell no broader than the submarginal cells.....72
 Pterostigma curiously broadened toward apex and entirely brown or fuscous except for the pale base and outer margin; marginal cell broader than the submarginal cells; clypeus except anterior border and two stripes on disk, lateral marks, tubercles, and a narrow and interrupted band on tergites 2 to 4 yellow; wings somewhat whitish hyaline, the nervures mostly testaceous yellow; length, about 5.5-6.5 mm...*maculigera maculipennis* Graenicher
72. Abdomen with an interrupted light band on tergites 1 to 4.....73
 Interrupted light bands present on tergites 1 to 5.....75
73. Markings of face and abdomen creamy white; a supraclypeal mark sometimes well developed.....74
 Markings of face and abdomen yellow; two narrow stripes on disk of clypeus and supra-

- clypeal area black, but the latter sometimes with two yellow dots; bands of abdomen narrowly interrupted in middle; margins of pygidial plate arcuate and the apex notched; length, about 5.5 mm. *durangoënsis*, n. sp.
74. Clypeus, except two stripes on disk, lateral marks, and usually a supraclypeal mark, white, the lateral marks truncate at level of antennae; antennae dark, the scape black; mesonotum with rather close fine punctures, the posterior border of scutum dull from fine lineolation; pygidial plate large, the sides converging nearly straight to the rather narrow, entire, or slightly retuse apex; length, about 6.5 mm. *cazieri*, n. sp.
- Face markings similar, but dark stripes of clypeus arcuate, the lateral marks obliquely narrowed above; the supraclypeal mark transverse or absent; antennae fuscous above, the scape pale yellow beneath; abdominal bands narrow and rather widely interrupted except on tergite 1; pygidial plate notched at apex; wings slightly dusky hyaline, the nervures brown *apacheorum*, n. sp.
75. Clypeus, supraclypeal, lateral marks, and often an oval mark on subantennal plates yellowish white; abdominal bands rather narrowly interrupted, that on tergite 1 usually merely notched in front; scape of antennae broadly pale yellow beneath; mesonotum with a rather delicate tessellation, moderately close minute punctures and short, rather coarse, erect hair; pygidial plate notched at apex; length, about 5.5 mm. *butleri*, n. sp.
- Markings similar, but whiter, the subantennal marks lacking, the abdominal bands narrowly interrupted in middle; antennae blackish, the scape dark; mesonotum more distinctly punctured, the punctures of scutellum close, and hair of scutum moderately long and finer than in *butleri*; pygidial plate only slightly retuse at apex; length, about 7 mm. *quinquebalteata*, n. sp.
76. Light bands of abdomen almost uniformly and narrowly interrupted. 77
- Light bands of abdomen more or less broadly interrupted on one or more segments, or reduced to small lateral marks, or absent. 84
77. Face marks small, the clypeus mainly black, the supraclypeal and subantennal marks lacking 78
- Face marks well developed, the clypeus mainly light, and the lateral marks large. 79
78. Abdomen dark, with a white band on tergites 1 to 4, that on tergite 4 abbreviated; clypeus black, with a small median white mark, and sometimes a small spot on each side of disk; lateral marks reduced to a spot or line on the orbits, but sometimes produced inward anteriorly to margin of clypeus *ensenadensis*, n. sp.
- Abdomen blackish at base with a narrow, abbreviated, and slightly interrupted, pale-yellow band on tergites 2 and 3; tergites 4 to 6 brownish or perhaps rufotestaceous in life, the basal corners of tergite 4 and two subapical marks fuscous; clypeus blackish, with three small, faintly whitish spots; lateral marks white, moderately small, rounded next to clypeus and a little widened on orbits; head distinctly but not greatly longer than wide *microsticta*, n. sp.
79. Supraclypeal mark well developed 80
- Supraclypeal mark lacking or represented by but little more than a transverse line or two spots 81
80. Mesonotum with thin, moderately short, erect hair; clypeus, lateral marks, and large supraclypeal mark creamy white (the markings more yellow in the northern and eastern part of the range); tergites 1 to 5 with a white band, linearly interrupted, or sometimes entire on one or more segments; scape of antennae pale yellow except on apical half above; wings hyaline, or slightly whitish, the nervures testaceous yellow *swenki* Crawford
- Mesonotum with sparse, very short hair and appearing nude; markings bright yellow, the clypeus with two arcuate dark stripes on disk; a narrowly interrupted yellow band on tergites 1 to 4, and another one on tergite 5 abbreviated, evanescent, or lacking; wings somewhat dusky hyaline, with moderately dark nervures. *prionopsidis*, n. sp.
81. Smaller species, 6 mm., or less, long 82
- Rather dull, olive-green, robust species, about 7 mm. long; clypeus and lateral marks creamy

- white, the disk of clypeus with two arcuate dark stripes; supraclypeal mark a transverse band, or two spots, or absent; abdomen with a rather broad and narrowly interrupted white band on tergites 1 to 4 or 5. *bruneri* Cockerell
82. Color more olive green, the scape of antennae pale yellow beneath. 83
 Head and thorax dark blue-green, the scape of antennae entirely dark; clypeus except two arcuate stripes on disk and lateral marks creamy white; supraclypeal mark represented by a transverse line or absent; abdominal bands on tergites 1 to 4 usually too widely interrupted for position of insect here; head no broader than long; pygidial plate entire or weakly notched at apex *affinis* Cresson
83. Head and thorax dark green, the mesonotum less dull than in *affinis*; frons and mesonotum with moderately abundant, short, erect pubescence; clypeus and lateral marks white, the anterior margin of clypeus and sometimes two arcuate stripes on disk testaceous; supraclypeal mark transverse or absent; abdominal bands on tergites 1 to 4 white, rather narrow and moderately interrupted; pygidial plate notched at apex; head somewhat broader than long *apacheorum*, n. sp.
 Head and thorax olive green with a bluish tinge; frons and mesonotum minutely tessellate with a satiny luster, the frons opaque in some aspects; the pubescence of frons extremely short and sparse and that of mesonotum short, erect, and sparse, the puncturation extremely weak; clypeus and lateral marks creamy white, the disk of clypeus with two broad black stripes; light bands on tergites 1 to 4 creamy white, rather narrowly interrupted, the halves obtuse at inner ends, those on tergite 2 much broadened at outer ends, and those on tergite 4 sometimes lacking; head hardly broader than long; pygidial plate distinctly notched at apex *seneconis* Cockerell
84. Light markings of abdomen well developed on tergites 1 to 4 or 5. 85
 Light markings of abdomen more or less abbreviated and reduced to a small mark on each side of tergites 1 to 2, 3 (or rarely 4), or entirely absent. 94
85. Lateral marks of face large, wide below and more or less pointed above at level of antennae 86
 Head and thorax dark green, the face marks white and reduced to three small spots on clypeus and transverse lateral marks, which do not reach above level of summit of clypeus; abdomen with a large and broadly oval, pale-yellow mark on each side of tergites 1 to 5; mesonotum moderately dull, with abundant, long erect hair (cf. *jonesi*, couplet 93, which sometimes runs here) *separata*, n. sp.
86. Markings of abdomen larger, more bandlike, or becoming more or less broad on lateral margins of tergites 2 to 4 87
 Marks on tergites 1 to 4 small, narrow, widely separated, except sometimes on tergite 1, and failing to reach, or barely reaching, the lateral margins of segments. 92
87. More or less smaller and less dull western species, about 5 mm. long; mesonotum with thin and moderately short erect hair 88
 Large eastern species; mesonotum minutely and densely tessellate and about as dull as the frons, and either nearly nude or unusually densely pubescent for this group. 89
88. Head and thorax dark green, the mesonotum moderately dull; clypeus, except two abbreviated stripes on disk, and lateral marks creamy white; supraclypeal mark represented by two small dots or usually absent; abdominal marks white or pale yellowish, generally separated by a space equal to one-fourth to one-third of the width of the segments, those on tergites 2 and 3 oblique and those on tergite 4 enclosed, or sometimes evanescent or absent; scape of antennae yellow beneath *fallax* Cockerell
 Head and thorax dark blue-green, the mesonotum somewhat duller than in *fallax*; clypeus usually with two dark stripes on disk; supraclypeal mark absent, or sometimes represented by a transverse line; scape of antennae dark; marks of abdomen generally large and separated by a distance equal to one-fifth or less of the width of the segments, those on tergite 4 usually reaching the lateral margins. *affinis* Cresson
89. Mesonotum opaque, clothed with rather dense erect ochreous hair. 90
 Mesonotum dull with very sparse and short hair. 91

90. Head and thorax dark green; clypeus except two broad marks on upper part of disk, lateral marks and sometimes two small supraclypeal spots yellow; abdomen with four, or sometimes five yellow bands, that on tergite 1 narrowly and that on tergite 2 broadly interrupted, and those on following segments successively less broadly interrupted; wings dusky hyaline, the nervures brown; length, about 6 mm.
consobrina consobrina Timberlake
 Similar, but markings paler yellow, the dark marks on clypeus reduced to lines, the supra-clypeal mark well developed and sometimes traces of subantennal marks present; abdominal bands broader, less broadly interrupted with that on tergite 4 entire or nearly so, and that on tergite 5 well developed.....*consobrina lepida* Timberlake
91. Head and thorax dark blue-green, the markings yellow; clypeus often black with three marks on disk, the middle one much the largest, or sometimes yellow with two dark stripes on disk; marks of abdomen more or less widely separated, broadened at outer ends and more or less pointed within.....*octomaculata octomaculata* (Say)
 Similar, except that the markings are white and clypeus generally light, with two dark stripes on disk*octomaculata terminata* Cockerell
92. Wings strongly dusky or subfuliginous.....93
 Wings subhyaline; head and thorax dark green, the clypeus, except two dark stripes on disk, and lateral marks creamy white; abdominal marks of tergites 1 to 4 creamy white, those on tergites 3 and 4 a little oblique, largest of all on 3 and enclosed on 4 although close to the lateral margins; mesonotum with sparse, rather long, erect hair
aplopappi, n. sp.
93. Head and thorax dark olive green, the pronotum entirely dark; face and abdominal marks white, the clypeus black, with a narrow median mark and a small spot on each side; lateral marks of face rather narrow except at anterior end; abdomen with slender transverse marks close to base of tergites 2 to 4 and a narrow, interrupted band on tergite 1
discreta Timberlake
 Similar, but wings subfuliginous and markings more yellowish; median mark on clypeus generally with narrow horizontal arms at summit of disk; lateral marks on face small and hardly reaching level of antennae; abdominal marks on tergites 2 to 4 moderately small, oblique, and generally enclosed.....*jonesi* Cockerell
94. Head considerably longer than wide95
 Head broad96
95. Head and thorax dark olive green, the mesonotum with very short, erect and rather dense hair; markings yellowish white; clypeus black, with a median narrowly pyriform mark and sometimes a streak on lateral margins; lateral marks very small; abdomen entirely dark or sometimes with an abbreviated, very narrow and interrupted band on tergites 1 to 3; wings whitish hyaline, the nervures yellowish; length, about 6 mm.
dolichocephala Swenk and Cockerell
 Similar but more brassy-green; face entirely dark and abdomen always with a narrow interrupted band on tergites 1 to 3*tridentata* Stevens
96. Face always and abdomen usually with light markings, or if abdomen entirely dark, the face marks well developed97
97. Light markings of face and abdomen reduced to a small spot on middle of clypeus, or entirely absent; head and thorax dark green, with very sparse, short hair; frons and mesonotum minutely tessellate and moderately dull; clypeus rather shiny, with sparse shallow punctures; legs dark, the front knees and anterior side of tibiae yellow; wings with a whitish opacity, the nervures and margins of stigma brown; length, about 6 mm.
nuda Cockerell
97. Face below antennae with the normal convexity and well-developed light markings.....98
 Face below antennae weakly convex; a median club-shaped mark on clypeus and a small spot adjacent to clypeus on each side pale yellow; abdomen dark brown, with an interrupted and abbreviated pale-yellow band on tergites 1 and 2; similar to *dolichocephala*, except head hardly longer than wide; length, about 7 mm.....*dalyi*, n. sp.

98. Pygidial plate rounded or truncate at apex, with median notch weakly to moderately developed99
 Pygidial plate strongly notched and sharply bidentate at apex; head and thorax dark green; clypeus except two dark stripes on disk, lateral and supraclypeal marks, spot on each side of hind margin of pronotum and tubercles white; abdomen dark brown or fuscous; wings clear hyaline, the nervures brown; length, about 5 mm.....*gerhardi dallasiana* Cockerell
99. Head and thorax blue-green; base of mandibles, clypeus, lateral marks and tubercles pale yellow, the anterior margin of clypeus and two arcuate stripes on disk brownish fuscous, the lateral marks with a more or less rectangular emargination on inner margin; abdomen black, with a small yellowish spot on lateral margins of tergites 1 to 3, those on tergites 2 and 3 in the form of oblique lines; legs dark, the front knees and anterior side of front tibiae yellow; wings dusky hyaline, the nervures brown; length, 5.5 mm....*occidua*, n. sp.
 Dull dark blue-green, the base of mandibles, clypeus, except a black blotch on upper part of disk, and transverse lateral marks white; thorax entirely dark; abdomen black, with a white line on each side of the base of tergite 2, or on tergites 2 and 3; wings strongly dusky hyaline, the nervures fuscous; length, about 7 mm.....*gerardiae* Crawford
100. Yellow or almost entirely yellow species.....101
 Notum of thorax conspicuously dark green or blue, at least in part.....109
101. Head and thorax with sparse pubescence, the frons and mesonotum comparatively nude. 102
 Pubescence of head and thorax dense for a *Perdita*, the frons and mesonotum with abundant, fine, depressed white hair, that of vertex erect; entirely yellow, the frons a little dull, the wings white; length, about 4.5 mm.....*beatula*, n. sp.
102. Face uniformly bright yellow103
 Face below antennae pallid, either whitish or pale greenish yellow.....105
103. Small species, about 4-4.5 mm. long; mesonotum dullish and impunctate.....104
 Larger, about 8 mm. long; frons opaque, but mesonotum polished, with sparse minute punctures; bright yellow species, with small evanescent black markings on mesoscutum, propodeum and first three tergites of abdomen.....*perixantha*, n. sp.
104. Head a little broader than long; frons tessellate and somewhat dullish; mesoscutum slightly more shining than the frons and almost devoid of hair; wings somewhat whitish opaque, the nervures pale yellow; length, 4.5 mm.....*luteola* Cockerell
 Similar but frons a little duller; cheeks more narrowed anteriorly, with the widest part behind the middle of the eyes; mesoscutum with very sparse erect hair, which becomes rather long on the anterior third of disk; wings clear hyaline, the nervures pale brownish; length, about 4 mm.*xanthodes*, n. sp.
105. Somewhat dullish species, with thin, short, erect white pubescence on the mesonotum.... 106
 More shining species, with hair of mesonotum extremely short and fine.....107
106. Frons and mesonotum minutely tessellate and dullish; yellow, with a small spot on each side of frons and a blotch on each side of mesosternum dark greenish; wings hyaline, the nervures yellowish; subgenital plate straight and normally concealed; length, about 4 mm.
gerhardi gerhardi Viereck
 Similar to *gerhardi* in most characters; dark markings on frons and mesosternum lacking; apex of subgenital plate generally protruded in dry specimens and strongly recurved
variegata pura, n. subsp.
107. Head large, the cheeks broad, but narrowed anteriorly, the postgenal area with abundant long hair; hair of mesonotum very short, depressed, and sparse.....108
 Similar but cheeks more narrowed in front and the postgenal area less hairy; mesonotum with microscopic, appressed close-set hairs; entirely yellow, with the foveae of the frons and tergite 2 pale reddish brown; length, 4.5-5 mm.....*xanthochroa*, n. sp.
108. More or less pale-yellow, or almost creamy-white species, with face below antennae more pallid and sometimes tinged with greenish; sometimes a dark spot or mark on each side of frons, and a dark mark on each side of mesosternum; more rarely a blotch on anterior side of front femora and a smaller blotch on middle and hind femora; length, about 5 mm.
perpallida perpallida Cockerell

- Creamy white, with frons, vertex, and mesonotum more yellowish; mark on each side of frons, sometimes an interrupted line across vertex, more or less of under surface of head and thorax, a V-shaped mark on propodeum, broad marks on femora, and narrow bands on abdomen blackish *perpallida citrinella* Graenicher
109. Thorax marked more or less with yellow or white, besides the usual marks on pronotum. .110
 Thorax entirely dark except tubercles or other marks on pronotum. .131
110. Nearly all of face below level of anterior ocellus yellow, or mesonotum marked with yellow111
 Green of frons descending below level of anterior ocellus and mesonotum entirely dark (except rarely a trace of yellow on hind margin of scutellum in *gutierreziae* and *gerhardi*).118
111. Pterostigma very large and broadened toward apex, pale at base, and blackish on the expanded part112
 Pterostigma normal114
112. Head and thorax mainly dark green113
 Head and thorax yellow, with two marks on frons, interrupted crossband on vertex, three longitudinal stripes on mesoscutum and four marks on propodeum dark green; abdomen yellow with dark bands *maculigera maculigera* Cockerell
113. Lateral margins and U-shaped mark on middle of disk of mesoscutum yellow; frons yellow at sides and in middle to level of anterior ocellus, with the green of vertex descending broadly on each side not quite to level of antennal sockets; abdomen dark with six interrupted yellow bands *maculigera* var. *bilineata* Timberlake
 Similar, but mesonotum entirely dark, or with traces of yellow lines on mesoscutum; yellow of frons hardly reaching more than halfway to level of ocelli; abdomen dark with five or six yellow bands *maculigera maculipennis* Graenicher
114. Head mainly yellow, with a dark crossband on vertex115
 Lower half of face and undersurface of head whitish; the occiput, vertex, and most of frons dark green, or yellow variegated with green117
115. Mesonotum rather delicately tessellate and shining116
 Mesonotum strongly tessellate and dull; yellow of frons reaching level of ocelli and confluent with yellow of cheeks; dark green area of occiput covering also posterior corners of cheeks and involving the ocellar region of vertex except for a somewhat broken and arcuate yellow band on occipital margin; mesonotum dark, but the scutellum except anterior border and a small transverse mark on posterior middle of scutum yellow
luteiceps Cockerell
116. Yellow of face reaching level of ocelli, the blue-green of vertex and occiput covering upper half of posterior surface of head, except for a yellow mark behind ocelli and a smaller one on each side behind summit of eyes; or these yellow marks sometimes confluent, reducing the green of vertex to a band across the ocelli, with a narrow extension to posterior orbits of eyes; a transverse mark on posterior part of mesoscutum, and sometimes the axillae and a median spot on propodium yellow; abdomen yellow, with six narrow brownish bands, the one at base of tergite 1 trifold. *trifida*, n. sp.
 Markings of head similar to those of *trifida*, the green of vertex and occiput enclosing five yellow marks, of which three are on vertex behind level of ocelli and two on occipital margin; notum of thorax dark except a minute yellow spot on middle of scutellum; abdomen yellow, with six narrow and even brown bands. *flaviceps*, n. sp.
117. Thorax dark green, with marks on pleura and sternum, sometimes a transverse band on posterior middle of mesoscutum and line on each side of disk to anterior margin, a median mark on scutellum and line on its posterior margin, and median mark on propodeum pale yellow; abdomen usually yellowish, with a narrow pale-brown band more or less developed at junction of tergites 1-2 to 5-6. *gerhardi dallasiana* Cockerell
 Dark green with the following yellow marks more or less developed: four spots or a band in front of ocelli on frons, a row of two to five spots on vertex, four stripes on mesoscutum setting off three broad, triangular dark vittae, the middle one of which is enclosed by the yellow and has its broad end reversed to the broad end of the others, a small spot on

axilla and the hind margin of scutellum; abdomen dark, with six yellow bands; recurved tip of subgenital plate generally visible (the 5 yellow markings of *variegata* unusually variable, with intergrades between the typical form and *pura*. Cf. couplet 106)

variegata variegata, n. subsp.

118. Pterostigma more or less pallid centrally119

Pterostigma solidly dark brown except at extreme base; face pale yellow for a short distance above antennae, with the green usually descending on each side to the antennal sockets; mesosternum usually with a yellow T-mark, the arms of which are narrow and hardly extend to the pleura; abdomen with nearly equal fuscous and yellow bands

numerata Cockerell

119. Markings of face and gular region of head very pale yellow or whitish120

Face and abdominal markings yellow121

120. White of face changing to pale yellow where it extends straight across the frons just above level of antennae; T-shaped mark on mesopectus large, with the arms expanding on the pleura; one or two spots or marks on flanks of propodeum pale yellow or whitish; yellow bands of abdomen generally enclosed*gerhardi monardae* Viereck

Similar to *monardae*, and sometimes probably not much different; but upper margin of face marks tending to be more uneven, sometimes with a narrow extension along orbits to summit of eyes, and sometimes with an extension of the green to the antennal sockets

gerhardi dallasiana Cockerell, dark var.

121. Abdomen yellow or orange yellow with pale-brownish or ferruginous bands122

Abdomen clear yellow with about six brownish or fuscous bands123

122. Base of tergite 1 brown, and apical margin of tergite 1 and sometimes of tergite 2 more or less faintly pale brownish or ferruginous; green of frons hardly descending below level of foveae and the yellow sometimes emitting a slender median line to the anterior ocellus; yellow T-mark on mesopectus extending broadly to the pleura, and a small yellow spot present behind the tubercles*rhodura* Cockerell

Abdomen pale yellow, the base of tergite 1 and its apical margin dusky ferruginous, and band at apex of tergites 2 to 5 ferruginous; green of frons descending about two-thirds of way from level of anterior ocellus to antennal sockets; yellow T-mark of mesopectus hardly extending to the pleura*dilecta*, n. sp.

123. Mesonotum tessellate and dullish, but more or less distinctly less dull than the frons...124

Mesonotum more or less strongly tessellate and approximately as dull as frons127

124. Mesoscutum sparsely and usually faintly punctured and thinly hairy125

Mesoscutum much more closely punctured and hairy, the punctures either faint or distinct.126

125. Green of frons with a triangular projection on each side to, or nearly to, the antennal sockets; anterior end of gular region and orbital spur to middle of eyes yellow; anterior arm of yellow T-mark of mesopectus barely reaching the pleura; mesonotum only moderately more shining than the frons; length, about 3.5-4 mm.*nitidella* Cockerell

Green of frons descending not much below level of foveae and the yellow in middle reaching about halfway from level of foveae to anterior ocellus; gular region and anterior half, or more, of cheeks yellow; yellow of mesopectus extending broadly on the pleura; mesoscutum rather weakly tessellate and much more shining than the frons; length, about 4-4.5 mm.

bigeloviae Cockerell

126. Pronotum yellow, with a green band from flank to flank; anterior arms of the sternal T-mark ending narrowly well below and behind the tubercles; anterior half of gular region and inferior orbits to middle of eyes yellow; legs yellow except a small brownish streak on outer side of hind tibiae; yellow bands of abdomen sometimes enclosed on tergites 2 and 3; mesonotum more shining, moderately closely punctured and hairy*croceipes*, n. sp.

Pronotum yellow except a dark spot in front of tubercles; yellow T-mark of mesopectus with broad anterior arms extending to the tubercles; legs yellow, the hind tibiae except beneath, the hind tarsi and sometimes a streak on outer posterior margin of middle tibiae fuscous, and often a faint brown streak on front tibiae; a small yellow spot sometimes present on flanks of propodeum; mesonotum a little duller, more closely punctured, and hairy

media, n. sp.

127. Mesonotum less opaque; anterior and middle legs entirely or almost entirely yellow; or yellow bands of abdomen not enclosed 128
 Mesonotum and frons more opaque than usual, obscurely punctured and thinly hairy; yellow bands of abdomen not quite reaching lateral margins of segments; a streak or blotch on posterior side of femora and of front and middle tibiae, the hind tibiae except beneath and the hind tarsi fuscous; face unevenly yellow to level of foveae, except lower margin of subantennal plates more or less infuscated and a green spot present on outer margin of antennal sockets *ensenadensis*, n. sp.
128. Yellow mark of mesopectus sending broad arms to tubercles and covering about half, or more than half, of lateral aspect of mesepisternum; pronotum yellow, often with two dark spots on the disk, or with a green band from flank to flank; nervures of wings testaceous or yellowish, the subcosta and margins of stigma sometimes brownish 129
 Anterior arms of mesopectal mark ending more or less broadly but at some distance from the tubercles; green band on pronotum well developed; nervures of wings infuscated, the subcosta and margins of stigma fuscous 130
129. Mesepisternum sometimes almost entirely and sides of propodeum yellow, although the posterior border of lateral aspects of mesepisternum, the metapleura, and sides of propodeum often green; extent of yellow on frons variable, sometimes going to level of anterior ocellus at sides but not in middle, or sometimes ending at level of foveae; pedicel and flagellum of antennae more or less brown or fuscous above; legs yellow, the hind tibiae and tarsi and sometimes middle tibiae marked with fuscous. . *gutierreziae* Cockerell
 Similar, but yellow of face broadly reaching level of anterior ocellus but not enclosing it, with the green descending on each side halfway to level of foveae; antennae entirely or almost entirely yellow; legs yellow, the middle and hind femora marked with fuscous, in addition to the dark markings on middle and hind tibiae and tarsi; mesonotum more strongly tessellate, duller and more hairy..... *rectangulata* Cockerell
130. Green band on pronotum broad from flank to flank; hind femora more or less blotched behind with fuscous, and sometimes a small mark on front and middle femora; yellow of face extending to level of foveae and more or less notched on each side by the green *scitula scitula*, n. subsp.
 Similar but green band on pronotum less broad and sometimes becoming very narrow on the flanks; legs yellow, the hind tibiae on outer side and hind tarsi fuscous and usually a brown stripe on outer margin of middle tibiae. *scitula antiochensis*, n. subsp.
131. Abdomen ferruginous, or yellow banded with ferruginous 132
 Abdomen generally dark with light bands or marks, sometimes with the apical segments more or less fulvous or reddish, or abdomen sometimes yellow with dark bands or markings 133
132. Head and thorax dark green, rather dull; face below antennae white, the lateral marks extending slightly above antennae; abdomen ferruginous, the dusky apical margin of segments generally forming a transverse mark on each side of tergites 1 to 4
polygonellae Timberlake
 Yellow of face extending above antennae for a short distance from side to side; abdomen orange ferruginous with a suffused yellow band on tergites 1 to 3; legs yellow, the hind tibiae except at base and hind tarsi fuscous, an oval fuscous blotch on anterior and posterior sides of hind femora and on the middle tibiae; wings small, dusky hyaline, the nervures brown, the stigma narrow *labergei*, n. sp.
133. Labrum emarginate at apex 134
 Labrum normal 142
134. Mesonotum more or less distinctly tessellate and comparatively dullish 135
 Mesonotum shining, hardly at all tessellate 137
135. Two terminal joints of antennae entirely dark 136
 Flagellum entirely pale beneath; green of frons descending broadly on each side to involve the subantennal plates; base of mandibles, labrum, clypeus, supraclypeal and lateral marks, and small dot on center of subantennal plates pale yellow or whitish; basal half

- of abdomen dark, the first three tergites with an enclosed white band, the apical segments yellowish or fulvous; wings whitish hyaline, the nervures nearly colorless. *picturata*, n. sp.
136. Similar to *picturata*, the subantennal plates sometimes green with a white dot near lower end; white bands on tergites 1 to 3 narrowly interrupted, or nearly so, the apical segments orange; wings faintly dusky, the nervures and margins of stigma pale brownish
crotonis decipiens, n. subsp.
 Mesonotum distinctly tessellate but more shining than in *picturata* or *decipiens*; green of frons extending broadly to involve the subantennal plates, or the latter partly white; tergites 1 to 4 blackish, with an abbreviated and interrupted white band on the first three segments, the apical margin of tergite 4 and following segments fulvous; wings more distinctly dusky than in other forms of *crotonis*, the nervures brownish, the subcosta and margins of stigma fuscous *crotonis australis*, n. subsp.
137. Wings whitish hyaline, the nervures nearly colorless 138
 Wings clear hyaline or slightly dusky, the nervures pale yellowish or testaceous 139
138. Face white below level of antennae, the lateral marks ending broadly a little above that level; three basal tergites black, each with a rather narrow white band, the apical segments rufofulvous *crotonis leucoptera*, n. subsp.
 Similar, but abdomen orange fulvous, becoming darker toward base, with base of tergite 1 almost brownish fuscous; white bands on tergites 2 and 3 much narrowed at outer ends and that on tergite 1 narrowly interrupted at middle and sometimes also close to outer ends
crotonis titusi, n. subsp.
139. White bands of abdomen entire and reaching lateral margins 140
 White bands of abdomen very narrow and more or less abbreviated, that on tergite 1 sometimes reduced to two small, transverse oval marks, and that on tergite 3 interrupted medially and again close to lateral margins; apical segments orange fulvous, but tergite 4 infuscated on basal half; head and thorax shining dark blue. *crotonis caerulea*, n. subsp.
140. White bands of abdomen generally rather narrow and less even than in typical *crotonis*, that on tergite 1 sometimes interrupted, and apical margin of tergite 3 usually infuscated 141
 White bands of tergites 1 to 3 about as broad as the dark intervals between them, and the apical margin of tergite 3 orange fulvous like following segment or but slightly infuscated
crotonis crotonis Cockerell
141. White bands of tergites 1 to 3 somewhat narrowed at outer ends; tergite 4 with a white band which is often interrupted or sometimes reduced to two small oval marks, the base and sometimes the lateral borders of this segment fuscous, but the apical margin generally orange fulvous like the following segments *crotonis dilucida*, n. subsp.
 Similar to *dilucida*, but white bands of abdomen a little broader and more even, the white markings of tergite 4 absent, and the wings a little whiter, with testaceous nervures
crotonis cucullata, n. subsp.
142. Face marks white, yellowish white, or pale yellow 143
 Face marks bright yellow 154
143. Face marks extending above antennae either in median line or straight across 144
 Face marks extending above antennae only at the side (rarely a little also in middle in *abdominalis*) 147
144. Head about as broad as long, the face and abdominal markings somewhat tinged with yellow 145
 Head rather distinctly longer than wide; markings of face, thorax, legs, and abdomen white; white of face usually enclosing antennal sockets, but the green of frons with a median lobe extending to the prominence between the antennae; wings whitish hyaline, with pallid nervures *elegans*, n. sp.
145. Frons and mesonotum distinctly punctured and shining, although tessellate 146
 Frons and mesonotum strongly tessellate, rather dull, obscurely punctured and clothed with rather coarse, erect, whitish hair; frons narrowly pale yellow for a short distance above antennae, the blue descending on each side and often narrowly touching the dorsal margin

- of antennal sockets; abdomen fuscous, with a pale-yellow band on tergites 1 to 5 or 6, slightly interrupted medially on tergite 1 and sometimes on one or two other segments
hirsuta Cockerell
146. Similar to *hirsuta*, but frons closely and mesonotum sparsely punctured; pale-yellowish bands of abdomen broad and reaching the apical depression on tergites 2 to 6, except for a transversely oval, fuscous, subapical mark on each side of disk; light color of face extending a short distance above antennae in middle but only narrowly enclosing the antennal sockets; length, 4-4.5 mm. *chloris*, n. sp.
Head large and broad, the face marks rather strongly tinged with yellow, although paler anteriorly; frons usually pale yellow straight across above antennae for a short distance; abdominal bands white, interrupted medially and those on tergites 4 and 5 more or less broken or interrupted also on each side; mesonotum rather closely punctured and with fine erect pubescence; length, about 5 mm. *indioënsis*, n. sp.
147. Western species, with face mainly or entirely light below level of antennae. 148
Clypeus and rather small lateral marks, hardly surpassing summit of clypeus, white; remainder of face and the thorax dark blue-green; abdomen blackish, with a transverse creamy-white mark on each side of tergites 2 and 3; head and thorax minutely and densely lineolate-tessellate and dull *gerardiae* Crawford
148. Larger species, with white face marks 149
Face pale yellow below level of antennae, the lateral marks ending broadly at level of foveae; supraclypeal mark intruding between antennal sockets or sometimes going slightly above; abdomen brownish or pale fuscous, with a more or less broad and nubilous, dull or brownish-yellow band on tergites 1 to 4, or 5, and these bands sometimes narrowly interrupted in middle; length, about 3.5 mm. (cf. also *cognata*, couplet 172, which could be placed here). *abdominalis*, n. sp.
149. Abdomen fuscous or blackish, with white or yellow bands; mesonotum rather polished or faintly tessellate 150
Abdomen brownish ferruginous, with a nubilous yellow mark on tergites 1 and 2; face below antennae white, the lateral marks ending rather broadly and roundly above level of antennae; head and thorax strongly tessellate and dullish; wings dusky hyaline
stephensi, n. sp.
150. Mesoseutum polished, finely and rather closely punctured; frons tessellate and with strong close punctures; clypeus usually white, except usual pair of dark dots, the subantennal plates mostly green; head and thorax with abundant, rather long, erect hair. 151
Mesoseutum with a distinct but rather weak tessellation and moderately shiny; frons dullish, with rather obscure and sparse punctures 152
151. Abdominal bands yellowish, either notched medially or narrowly interrupted, bent abruptly backward at outer ends and sometimes abbreviated; antennae dark, the flagellum sometimes uniformly blackish or sometimes brownish beneath with the last two joints dark; pubescence more or less dusky, or at least not pure white. *hirticeps hirticeps*, n. sp.
Abdominal bands paler, often whitish, with that on tergite 4 often broken into three or four spots; scape of antennae white beneath, the flagellum dull yellow beneath, except last two joints entirely dark; wings slightly whitish hyaline; pubescence white
hirticeps apicata, n. subsp.
152. Frons with more or less obscure punctures. 153
Frons and vertex very minutely tessellate, dull and impunctate; face white below antennae; tergites 2 to 4 with a yellowish white band, not reaching lateral margins, and notched medially behind or slightly interrupted; scape of antennae yellow and the flagellum yellowish brown beneath; wings dusky hyaline. *phuceae*, n. sp.
153. Clypeus white, with two submedian dark stripes, which are sometimes confluent to form a broad discal mark; tergites 1 to 5 with a pale-yellow or whitish band, the bands on tergites 3 and 4 broadly emarginate behind on each side, and that on tergite 5 sometimes interrupted sublaterally; pubescence rather abundant, erect, and white. ... *paroselae*, n. sp.

Face entirely white below level of antennae; abdomen blackish with an interrupted white band on tergites 1 to 3, that on tergite 2 much widened at outer ends and that on tergite 3 abruptly bent backward and then continued as a thin, transverse, subapical streak on each side; or abdominal markings sometimes reduced to about six small spots

pectidis Cockerell

154. Yellow of face extending above antennae in median line, or the frons yellow straight across above antennae155

Yellow of face not extending above antennae except at sides.....170

155. Abdomen yellow, with the dark markings restricted mainly to the first two or three segments156

Abdomen dark, with distinct light bands; or if mainly yellow having five or six dark bands159

156. Yellow of face nearly reaching the anterior ocellus, or ascending on orbits to summit of eyes157

Yellow of face covering not more than the lower half of frons.....158

157. Yellow of face continued narrowly on orbits to summit of eyes and there connecting with yellow of posterior orbits, but green of frons descending on each side below level of foveae; abdomen yellow, with base of tergite 1 and evanescent bands at base of tergites 2 to 3 or 4, fuscous; head and thorax with abundant, subappressed, short white pubescence; wings whitish hyaline, the nervures pallid.....*bridwelli*, n. sp.

Yellow of face ascending broadly nearly to level of anterior ocellus; abdomen yellow, with the first tergite infuscated, and some duskiness apparent in following segments; head and thorax with thin, fine, erect whitish hair; wings clear hyaline, the nervures testaceous
halli, n. sp.

158. Abdomen yellow, with base of tergite 1 and band at junction of tergites 1-2 to 2-3 fuscous, the part of band at apex of tergite 2 reduced to a transverse mark on each side, and apex of tergite 3 similarly marked; pubescence moderately long and abundant, erect and white
knowltoni, n. sp.

Abdomen yellow, the first two tergites fuscous, with two subpyriform yellow marks on tergite 1 and an enclosed basal band on tergite 2, the sides of these segments broadly dark; disk of mesoseutum and scutellum polished; pubescence rather short and sparse

vittata Cockerell

159. Lower part of frons usually yellow straight across, the yellow ascending on each side to touch or encircle the lower end of foveae160

Yellow of face extending above antennae in median line for a short distance, the green descending more or less broadly on each side to the antennal sockets.....166

160. Smaller, more or less dullish species, about 3-5.5 mm. long.....161

Large species of California deserts, about 6-7 mm. long; mesonotum shining, although tessellate, and with moderately sparse fine punctures and rather long, erect, fine whitish hairs; abdomen black, with a yellow band on tergites 1 to 6, the bands on the more apical segments often enclosed (cf. *indioënsis*, couplet 146, which would run here except for paler-yellow face markings).*trimaculata*, n. sp.

161. Head as broad as long; mesonotum usually a little more shining than the dark part of frons and vertex162

Head somewhat longer than wide; head and thorax dark olive green, subopaque, the sub-antennal plates sometimes green; abdomen dark brown, with a yellow band on tergites 1 to 5, the bands on tergites 3 to 5 not reaching lateral margins; hair of mesonotum short, erect, and mosslike*dolichocephala* Swenk and Cockerell

162. Head and thorax moderately dull; yellow bands of abdomen broad, or interrupted, or reaching lateral margins163

Frons and vertex dull, with a minute dense tessellation, and the mesonotum hardly more shining; abdomen dark, with the yellow bands on tergites 1 to 5 usually narrow and enclosed, and that on tergite 2 slightly and more or less evenly dilated on outer ends

swenki Crawford

163. Yellow bands of abdomen broad and entire, that on tergite 1 more or less dilated medially164
 Yellow bands of abdomen moderately wide, that on tergite 1 not or hardly broadened medially, some or all interrupted medially and one or two on the more apical segments enclosed; legs yellow, the front and middle femora with a dark blotch behind, and the hind femora usually dark except at apex*aplopappi*, n. sp.
164. Yellow bands of abdomen not enclosed165
 Yellow bands on tergites 3 to 5 enclosed, although with a cutoff transverse mark on the apical corners of the segments, those on tergites 4 and 5 touching the apical depression at the middle; tergites 6 and 7 and the venter yellow; upper margin of yellow on frons unusually even and touching lower end of foveae; wings whitish hyaline, the nervures pale yellowish brown (cf. *lasiogastra*, couplet 168, a variation of which runs here)
aridella, n. sp., var.
165. Small species, about 3-3.5 mm. long; abdomen yellow with dark bands at base of tergite 1 and at apex of tergites 1 to 4 or 5; legs yellow, the front and middle femora with a large dark blotch behind, and the hind femora dark except at apex.....*aridella*, n. sp.
 Larger, about 5 mm. long; abdomen with five yellow bands which are even, entire, and about equal to the dark intervals; yellow band on tergite 1 usually entire and broadened medially, but sometimes slightly interrupted, with the inner ends of the halves only slightly expanded; hind femora broadly yellow on dorsal margin.....*retusa*, n. sp.
166. Face below antennae entirely, or almost entirely, yellow.....167
 Subantennal plates green, but the yellow of sides of face and usually that in median line reaching level of foveae; dark parts of head and thorax dark green and subopaque; abdomen brownish or fuscous, with five broad yellow bands, the distal two or three enclosed; wings whitish hyaline, the nervures pale yellow.. *laticincta* Swenk and Cockerell
167. Yellow bands of abdomen entire, except sometimes on tergite 1, and usually enclosed...168
 Abdominal bands narrowly interrupted medially, except sometimes on tergite 1.....169
168. Tergite 1 to 5 each with a rather broad yellow band, that on tergite 1 interrupted, the others entire, and those on tergites 3 to 5 not reaching the lateral margins; lateral face marks ending broadly above and notched by the foveae; supraclypeal mark reaching upper level of antennal sockets and then emitting a slender nipple-shaped spur into the green of frons*snowii* Cockerell
 Similar but supraclypeal mark sending a broad spearhead-shaped spur into the green of frons; light bands of abdomen paler yellow; wings clear hyaline, with a broader stigma; subgenital plate and genitalia distinctive.....*lasiogastra* Timberlake
169. Light bands of tergites 1 to 5 pale yellow, that on tergite 1 entire, the others interrupted and all reaching lateral margins; lateral face marks ending broadly and obliquely just below level of the foveae; supraclypeal mark extending onto frons for a short distance and enclosing a small dark spot between the antennal sockets.....*butleri*, n. sp.
 Yellow bands restricted to tergites 1 to 3 or 4, all interrupted medially, those on tergites 1 to 3 reaching lateral margins, and that on tergite 2 considerably expanded at outer ends; lateral face marks ending broadly at lower end of foveae; supraclypeal mark ending a broad spearhead-shaped spur into the green of frons.....*fallax* Cockerell
170. Abdomen dark brownish fuscous or blackish, with sharply defined light bands or marks, which are sometimes evanescent171
 Abdomen dull yellowish, with pale-brown bands at base of tergite 1 and at junction of the segments, the yellow intervals sometimes narrowly interrupted medially and the brown color predominating on apical tergites; face pale yellow below level of antennae, the supraclypeal mark intruding between the antennal sockets and sometimes infringing slightly on the frons; length, about 3.5 mm. (cf. couplet 148).....*abdominalis*, n. sp.
171. Light bands of abdomen entire on two or more segments.....172
 Light bands of abdomen interrupted medially or sometimes evanescent.....174
172. Abdominal bands more or less narrow and enclosed, those on tergites 2 and 3 entire, two of the others, or at least that on tergite 1, generally narrowly interrupted in the middle; subantennal plates dark173

Tergites 1 to 5 with pale-yellow bands which are comparatively broad, not enclosed laterally but notched medially behind, or those on tergites 1 and 5 very narrowly interrupted; face entirely pale yellow below level of antennae; legs yellow, the femora and tibiae with dark blotches on posterior side *cognata*, n. sp.

173. Head and thorax dark green, the mesonotum more brassy green; head distinctly longer than wide; clypeus, supraclypeal and lateral marks yellow, the lateral marks evenly narrowed above and acute; yellow bands on tergites 1 and 5 slightly interrupted

tridentata Stevens

Head and thorax dark olive green; mandibles except red tips, labrum, clypeus, lateral and supraclypeal marks clear sulphur yellow, the lateral marks evenly triangular, about twice as high as wide and acute above; abdomen with a narrow abbreviated yellow band on tergites 1 to 4, those on tergites 1 and 4 slightly interrupted. *translineata*, n. sp.

174. Face below antennae entirely or almost entirely yellow. 175

Subantennal plates and sometimes the supraclypeal area dark. 181

175. Mesonotum tessellate, but considerably more shining than the dull, impunctate frons. 176

Mesonotum more strongly tessellate and nearly or quite as dull as the frons. 177

176. Face entirely yellow below level of antennae, the lateral marks ending broadly above, either obliquely or with a small spur extending inward above dorsal margin of antennal sockets; abdomen blackish, with two pale-yellow and more or less widely separated marks on tergites 1 to 3 *cazieri*, n. sp.

Similar but inner margin of subantennal plates green and the lateral marks narrowed evenly above; mesonotum more shining, with rather numerous fine punctures, and fine, rather long, erect hair *durangoënsis*, n. sp.

177. Lateral face marks broad or more or less truncate at or somewhat above level of antennae, and with a slender orbital extension to level of foveae. 178

Lateral marks obliquely narrowed above level of antennae; yellow bands on tergites 1 to 4 or 5, more or less narrowly interrupted. 180

178. Mesonotum rather densely clothed with short whitish hair. 179

Mesonotum with sparse, very short whitish hair; lateral face marks ending a short distance above level of antennae where they are obliquely or squarely truncate, or sometimes emarginate, and with an orbital extension to foveae; abdomen usually with a narrow and interrupted yellow band on tergites 1 to 4. *prionopsidis*, n. sp.

179. Dark parts of head and thorax dark olive green, opaque, and impunctate; abdomen blackish, with a narrow abbreviated and interrupted yellow band on tergites 1 to 3 or 4

consobrina consobrina Timberlake

Similar, but abdominal markings more or less smaller or broken

consobrina lepida Timberlake

180. Larger, about 5.5-6 mm. long; a black sutural spot at lower end of subantennal plates; legs yellow, with a large dark blotch on anterior side of front and middle femora and the hind femora dark except on dorsal margin; abdomen with a yellow band on tergites 1 to 4 or 5, the last one or two bands more or less abbreviated; venter usually yellow

bruneri Cockerell

Smaller, about 4.5-5 mm. long; sutures of subantennal plates very narrowly dark; hind femora dark except at apex, and middle femora dark except broadly in front and at apex; yellow bands on tergites 1 to 4 or 5, narrowly to moderately widely interrupted, those on tergites 2 and 3 widened at outer ends and that on tergite 5 reduced to two small marks or absent; venter more or less dark; mesonotum a little less dull than in *bruneri* *affinis* Cresson

181. Wings dusky hyaline or subfuliginous; abdomen with a yellow mark on each side of tergites 1 to 4 182

Wings comparatively clear hyaline, the nervures brown; abdomen dark, with a transverse pale-yellow spot on each side of median line of tergite 1 and a median dot near base of tergite 2; face marks pale yellow, including a supraclypeal mark, but the subantennal plates green; head and thorax dark olive green and subopaque. *atriventris*, n. sp.

182. Larger species, about 5-6 mm. long; anterior wing about 4 mm.; wings moderately dusky183
 Smaller species, about 4.5-5 mm. long; anterior wing about 3 mm.; wings more strongly dusky to subfuliginous184
183. Mandibles except reddish tips, labrum, clypeus, and lateral marks yellow; abdomen blackish, with a transverse yellow mark on each side of tergites 1 to 4; mesonotum nearly as dull as the opaque and impunctate frons.....*octomaculata octomaculata* (Say)
 Similar, but a well-developed supraclypeal mark usually present
octomaculata terminata Cockerell
184. Mandibles except red tips, labrum, clypeus, lateral marks, and a transverse irregular supraclypeal mark yellow, the lateral marks ending near level of antennae; yellow marks on each side of tergites 1 to 5 narrow, transverse, rather widely separated and ending far from lateral margins of segments*discreta* Timberlake
 Similar, but wings more fuliginous; lateral marks of face triangular and ending acutely at level of antennae, the supraclypeal mark usually well developed, and the yellow marks of abdomen very broadly separated, widened at outer ends and reaching lateral margins of segments*jonesi* Cockerell

Perdita beatula, n. sp.

(Figs. 522, 523, 662)

Beatula is a small, entirely yellow species with dense white hair on head and thorax. It is closely allied to *P. bridwelli*, which is a dark green and yellow species that visits *Sphaeralcea* in the deserts of California. In Cockerell's table (1896) *beatula* runs out at couplet 1 and is much closer to *P. luteola* than to *P. beata* or *P. larreae*.

Male.—Yellow, unmarked except for the small brownish foveae on sides of frons and lateral margins of tergite 2, and a small black dot in the impression on sides of mesoscutum beneath apex of tegulae. Propodeum tinged with greenish and apical depression of tergites a little whitened; mandibles except rufous tips, labrum, and clypeus slightly paler yellow. Antennae and legs yellow, the claws rufous. Tegulae yellow at base and yellowish hyaline on outer margin. Wings milky hyaline, the nervures pale yellow, subcosta and margins of stigma orange yellow.

Head as broad as long, somewhat broader than thorax, the face depressed, the cheeks about as broad as eyes and unarmed. Facial foveae oval, twice as long as wide. Mandibles moderately long, tapering, and simple. Abdomen rather broadly ovate and subdepressed. Claws of legs bifid. Stigma of wings of ordinary size and width, and the parts of the marginal cell beneath and beyond stigma about equal. Head and thorax very minutely tessellate and rather shiny, the frons and mesoscutum with fine, close punctures which are obscured by the pubescence. Face below antenna almost polished and impunctate. Abdomen slightly dullish, without evident sculpture. Head and thorax with abundant white hair, that is rather dense for a *Perdita*, but face below antennae with sparse fine hair; hair of frons and mesonotum shorter than elsewhere, more or less appressed and mosslike. Subgenital plate a little longer than wide and very acutely triangular. Parameral lobes of genitalia as long as the caulis and very slightly clavate at apex as seen from above; sagittae very long, the fused part narrowly fusiform, with the two elements spreading apart at apex; in lateral view the sagittae are moderately curved downward in apical half and blunt at apex. Length, 5 mm.; interior wing, 3.8 mm.

One male (holotype), Lovelock, Humboldt Co., Nevada, June 9, 1933 (Mrs. Y. Mexia), in collection of the California Academy of Sciences, San Francisco.

Perdita perixantha, n. sp.

(Figs. 524, 525, 663)

This is a yellow species of unusually large size for the *octomaculata* group. In Cockerell's table (1896) it runs near *P. luteola*, but is about twice as large, with small black markings and a shining mesonotum.

Male.—Bright yellow including legs and antennae, and with small black or blackish markings as follows: the facial foveae, a dot on margin of each ocellus, short streak on lateral impressed lines of mesoscutum, a dot at posterior end of the median impressed line, a transverse streak in the deep impression behind each axillae, a short longitudinal streak at the outer ends of the metanotum, short transverse streak on each side of base of propodeum, a short arrow-shaped mark, pointing distad, on middle of apical half of propodeum, a small spot on each side of the summit of truncation of propodeum, median streak at base of tergite 1, a spot on each side of summit of the basal declivity, a pair of transverse marks placed closer together on apical margin of same segment, a pair of similarly situated marks on apex of tergites 2 and 3, the lateral foveae of tergite 2, and the extreme basal margin of tergites 2 and 3. Antennae somewhat more orange yellow than body, with a small black spot on pedicel and a more brownish spot on the next four joints, those on the second and third of these joints larger and extending obliquely toward the inner side. Mandibles and claws of legs rufous at apex. Tegulae yellow, with the outer margin subhyaline. Wings clear hyaline, the nervures and margins of stigma brownish testaceous, the subcosta slightly darker.

Head rotund, as broad as long, the face depressed, the cheeks unarmed and considerably less broad than the eyes. Mandibles rather short, tapering, and simple. Proboscis ordinary, the galeae shorter than the stipites. Facial foveae small, oval, about twice as long as wide. Claws of legs small, the inner tooth about one-half as long as the outer. Face below antennae minutely tessellate, rather shiny, and sparsely punctate, but frons and vertex opaque, impunctate, with the sculpture excessively minute. Thorax delicately tessellate and shining, the mesonotum almost polished, with minute sparse punctures. Abdomen minutely lineolate and a little duller than thorax, the apical tergite sparsely punctate. Pubescence white and moderately dense on cheeks, the pleura and sternum of thorax, abundant but short and appressed on sides of face below antennae, sparse and fine on the frons and extremely fine, short, and sparse on the mesonotum. Subgenital plate anomalous for this group, about twice as long as wide, with apical fourth dividing into divergent lobes. Caulis of aedeagus broad across the middle, then narrowed to base of parameral lobes, which are moderately long and rather broad as seen from above; sagittae of moderate length and broadly fusiform, with the apex acute in both dorsal and lateral views and provided with a large eversible sac. Length, about 8 mm.; anterior wing, 4.5 mm.

One male (holotype), Holbrook, Navajo Co., Arizona, 5,400 feet, June 25, 1931 (H. A. Scullen), in collection of the California Academy of Sciences, San Francisco.

Perdita luteola Cockerell

(Figs. 526, 527, 664)

Perdita luteola Cockerell, 1894, Ent. News, 5:328, ♂; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:92, ♀; Swenk and Cockerell, 1907, Ent. News, 18:57.

This is a small yellow species, flying in the fall months at flowers of *Aplopappus* (*Isocoma*) *heterophyllus*, *Gutierrezia sarothrae*, and other Compositae from the eastern border of Arizona to Sioux County, Nebraska. It is distinguished from other small yellow species by the moderately shining aspect, the comparatively elongate facial foveae, the almost perfectly nude mesonotum, and the clear and not much whitened wings. It has been recorded previously from Las Cruces, Dona Ana County, New Mexico, and Glen, Sioux County, Nebraska.

Material of *luteola* has been examined from the Mesilla Valley, New Mexico, and Glen, Sioux Co., Nebraska, and from the following new localities.—ARIZONA: 15 miles west of Holbrook, Navajo Co., on *Erigeron*, Sept. 3, 1930; 36 miles east of Holbrook, Apache Co., on *Gutierrezia sarothrae*, Sept. 3, 1930; near south entrance to Petrified Forest, Apache Co., on *Gutierrezia*, Aug. 27, 1931 (Timberlake). NEW MEXICO: Laguna, Valencia Co., on *Aplopappus heterophyllus*, Sept. 4, 1930 (Timberlake); Torrance Co., July, 1925 (C. H. Martin); 20 miles east of Albuquerque, Bernalillo Co., 6,800 feet, Sept. 3, 1955 (H. A. Scullen); Abeytas, Socorro Co., on *Gutierrezia sarothrae*, Aug. 26, 1931 (Timberlake). COLORADO: Ute Creek, on sage flats near Ft. Garland, Costilla Co., on *Chrysothamnus*, Aug. 9 (L. Bruner and R. W. Dawson); Maybell, Moffat Co., Aug. 18, 1940 (R. H. Beamer).

***Perdita xanthodes*, n. sp.**

(Figs. 528, 529, 665)

P. xanthodes is similar to *luteola*, but smaller, a little paler yellow in color, with a brown blotch on each side of the mesosternum, and a more hairy mesonotum in both sexes.

Female.—Canary yellow, with a quadrate brownish patch on each side of the mesosternum. Foveae of the face and second tergite black. Antennae yellow. The flagellum brown above, with a ring of darker brown on the second to fourth joints. Tegulae yellow at base and broadly hyaline on outer margin. Wings slightly whitish hyaline, the nervures and stigma pale yellow.

Head rotund, as long as wide. Proboscis moderately long, the galeae a little exceeding the proboscis fossa. Facial foveae linear, about their own width from margin of eyes and reaching from level of upper margin of antennal sockets nearly two-thirds of the distance to level of anterior ocellus. Pterostigma moderately narrow, and the parts of marginal cell beneath and beyond stigma about equal. Pygidial plate as long as the basal width, ogival at apex with a small median notch. Frons and mesonotum minutely tessellate, moderately shining, and with minute, rather sparse, and indistinct punctures. Pubescence sparse and whitish, the anterior part of mesonotum with a few moderately long erect hairs. Length, 5 mm.; anterior wing, 3 mm.

Male.—Entirely yellow and much like the male of *luteola*, but smaller and having the mesonotum distinctly although sparsely hairy. Facial foveae punctiform. Genitalia similar to same parts of *luteola*, the parameral lobes appearing narrow in dorsal view, although they are much broader in lateral view than in *luteola*; fused body of the sagittae a little more elongate and more slender than in *luteola*, but with the apex blunter both in dorsal and lateral views. Length, about 4 mm.; anterior wing, 2.7 mm.

One female, 4 males (holotype female, allotype, and paratypes), Lovejoy Buttes, Mohave Desert, Los Angeles Co., California, on *Aplopappus cooperi*, May 10, 1944 (Timberlake), in collection of the Citrus Experiment Station, Riverside.

***Perdita xanthochroa*, n. sp.**

(Figs. 530, 531, 666)

This is another yellow species that can be distinguished from *luteola* and *perpallida* by the brown facial and abdominal foveae. It differs from *perpallida* also in having the notch at apex of pygidial plate weak, the sculpture less dull, and the coloration deeper yellow.

Female.—Rather bright clear yellow, including the proboscis, but with the face below antennae, mandibles except reddish tips, and the labrum more pallid; face usually and the posterior surface of propodeum tinged with green. Antennae yellow, tinged with pale brown at base of the flagellar joints. Legs yellow, the four apical joints of hind tarsi blackish. Foveae of frons and second tergite pale brown. Tegulae pale testaceous, becoming more yellowish at base. Wings whitish hyaline, the nervures and margins of stigma pale yellow.

Head rounded, slightly broader than long. Face below antennae less convex than in *perpallida*, the lateral extensions of clypeus broad. Subantennal plates small, with the part above level of top of clypeus no longer than wide. Facial foveae elongate, about their width from margin of eyes, slightly curved and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Mandibles simple, acute, and hardly reaching the far margin of proboscis fossa. Proboscis, when folded in repose, barely exceeding the fossa. Pygidial plate slightly longer than wide at base, ogival at apex, with a weak median notch. Part of marginal cell beyond stigma slightly longer than the part beneath. Claws strong, with the inner tooth half as long as the outer section. Frons, vertex, and mesonotum finely tessellate and moderately dull, the frons a little duller than mesoscutum, the clypeus and supra-clypeal area smoother and shining. Punctures of face and mesonotum very fine and indistinct, those of frons sparse and situated mostly between the upper halves of the foveae, and those of mesoscutum moderately close. Pubescence whitish and short, the face and mesonotum appearing nude, although the disk of mesoscutum is invested with rather close-set, very fine appressed hair. Length, 5.5–5.75 mm.; anterior wing, 3.8–3.9 mm.

Male.—Coloration as in female, except that there is a black line on the under margin of hind femora, and the antennae are clearer yellow with a brown spot only on the upper side of the pedicel.

Head somewhat broader than long, the cheeks rounded behind and a little wider than the eyes. Facial foveae about twice as long as wide, broadest above, and tapering below. Mandibles slightly longer and more acute than in female. Pubescence and sculpture similar, but punctures of frons more numerous. Genitalia similar to those of *perpallida* and allied species, but the somewhat knobbed tips of the parameral lobes are distinctive. Length, 4–5 mm.; anterior wing, 3.1–3.5 mm.

Four females, 11 males (holotype female, allotype, and paratypes), 10 miles east of Jensen, Uinta Co., Utah, on *Sphaeralcea ambigua*, June 23, 1950 (C. D. Michener). Additional paratypes as follows.—UTAH: 1 female, 13 males, 10 miles west of Vernal, Uinta Co., on same flower, June 24, 1950 (Michener); 1 male, Eureka, Juab Co., on *Sphaeralcea*, June 27, 1951 (G. E. Bohart). COLORADO: 1 male, Elk Spring, Moffat Co., on *Stanleya pinnata*, June 23, 1950 (Michener). IDAHO: 2 females, 2 males, 16 miles northwest of Grandview, Owyhee Co., June 17, 1955 (W. F. Barr).

Types in collection of the University of Kansas, Lawrence; paratypes in collections of the Citrus Experiment Station and the University of Idaho, and one in the Bohart collection.

Perdita perpallida perpallida Cockerell

(Figs. 532, 533, 667)

Perdita perpallida Cockerell, 1901, Entomologist, 34:190, ♀, ♂; Swenk and Cockerell, 1907, Ent. News, 18:57; Stevens, 1919, Canad. Ent., 51:207.

The type locality of *perpallida* is Neligh, Antelope County, Nebraska, and it has been recorded by Stevens from the sand hills near Sheldon, Ransom County, North Dakota. It is reported from the flowers of *Petalostemum purepureum* in Nebraska and from *P. villosum* in North Dakota.

Female.—Very pale yellow, or yellowish white, the face below antennae and the underparts whiter and the frons and mesoscutum more yellowish. Foveae of face and second tergite fuscous or blackish, as well as a longitudinal mark which is frequently present on each side of mesosternum and sometimes a small linear or comma-shaped mark on each side of frons halfway between the foveae and median line. Small joints of hind tarsi dusky. Flagellum of antenna slightly brownish above, with short oblique brown stripes across the inner side of joints 2 to 4, and generally a small brown spot on pedicel and apex of scape above. Wings rather opaque whitish, the stigma and nervures yellowish. In more heavily marked specimens the marks on mesosternum are confluent and cover nearly the whole undersurface of mesothorax. The front and hind femora have a black line on inferior margin, the hind tarsi are entirely infuscated,

the proboscis except galeae and glossa fuscous, the dark markings of antennae accentuated, and a narrow dark band is present at base of tergites 2 to 3 or 4.

Head rounded, about as broad as long, the clypeus strongly convex, with the reflexed lateral extensions broad. Facial foveae linear, reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Mandibles simple and tapering to acute apex. Galeae of proboscis when folded hardly reaching beyond middle of stipites. Face and mesonotum punctureless and dull from an extremely fine tessellation, with the clypeus a little more shining. Abdomen microscopically lineolate and moderately dull. Pubescence whitish, restricted mainly to the cheeks, underparts of thorax, legs, and apex of abdomen, the face nude, the vertex with scattered short erect hair, and the mesonotum with sparse, very short, and fine reclinate hair. Length, about 5.5-7 mm.; anterior wing, 3.8-4.2 mm.

Male.—Generally a little paler and more whitish than female, with the proboscis at base, the foveae, often the inner side of front and hind femora and a mark on each side of mesosternum infuscated in the darkest specimens. More rarely a dark spot on each side of frons as in some females, and occasionally a dark band from lateral ocelli toward eyes. Flagellum of antennae pale orange; sometimes a brown spot on first one or two joints of flagellum and on pedicel and apex of scape. Facial foveae narrowly oval, about twice as long as wide and a little oblique to margin of eyes. Other structural characters, sculpture, and pubescence much as in the female. Caulis of aedeagus with a large and oblique basal orifice; parameral lobes appearing slender in dorsal view and rather broad although much narrowed in the apical third in lateral view; fused body of sagittae narrowly fusiform and acute at apex. Subgenital plate as long as wide at base and very acute at apex. Length, about 5 mm.; anterior wing, 3.6 mm.

Material examined.—NEW MEXICO: San Jose, San Miguel Co., on *Petalostemum*, July 21, 1950 (C. D. Michener); Albuquerque, Bernalillo Co., on *Helenium autumnale*, July 23, 1950 (R. H. Beamer); Isleta, Bernalillo Co., July 22, 1950 (J. G. Rozen and H. O. Wright); 15 miles west of Las Vegas, San Miguel Co., July 24, 1950 (Rozen); Hot Spring, San Miguel Co., on *Solidago occidentalis*, July 22, 1950 (Wright); Jemez Springs, Sandoval Co., July 22, 1950 (Beamer). KANSAS: Hutchinson, Reno Co., on *Petalostemum villosum*, July 14, 1949, and July 27, 1950 (Michener); Hutchinson, July 25, 1950 (Beamer); sand dunes, Medora, Reno Co., July 7, 1953 (H. E. Evans, Lin and Yoshimoto). NEBRASKA: Halsey, Thomas Co., on *Petalostemum candidum*, Aug. 12, 1912 (J. I. Zimmer). NORTH DAKOTA: Sheldon, Ransom Co., on *P. villosum*, Aug. 21, 1918 (O. A. Stevens); Beach, Golden Valley Co., Aug. 5, 1924 (C. N. Ainslie); Minot, Ward Co., on *P. oligophyllum*, Aug. 22, 1915 (Stevens); Leonard, Cass Co., July 25, 1937 (C. L. Johnson). MINNESOTA: Barden, Scott Co., on *Amorpha canescens*, July 9, 1923 (C. E. Mickel).

The females from Albuquerque, although recorded from *Helenium*, bear a fine-grained pollen that resembles the pollen gathered by other females from *Petalostemum*. The females from Barden, Minnesota, were evidently collecting pollen from *Amorpha*.

One female from Hutchinson, Kansas, has three nearly equal submarginal cells on both wings, with an adventitious cross vein from base of the stigma to the cubital nerve. This is the only *Perdita* that I have ever seen with three nearly equal submarginal cells.

Perdita perpallida citrinella Graenicher

Perdita citrinella Graenicher, 1910, Canad. Ent., 42:102, ♀; Graenicher, 1911, Bull. Milwaukee Mus., 1:238; Crawford, 1912, Canad. Ent., 44:359; Graenicher, 1914, Canad. Ent., 46:55; Stevens, 1919, Canad. Ent., 51:207, ♀, ♂.

Graenicher described *citrinella* from specimens collected at North Hudson, St. Croix County, Wisconsin, at flowers of *Petalostemum villosum*. Later he recorded

it from Prescott in Pierce County. It has been recorded by Crawford from Medicine Hat, Alberta, and by Stevens from Minot and Granville, North Dakota.

The only authentic specimens that I have examined are two pair from St. Cloud, Stearns County, Minnesota, on *P. purpureum*, August 8, 1925 (O. A. Stevens). One female from Mitchell, Scotts Bluff County, Nebraska, July 26, 1916 (C. E. Mickel) is similar. Judging from this limited material it is my opinion that *citrinella* is a dark-colored form of *perpallida* and perhaps not a valid race. The specimen from Mitchell, Nebraska, is possibly a dark specimen in a population of typical *perpallida*. Moreover, numerous specimens of *perpallida* from Kansas and New Mexico have the dark markings extensive enough to comply with Graenicher's description, and if still darker specimens were not known, agreeing with characters given in the preceding key, it would be necessary to treat *citrinella* as as synonym.

Perdita gerhardi gerhardi Viereck

Perdita gerhardi Viereck, 1904, Ent. News, 15:21, ♀, ♂; Graenicher, 1914, Canad. Ent., 46:56.

Perdita gerhardi arenicola Timberlake, 1929, Jour. New York Ent. Soc., 37:119, ♀, ♂ (new synonymy).

The type locality of *gerhardi* is East Chicago, Lake County, Indiana, and that of *arenicola* is Meredosia, Morgan County, Illinois. Typical *gerhardi*, including *arenicola*, has been recorded also from the sand dunes south of Kenosha, Wisconsin, and from Cass and Mason counties, Illinois.

Female.—Rather dull clay yellow, with spot at apex of scape, another on pedicel and the flagellum except beneath blackish; a mark on each side of frons about halfway between antennal sockets and interior ocellus and sometimes a line connecting the lateral ocelli dark green. Large mark on each side of posterior part of mesosternum, and narrow band at junction of tergites 1-2 to 4-5 brown or blackish. Sometimes also two brown or greenish vittae on the mesoscutum. Wings hyaline, the nervures and margins of stigma yellowish.

Head rounded, barely broader than long; mandibles simple and tapering to acute apex. Facial foveae wider than interval between them and margin of eyes, sometimes not quite reaching level of antennal sockets and generally about two-thirds as long as space between antennal sockets and anterior ocellus. Proboscis moderately long, when folded in repose hardly exceeding the proboscoidal fossa. Pygidial plate about as long as wide, the converging side slightly arcuate, the median notch at apex deep with tooth on each side of notch acute. Head and thorax very finely tessellate and dull, without puncturation, the face below antennae more shining with a few indistinct punctures on clypeus. Pubescence white, rather sparse, short, mosslike, and erect on face and mesonotum, not much longer on the cheeks, and rather long on front coxae, mesosternum, and apex of abdomen. Length, about 5-5.5 mm.; anterior wing, 3.5-3.7 mm.

Male.—Similar to the female in color and markings; more typically with only a small spot on each side of frons, two marks on mesosternum, bands of abdomen very faint, and a short brown streak on posterior side of the tibiae. In more heavily marked specimen the front and hind femora are also streaked with brown on posterior side.

Head a little broader than long. Facial foveae about twice as long as wide. Tergite 7 ending in an acute, slightly upturned point. Disk of subgenital plate small, triangular, ending in a long, slender, slightly recurved point, the lateral apophyses large in relation to disk and extending straight outward. Parameral lobes of caulis appearing slender and incurved in dorsal view, and moderately wide at base and tapering to narrow apex in lateral view; sagittae fusiform, very acute at apex in both dorsal and lateral views. Length, about 4-4.5 mm.; anterior wing, 2.8-3 mm.

Only a few previously recorded specimens of *gerhardi* have been examined at the present time from East Chicago, Indiana, and Meredosia, Illinois.

Perdita gerhardi monardae Viereck

Perdita monardae Viereck, 1904, Ent. News, 15:22, ♀, ♂.

The type locality of *monardae* is Riverton, Burlington County, New Jersey. It agrees structurally with *gerhardi*, and differs in having the head and thorax mainly dark green, and the abdomen dark with yellow bands.

Female.—Head and thorax dark green. Base of mandibles, clypeus, lateral and supraclypeal marks, collar of pronotum, tubercles confluent with an interrupted band on hind margin of disk of pronotum, and a small spot at anterior end of mesopleura creamy white. Clypeus with two brown discal stripes. Lateral face marks generally narrowed above to end bluntly at lower end of foveae. Supraclypeal mark more or less strongly intruded between antennal sockets. Mandibles more or less testaceous beyond the base with apex or sometimes the apical half red. Labrum testaceous. Abdomen fuscous or blackish above, with a yellow band, not reaching the lateral margins, on tergites 1 to 4 or 5, the bands all basal except on tergite 1, and that on tergite 5 if present usually interrupted. Venter yellowish. Flagellum of antennae above, mark on pedicel, and apex of scape blackish, then antennae otherwise pale yellow. Legs blackish, apex of front and middle femora, the anterior side of middle tibiae, front tibiae except behind, and front and middle tarsi yellow. Tegulae yellowish at base and testaceous hyaline on outer margin. Wings subhyaline, the nervures and margins of stigma testaceous yellow. Length, about 5–5.75 mm.; anterior wing, 3.2–3.6 mm.

Male.—Head and thorax dark, with yellowish to whitish markings as follows: anterior half of underside of head, mandibles except red tips, labrum, face nearly to level of foveae (the upper margin uneven, with the green descending slightly on each side), a broad T-shaped mark on the mesosternum and sides of thorax, isolating a large green mark beneath tubercles, and the flanks more or less of the propodeum. Antennae yellow, the flagellum narrowly pale brown to fuscous above, the pedicel and apex of scape also fuscous above. Legs yellow, with a more or less developed fuscous blotch on posterior side of all the femora, and on front and middle tibiae the hind tibiae also dark except beneath, and the hind tarsi pale brownish. Abdomen fuscous above, with a yellow band, almost reaching lateral margins, on tergites 1 to 5; tergites 6 and 7 and the venter testaceous to yellowish. Tegulae and wings as in female. Length, 4–5 mm.; anterior wing, 2.9–3 mm.

The type material of *monardae* has been examined at Philadelphia, and new material as follows: 1 male, Gloucester Co., New Jersey, Aug. 16, 1891 (W. J. Fox); 2 males from Department of Agriculture in U. S. National Museum, without further data; 2 females, Cape Henry, Princess Anne Co., Virginia, Sept. 9, 1924 (W. S. Fisher); and 13 males, 13 females, St. Augustine, St. John Co., Florida, on *Monarda punctata*, July 28, 1956, (R. C. Dickson).

Perdita gerhardi dallasiana Cockerell

(Figs. 534, 535, 668)

Perdita dallasiana Cockerell, 1906, Entomologist, 39:178, ♂.

Female.—Similar to *monardae* and sometimes not distinguishable, but abdomen frequently dark, with the yellow bands evanescent or lacking. Length, about 4–5 mm.; anterior wing, 3–3.2 mm.

Male.—Similar to *monardae*, but more variable in color. Darker specimens have nearly the same markings, but the marks on sides of the thorax small. Light specimens have white or yellowish markings as follows: face light straight across above antennae, with a narrow extension on orbits to summit of eyes, an interrupted band on vertex, anterior corners of mesoscutum and two narrow submedian stripes on disk, axillae, and narrow posterior margin of the scutellar

sclerite, and a large mark on middle of propodeum as well as one on the flanks. Abdomen sometimes dark with yellow bands as in *monardae*, but usually yellow with a brown band at base of tergite 1 and a narrow pale brown band at junction of tergites 1-2 to 4-5. Length, about 3.5-4.5 mm.; anterior wing, 2.7-2.9 mm.

The type locality of *dallasiana* is Dallas, Texas, where it was taken at flowers of *Helianthus*, and it was also originally recorded from Rosser, Kaufman County. Additional material examined as follows.—TEXAS: 1 male, Tyler, Smith Co., in peach orchard, June 14, 1938 (Christenson); 4 males, 1 female, Jacksonville, Cherokee Co., on *Monarda citriodora*, June 28, 1906 (F. C. Bishopp); 1 male, Handley, Tarrant Co., on *M. punctata*, June, 1906 (J. C. Crawford; 2 males, 4 females, Wolfe City, Hunt Co., on *M. citriodora*, June 16, 1908 (Bishopp); 1 male, Fedor, Lee Co., June 7 (Birkmann); long series, Raymondsville, Willacy Co., on *M. citriodora* and *Aster tenacetifolius*, April 17, 1952 (C. D. Michener, R. H. and L. D. Beamer, Wille, and W. La Berge); 27 males, 6 females, 6 miles south of Raymondsville, on *Helianthus annuus*, April 4, 1952 (Michener, Beamers, Wille, and La Berge); 7 males, 5 females, Giddings, Lee Co., on *Dalea aurea*, May 12, 1953 (L. D. Beamer); 20 males, 14 females, Giddings, on *Monarda*, May 9, 1954 (R. H. Beamer); 1 male, 1 female, Goliad, Goliad Co., on *Dalea aurea*, May 8, 1953 (L. D. Beamer); 5 males, 2 females, McDade, Bartrop Co., on *Monarda*, May 10, 1954 (L. D. Beamer); 15 males, Catarina, Dimmit Co., on *M. punctata*, April 4, 1952 (Beamers, Stephen, Rozens and Michener); 2 females, Rachal, Brooks Co., May 12, 1952 (M. Cazier, W. Gertsch and R. Schrammel).

Perdita stepheni, n. sp.

(Figs. 536, 537, 669)

This little bee was taken with *dallasiana* at flowers of *Monarda* and agrees closely with *gerhardi* in structural characters, but the divergence in the color markings is much greater than can be expected within specific limits.

Male.—Head and thorax dark green. Inferior orbits at anterior end of eyes, base of mandibles, labrum, and face below level of antennae pure white, the lateral marks broad and ending almost in their full width and in a broad convex curve barely above level of summit of antennal sockets. Mandibles red at apex and shading into white at middle. Collar of pronotum, small spot at posterior corners of disk, and tubercles pale yellow. Abdomen dark ferruginous, tinged with fuscous on the first two tergites; two opposed tear-shaped marks at summit of basal declivity of tergite 1 and a nubilous, interrupted, and enclosed band at base of tergite 2 pale yellow; traces of another interrupted band on tergite 3. Venter ferruginous, tinged with yellow, and with a large fuscous mark on each side of first segment. Legs fuscous, the front coxae and trochanters, anterior edge of front femora, front tibiae except behind, apex of middle and hind coxae and their trochanters except beneath, middle and hind knees, and front and middle tarsi, pale yellow, the hind tarsi pale brown. Antennae fuscous above and pale yellow beneath, a little duller yellow on the flagellum. Tegulae testaceous hyaline, and brownish edged with yellowish at base. Wings dusky hyaline, the nervures testaceous, margins of stigma and subcosta brown.

Head somewhat broader than long, the cheeks nearly as wide as the eyes. Proboscis rather short and probably included within the fossa in repose. Mandibles tapering and not quite reaching far margin of proboscoidal fossa. Disk of clypeus only slightly broader than high, the lateral extensions almost as broad as the labrum and fully visible in frontal view of head. Antennae a little shorter and the flagellum thicker than in *dallasiana* from same locality. Facial foveae oval, about twice as long as wide. Venation normal, the parts of marginal cell beneath and beyond the stigma about equal, the second submarginal cell narrowed two-thirds or less above. Tergite 7 narrowed gradually from its base to its narrow rounded apex. Head and thorax tessellate, moderately dull, the frons duller than the mesonotum, punctures of frons and mesonotum minute and moderately close, those of frons faint. Pubescence whitish, abundant, moderately short, and coarse, becoming longer on the underside of thorax. Subgenital plate

narrowly triangular, much longer than wide, a little recurved, and very acute at apex, but not so thinly acute as in *gerhardi*. Genitalia similar to some parts in *gerhardi*, but caulis more slender, the retaining rim of the basal orifice but little developed, and the sagittae slightly longer. Length, 3.75 mm.; anterior wing, 2.4 mm.

One male (holotype), Catarina, Dimmit Co., Texas, on *Monarda punctata*, April 11, 1950 (Michener, Beamers, Rozens, and W. P. Stephen), in collection of the University of Kansas.

Perdita variegata variegata, n. subsp.

(Figs. 538, 539, 670)

This species is closely allied to *gerhardi* and apparently replaces it in Kansas, although forms of both species occur in Texas. Both species vary from mainly dark green to entirely yellow, and the females are in some cases hardly distinguishable, but the male of *variegata* can be separated from *gerhardi* by the more or less protruded and recurved tip of the subgenital plate. Like *gerhardi*, *variegata* is primarily a visitor of *Monarda*.

Female.—Head and thorax normally dark green, marked with creamy white as follows: mandibles except tips, clypeus except usual pair of dark dots, and two arcuate brown stripes on disk, lateral marks, twice as high as wide and truncate above at level of foveae (sometimes with an orbital spur between fovea and eye margin), supraclypeal mark and often a small adjacent spot on subantennal plates, often two lines or spots, which may become confluent and enlarged on middle of frons, tubercles, collar of pronotum and interrupted band on hind margin of disk, often a line on the hind margin of the mesoscuteller sclerite from one hind wing base to the other, often a small spot on mesepisternum behind the tubercles and sometimes two more or less developed submedian lines on disk of mesoscutum. Abdomen blackish, with an enclosed yellow band on tergites 1 to 5, those on tergites 2 to 5 basal; tergite 6 ferruginous, the venter mainly dark. Labrum testaceous, more or less infuscated at base. Antennae fuscous becoming pale yellowish beneath. Legs dark, the hind knees, apex of front and middle femora, the front and middle tibiae except behind, and the tarsi pale yellow. Tegulae yellow, with the outer margin subhyaline. Wings hyaline, but somewhat opaque from the close-set, microscopic discal setae, the nervures and margins of stigma pale testaceous.

Head as broad as long, with the face moderately convex. Mandibles simple, acute at apex, and reaching far margin of proboscis fossa. Proboscis moderately long, not exceeding the fossa in repose. Facial foveae narrow, elongate, about their own width from margin of eyes, and reaching from level of antennal sockets about two-thirds of distance to level of anterior ocellus. Marginal cell with the parts beneath and beyond stigma about equal. Pygidial plate as long as wide at base, the sides converging to the notched apex, the teeth on each side of notch sharply triangular and about equal to the notch. Head and thorax minutely, densely tessellate and dull, without evident punctation, the face below antennae and the abdomen more shining. Pubescence whitish, moderately abundant, rather short, erect and somewhat mosslike on face and mesonotum and moderately long on cheeks, underside of thorax and at apex of abdomen. Length, about 5–5.75 mm.; anterior wing, 3–3.4 mm.

Var. a.—Light markings much enlarged. Head mainly yellow with a large dark mark on each side of frons and a dark line from each lateral ocellus to the adjacent eye. Mesoscutum, scutellum, metanotum, and base of propodeum yellow, the scutum with three triangular dark vittae, the two outer ones narrowed to a point on hind margin of disk, the median one broadest behind and falling far short of the hind margin of disk. A large yellow mark on mesepisternum, broad in front and narrowed behind. Abdomen yellow, with base of tergite 1 and band at junction of tergites 1–2 to 5–6 fuscous.

Male.—Head and thorax dark green, with pale-yellow markings, the face below antennae white. Light marking very variable in extent, the face sometimes mainly light almost to occipital margin, with a broken dark band through ocelli and a green mark on each side of frons, the

yellow of vertex connecting or almost connecting with yellow of cheeks; or the vertex may be more or less solidly green and confluent with green marks of frons, the yellow on sides of face extending upward above foveae and then turning inward; at least anterior half of underside of head pale yellow. Pronotum pale yellow, with a black crossband which is narrowed on the flanks. Lateral margins of mesoscutum, two submedian lines on disk which unite and delimit a transverse mark on middle of hind margin, a spot on axillae, line on posterior margin of scutellar sclerite, two marks, often confluent, on anterior part of mesepisternum, and mark on the flanks of propodeum yellow. Sometimes the yellow markings of thorax expanded, the mesoscutum becoming yellow with three green marks, the two lateral ones triangular with broad end forward, the median one shorter, sometimes more or less rounded or even evanescent, the disk of scutellum more or less yellow, the hind margin of the metanotal sclerite yellow, and the yellow marks on pleura very large. Abdomen fuscous, with a yellow band, not quite reaching lateral margins on tergites 1 to 6, or in lighter specimens mainly yellow, with seven dark bands including one at base of tergite 1; the apical tergite and venter usually entirely yellow or testaceous yellow. Antennae pale, yellow, narrowly fuscous above from base of scape to apex of flagellum, the flagellum otherwise becoming brighter yellow toward apex. Legs yellow, the posterior side of hind coxae and blotch or broad stripe on posterior side of all the femora and tibiae fuscous, the hind tibiae sometimes entirely dark except at base, the hind tarsi dark. Tegulae and wings as in female.

Head rather large and somewhat broader than thorax but not much broader than long, cheeks a little broader than the eyes and simple. Mandibles tapering, acute at apex, and reaching far margin of proboscival fossa. Facial foveae elongate oval, about three times longer than wide. Head and thorax minutely tessellate, moderately dull, and impunctate, the face below antennae more shining. Pubescence whitish, moderately abundant, and moderately short and erect on face and mesonotum. Tip of subgenital plate and sometimes apex of sagittal rods of the aedeagus slightly protruded in dry specimens, and both recurved, the former downward, the latter upward. Subgenital plate triangular, about twice as long as wide at base, the recurved apex slightly rounded. Caulis of genitalia narrower than in most other species of this group, somewhat less than twice as long as the slender parameral lobes, the latter in lateral view widest beyond the middle and acute at apex; fused sagittae slenderly fusiform, with the free tips close together and strongly curved upward. Length, about 3.5-5 mm.; anterior wing, 2.8-3.4 mm.

Twenty-eight females, 153 males (holotype female, allotype, and paratypes), Garden City, Finney Co., Kansas on *Monarda punctata* var. *occidentalis*, June 15, 1949 (Michener and Beamer). Additional material from Kansas examined as follows:—1 female (var. *a*), Morton Co., 3,200 feet (F. H. Snow); 1 male, Barton Co., 1,816 feet (F. X. Williams); 1 male, Great Bend, Barton Co., June 11, 1938 (H. B. Hungerford); 4 males, Dodge City, Ford Co., June 12, 1938 (Hungerford); 2 males, St. John, Stafford Co., June 26, 1926 (E. G. Anderson); 25 females, 37 males, 9 miles north of Caldwell, Sumner Co., on *Monarda*, June 11, 1952 (Wille and Michener); 8 females, 15 males, 9 miles east of Medicine Lodge, Barber Co., on *Monarda*, June 11, 1952 (Wille and Michener); 10 females, 62 males, 7 miles east of Garden City, Finney Co., on *Monarda*, June 12, 1952 (Wille and Michener); 1 female, 1 male, Larned, Pawnee Co., on *Monarda*, June 14, 1949 (Michener and Beamer); 1 female, 3 males, Larned, on *Monarda*, June 12, 1952 (Wille and Michener); 1 female, 10 miles east of Larned, on *Monarda*, June 12, 1952 (Wille and Michener); 21 females, 5 males, 26 miles east of Larned, on *Monarda*, June 12, 1952 (Wille and Michener); 1 female, 5 miles west of Nickerson, Reno Co., on *Monarda*, June 12, 1952 (Wille and Michener); 5 males, Hutchinson, Reno Co., on *Monarda*, June 13, 1952 (Wille and Michener).

Types in collection of the University of Kansas, Lawrence; 9 paratypes retained at Riverside.

Perdita variegata pura, n. subsp.

This is a yellow form of *variegata* with the dark markings evanescent or absent. Specimens collected in the vicinity of Garden City, Kansas, although almost en-

tirely yellow, presumably are extreme variants of the typical subspecies, but the yellow form may be dominant in parts of Texas.

Female.—Entirely yellow except foveae of frons and second tergite black. Spot at apex of scape, pedicel, and flagellum above brownish fuscous. Sometimes (paratype) there is an evanescent dark band at junction of tergites 1-2 to 3-4, a dark dot at basal corners of tergites 2 to 4, a dark line in the crease on the flanks of pronotum, and the tibiae except at base and the hind tarsi fuscous. Length, 5 mm.; anterior wing, 3.3 mm.

Male.—Yellow, the face below antennae whitish. Foveae of face and second tergite dark. A small brown spot on posterior side of hind femora near apex and a brown suffusion on posterior side of hind tibiae. In the Kansas males the tibiae and hind femora are streaked or blotched with fuscous behind, and one has a short dark line on each side of frons, the crease of pronotal flanks dark and a faint dark band at junction of tergites 1-2 to 4-5. Length, about 4 mm.; anterior wing, 3-3.2 mm.

One female, 1 male (holotype female and allotype), Uvalde, Uvalde Co., Texas, Nov. 14, 1913 (F. C. Bishopp); 1 female (paratype), Romero, Hartley Co., Texas, June 22, 1940 (L. J. Lipovsky); 5 males (paratypes), Garden City, Finney Co., Kansas, on *Monarda punctata* var. *occidentalis*, June 15, 1949 (Michener and Beamer); and 2 males (paratypes), 7 miles east of Garden City, on *Monarda*, June 12, 1952 (Wille and Michener).

Types in collection of the U. S. National Museum; paratypes in collection of the University of Kansas, except two retained at Riverside.

Perdita maculigera maculigera Cockerell

Perdita maculigera Cockerell, 1896, Ent. News, 7:255, ♂.

This species is remarkable for the peculiarly broadened and bicolored pterostigma, the compressed and reflected subgenital plate, and the distinctive genitalia of the male. It varies from nearly all yellow in the south to the mainly dark green *maculipennis* in the north.

Female.—Pale sulphur yellow, the face below antennae more whitish, the foveae of face and second tergite black. Two oblique marks on frons, converging toward anterior ocellus, spot between anterior ocellus and each lateral ocellus, oblique mark on inner side of summit of eyes sometimes nearly reaching occipital margin, spot at middle of anterior margin of mesoscutum and sometimes two narrow lines on disk, and large mark on each side of mesopectus dark green. Base of tergite 1, two transversely oval sublateral marks on apical margin of tergites 1 to 5, those on tergite 5 very small, and a small rounded spot on basal corners of tergites 2 to 5 black, the apical marks sometimes superimposed on a narrow, more or less faint, brownish apical band. Antennae yellow, a narrow triangular mark on upper side of scape and on pedicel and flagellum above fuscous. Legs yellow, a narrow line on posterior side of front and middle femora and tibiae, spot above on hind femora near apex, outer side of hind tibiae, and the hind tarsi fuscous. Tegulae yellow at base and hyaline on outer margin. Wings hyaline, the nervures testaceous yellow, the subcosta and stigma except basal part brown or fuscous.

Head a little broader than long. Proboscis in repose included within the fossa, the galeae much shorter than the stipites. Facial foveae slender, about two-thirds as long as space between antennal sockets and anterior ocellus, slightly more than their width from margin of eyes. Pterostigma much expanding toward apex and the marginal cell very broad on basal half, where it is as wide as the submarginal cells, and with the part beneath the stigma somewhat less than half as long as the following part. Pygidial plate about as long as basal width, the sides converging to the notched apex, with points on each side of the notch a little broader than long and rounded at apex. Head and thorax rather delicately tessellate, moderately shining, the mesonotum with sparse, very minute punctures. Pubescence whitish, moderately abundant, fine and erect, becoming rather short on the face and mesonotum. Length, about 5 mm.; anterior wing, 3.8-4 mm.

Male.—Similar to female, but the dark markings larger, the mesoscutum usually with three dark vittae, the median one not reaching the posterior margin of disk, the recessed parts of scutellum and metanotum black, propodium with a V-shaped dark mark, or entirely dark except on flanks, and abdomen distinctly banded except that the markings on last three segments are reduced to spots; dark markings of head and thorax generally black or rather faintly greenish.

Head distinctly broader than long. Mandibles tapering and reaching far margins of proboscis fossa. Facial foveae very small, about twice as long as wide. Sculpture and pubescence nearly as in female, but the frons and vertex more definitely duller than the mesonotum. Subgenital plate broad across the base of disk but twice as long as wide, with more than half of the length compressed into a thin plate that is reflected downward at an angle of nearly 45 degrees and as seen from side a little widened and oblique at apex. Ventral segment 7 with a large circular emargination fringed with short hair, the apical opening taking up about one-fourth of the circumference. Parameral lobes of genitalia slender and about as long as the caulis, and in lateral view tapering gradually from base to rather acute apex; sagittae very slenderly fusiform, with spreading tips, the extreme tips produced into short filiform points curving downward. Length, about 4–4.5 mm.; anterior wing, 3.2–3.5 mm.

Cockerell's type of *maculigera* was taken May 2, 1896, on *Salix* at Las Cruces, Dona Ana Co., New Mexico. New material examined as follows.—4 females, 7 males, Las Cruces, on *Salix*, June 12, 1950 (R. H. Beamer); 1 female, 4 males, Las Cruces, on *Salix*, April 25, 1954 (Beamer); and 1 male, Southmost, Cameron Co., March 27, 1951 (C. D. Michener).

Perdita maculigera var. *bilineata* Timberlake

Perdita maculipennis var. *bilineata* Timberlake, 1929, Jour. New York Ent. Soc., 37: 121, ♀.

This form of *maculigera* is an intergrade between typical *maculigera* and *maculipennis* and there is as yet no evidence that it is stabilized anywhere. It differs from *maculipennis* mainly in having two fine lines on the disk and sometimes the lateral margins of mesoscutum yellow.

The type of *bilineata* is a female from Wittenberg, Perry County, Missouri, and similar specimens have been recorded from Savanna, Carroll County, Illinois.

Additional specimens agreeing with *bilineata* have been examined as follows.—1 female, Elk Point, Union Co., South Dakota, June 24, 1926 (H. C. Severin); 1 female, Hot Springs, Fall River Co., South Dakota, July 9, 1924 (probably Severin); 2 males, Mitchell, Scotts Bluff Co., Nebraska, June 16, 1916 (R. W. Dawson and C. E. Mickel); and 2 females, 1 male, Hamilton Co., Kansas, 3,350 feet (F. H. Snow).

Perdita maculigera maculipennis Graenicher

(Figs. 540, 541, 671, 672)

Perdita maculipennis Graenicher, 1910, Canad. Ent., 42:102, ♀; Graenicher, 1914, Canad. Ent., 46:54, ♂; Timberlake, 1929, Jour. New York Ent. Soc., 37:121.

Female.—Dark green, the labrum at base, anterior margin and the broad marks on disk of clypeus, anterior end of lateral plates of face, subantennal plates, and supraclypeal area black. Mandibles except reddened tips, ground color of clypeus, lateral marks reaching level of antennae, scape of antennae beneath, collar of pronotum, small spot on posterior corners of disk, and tubercles pale yellow. Abdomen blackish, with two small transverse spots on tergite 1 and a more or less narrow interrupted basal band on tergites 2 to 4 or 5, yellow. Antennae fuscous to blackish, the flagellum dull yellow beneath. Legs blackish, apex of front and middle femora in front and anterior side of front and middle tibiae, and front tarsi except outer edge, yellow. Tegulae yellow at base and broadly subhyaline on outer margin. Wings hyaline, slightly opaquely whitened, the nervures testaceous brown, the stigma blackish or fuscous on a little more than apical half except on outer margin, the base whitish.

Structural characters, sculpture and pubescence as in *maculigera*, the frons and vertex somewhat duller than the mesonotum. Length, about 5-6 mm.; anterior wing, 4-4.3 mm.

Male.—Head and thorax dark green. Mandibles except tips, labrum, face to level of foveae, sometimes a dot in front of lateral ocelli, cheeks broadly in front and narrowly above sometimes to summit of eyes, collar of pronotum, posterior corners of disks, tubercles, and inferior part of flanks of pronotum, T-shaped mark on mesosternum, a small spot on pleura behind tubercles, and spot on flanks of propodium yellow. Abdomen dark, with an interrupted yellow band on tergites 2 to 5 or 1 to 6.

Other characters as in *maculigera*. Length, 4-5.25 mm.; anterior wing, 3.2-4.1 mm.

The type locality of *maculipennis* is Milwaukee, Wisconsin, and it has been recorded also from near Genoa, Vernon Co., Wisconsin, and from Oregon, Ogle Co., Illinois. According to Graenicher it collects pollen from *Melilotus albus*, but other collectors have taken it on willow. New material of *maculipennis* has been examined as follows.—IOWA: 2 females, Ames, Story Co., on *Salix*, June 3, 1956 (W. E. La Berge). KANSAS: 92 females, 16 males, Lawrence, Douglas Co., May 18, 1955 (C. W. Rettenmeyer); 1 female, 3 males, Lawrence, on *Salix*, May 25, 1958 (C. D. Michener); 1 female, 1 male, Lake View, Douglas Co., on *Erigeron philadelphicus*, June 10, 1950 (J. R. White and Michener); 1 female, Hamilton Co., 3,350 feet (F. H. Snow). TEXAS: 8 females, 52 males, Palestine, Anderson Co., May 2, 1950 (R. F. Smith); and 1 male, Franklin Robertson Co., May 2, 1950 (R. F. Smith).

In the series from Lawrence about two males out of nine, but none of the females, have the yellow markings of *bilineata* more or less developed on the mesoscutum; and in the series from Palestine none of the females and twelve of the males have the same pale markings.

Perdita bridwelli, n. sp.

(Figs. 542, 543, 673)

P. bridwelli is one of our most distinctive species. The female has creamy-white markings, the legs and abdomen mainly pale, and the face markings extending above antennae for a short distance, with narrow orbital lines to summit of eyes. The pubescence is white, subappressed, and unusually dense for a *Perdita*. The male is similar but with much brighter yellow markings. The closest ally of this species is apparently *P. beatula*.

It is a pleasure to name such an interesting species in memory of its discoverer, the late J. C. Bridwell.

Female.—Head and thorax dark green, the mandibles except red tips, labrum, face to level of antennae and straight across for a short distance above them, narrow orbital lines extending around summit of eyes and slightly expanding above the foveae, lower cheeks to middle of eyes and usually extending inward anteriorly to proboscival fossa, and pronotum, except line or blotch on flanks, creamy white. Clypeus with the usual pair of dark dots. Green color of frons descending to lower end of foveae on each side and more or less notched by the white in median line. Abdomen creamy white, with a pair of brown or fuscous spots at summit of basal declivity and close to apex of tergite 1; pair of similar spots at apex of tergites 2 and 3, and narrow band at base of tergites 2 to 5, expanding at basal corners of tergites 2 or 3 to 5; or in darker specimens these maculations enlarged, the mediolateral spots on tergite 1 extending obliquely basad and inward and uniting with a dark line in the median crease, and the spots at basal corners of tergites 2 to 5 extending halfway to apex of segments. Antennae pale yellow, the flagellum tinged with pale brown above, a spot at apex of scape, the pedicel above, and a transverse mark on the next four joints pale fuscous. Legs white, the femora more or less completely brown or blackish except broadly at apex, and a dark streak or blotch on posterior side of middle and hind tibiae, and more rarely on front tibiae; or in pale specimens legs almost entirely white with a narrow

blotch on hind femora and a blotch on hind tibiae. Tegulae subhyaline with a yellowish spot at base. Wings whitish hyaline, the nervures pale yellowish, the subcosta and margins of stigma sometimes slightly brownish.

Head rotund, about as broad as long. Glossa and galeae of proboscis slightly exceeding proboscis fossa in repose. Mandibles tapering to acute apex. Facial foveae a little wider than the interval between them and eyes, and extending from upper level of antennal sockets about three-fourths of distance to level of anterior ocellus. Venation of wings normal, the part of marginal cell beyond stigma somewhat longer than the part beneath. Pygidial plate somewhat broader across the base than long, the sides converging more or less arcuately to the moderately narrow and strongly notched apex, with the points defining the notch rather obtuse. Head and thorax rather delicately tessellate and shining, the frons and mesonotum with close very fine punctures. Pubescence white, short, subappressed, and mosslike on frons and mesonotum and longer and more erect on occiput, cheeks, underparts of thorax, legs, and apex of abdomen; the face below antennae nude. Length, about 4.5–5.5 mm.; anterior wing, 3.3–3.7 mm.

Male.—Similar to female but light parts bright yellow. Orbital stripes above antennae sometimes broad enough to enclose the foveae and extending around the summit of eyes to unite with postorbital stripes which are very narrow above, but anterior half of undersurface of head entirely yellow. Pronotum and legs entirely yellow except for a dark streak on underside of hind femora and posterior side of hind tibiae, but darker specimens have a dark blotch on all the femora and tibiae and a dark line in the crease of the flanks of pronotum. Abdomen yellow, with a brown or fuscous band at base of tergite 1, a small transversely oval mark subapically on each side of tergites 1 and 2, and a spot at basal corners of tergites 2 to 5; in darker specimens these maculations are enlarged, especially the spots on basal corners of tergites 2 to 4. Antennae yellow, a fuscous spot on scape above, another on the pedicel, and small brownish spots on following joints, these markings sometimes evanescent or distinct but fading out gradually toward apex of flagellum. Tegulae and wings as in female. Sometimes the orbital band opposite summit of eyes is much broadened and produced inward, and the flanks of propodeum rarely exhibit a yellow mark, and the mesepisternum a small yellow spot behind the tubercles.

Head not enlarged, rounded, about as broad as long. Cheeks as broad as the eyes and unarmed. Mandibles a little more slender than in female, more acute at apex and reaching far margin of proboscis fossa. Facial foveae about three to four times longer than wide. Sculpture and pubescence essentially as in female. Median lobe of seven tergites moderately produced and truncate or slightly rounded at apex. Subgenital plate narrowly triangular, larger than wide at base, very acute at apex, which is produced into a short filiform point. Genitalia similar to those of *beatula*, the parameral lobes more acute in lateral view, the sagittae not or only slightly spreading apart at tip and more strongly curved downward at apex as seen from the side. Length, 3.1–5 mm.; anterior wing, 2.2–3.4 mm.

One female, 3 males (holotype male, allotype, and paratypes), Imperial Co., California, probably near Meloland, on *Sphaeralcea orcuttii*, April, 1911 (J. C. Bridwell). Also the following paratypes.—ARIZONA: 2 males, Wellton, Yuma Co., May 5–6, 1918 (J. C. Bradley). CALIFORNIA: 3 females, 2 males, Olancho, Inyo Co., June 3 and 5, 1917 (C. L. Fox); 34 females, 26 males, near Westmoreland, Imperial Co., west of town, on *S. orcuttii*, May 31, 1930 (Timberlake); 1 female, Andrade, Imperial Co., on *Sphaeralcea*, April 12–14, 1939 (Juanita Hearst); 5 females, 10 males, 3 miles southwest of El Centro, Imperial Co., on *S. orcuttii*, March 21 and 27, 1951 (R. A. Flock); 1 male, 1.8 miles east of Hopkins Well, Riverside Co., on *S. emoryi*, Oct. 23, 1951 (Timberlake); 2 males, 18 miles west of Blythe, Riverside Co., on *S. emoryi*, April 29, 1952 (Timberlake and P. D. Hurd, Jr.); and 5 females, 2 males, 2 miles north of Kane Springs (junction of Highways 99 and 78), Imperial Co., on *S. orcuttii*, May 1, 1952 (Timberlake).

Types in the U. S. National Museum (No. 43,399); paratypes in collection of the University of California at Riverside and Berkeley, Cornell University, and the California Academy of Sciences.

Perdita luteiceps Cockerell

(Figs. 544, 545, 674)

Perdita luteiceps Cockerell, 1896, Proc. Acad. Sci., Phila., 48:74, ♂; Timberlake, 1929, Jour. New York Ent. Soc., 37:112, ♀.

Perdita zebrata Cresson, 1878, Trans. Amer. Ent. Soc., 7:69, ♀ (in part, not the type as restricted by authors).

The type locality of *luteiceps* is Glenwood Springs, Garfield County, Colorado, whence Cockerell had only one male collected by Gillette. The four females that Cresson included under *zebrata* must, without any doubt, belong here. The species remains very rare in collections, and I have only two additional specimens to record.

Female.—Head and thorax dark brassy green, the propodeum bluish. Face yellow below level of antennae and sometimes extending above antennae to level of foveae with a narrow median extension to anterior ocellus, the green descending narrowly and obliquely on each side to antennal sockets; or the frons may be dark, except for a median notch, or a small yellow central spot, with green descending to the middle of the subantennal plates. Pronotum yellow, with a dark crossband from flank to flank, the thorax otherwise dark except a narrow yellow line across apex of scutellar sclerite. Abdomen yellow with a narrow brown band at apex of tergites 1 to 4, more or less accentuated into, or reduced to a transverse oval mark on each side, a small spot on each side of basal declivity of tergite 1, and a small spot on basal corners of tergites 3 and 4. Legs yellow, with about apical half of hind tibiae infuscated, and the hind tarsi dusky. Antennae yellow, the flagellum brown above. Tegulae broadly subhyaline, with a yellow basal spot. Wings hyaline, a little opaque, the nervures pale yellow, the stigma except margins whitish.

Head rotund, as broad as long. Mandibles tapering to acute apex. Facial foveae slender, about as wide as interval between them and eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Proboscis ordinary. Pygidial plate about as long as wide at base, moderately narrow and rounded at apex, without a median notch. Frons and mesonotum finely and densely tessellate and rather dull, the face below antennae smoother and shining, the frons impunctate, the mesoscutum with sparse fine punctures. Pubescence whitish, rather sparse and erect, the hair of mesonotum a little shorter than that elsewhere. Length, 4 mm.; anterior wing, 3 mm.

Male.—Head mainly yellow, the occiput and part of vertex dark green, the green enclosing ocelli but not reaching summit of eyes, and behind the ocelli there may be a transverse yellow band more or less enclosed by the green. Thorax dark green, the pronotum yellow except a narrow band from flank to flank, a short transverse mark across middle of posterior border of mesoscutum, apical half of scutellum and line to wing base on each side, small spot in recess on each side of metanotum, spot on mesepisternum behind tubercles and T-shaped mark on mesosternum yellow. Abdomen yellow, with a dark band at junction of tergites 1-2 to 5-6, and a transversely oval mark more accentuated on each side of the apex of segments. Legs yellow, with a brown or fuscous patch on posterior side of middle femora and tibiae, and the hind legs mostly dark except at base and at knee joint. Antennae yellow, a small brown spot on upper side of pedicel and the flagellum slightly brownish above. Tegulae and wings as in female.

Head rotund, as broad as long, the cheeks no broader than the eyes and unarmed. Mandibles rather short, tapering, and acute at apex. Facial foveae small, slightly longer than wide. Sculpture and pubescence about as in female. Subgenital plate triangular, as long as wide at base and acute at apex. Caulis of genitalia broadly oval, not much longer than wide, the parameral lobes but little more than half as long and very broad across their base in lateral view; sagittae short, the fused part widened and angulate on each side near middle in dorsal view, thence narrow to subacute apex, and rather slenderly fusiform and curved in lateral view. Length, about 4 mm.; anterior wing, 2.8 mm.

New material of *luteiceps* examined as follows.—COLORADO: 1 female, Alamosa, Conejos Co., Sept. 2, 1921 (Carl D. Duncan); and 1 male, Steamboat Springs, Routt Co., Aug., No. 1414 (C. F. Baker).

Perdita trifida, n. sp.

(Figs. 546, 547, 675)

This species from the Mohave Desert of California is similar to *luteiceps*, but the dark part of head and thorax more blue-green, the legs bright yellow with outer side of hind tibiae and tarsi and a slight streak on middle tibiae infuscated, the basal mark on abdomen strongly trifid, and the head and thorax more shining.

Male.—Head and thorax dark blue-green, the following parts bright yellow; mandibles except red tips, face to level of anterior ocellus, anterior half of undersurface of head, a mark on vertex behind ocelli and one on cheeks behind upper half of eyes, the pronotum, transverse mark on middle of hind border of mesoscutum, and anterior part of mesepisternum, and middle of mesosternum; or sometimes the yellow includes most of head, except a broad green band through ocelli, with a narrow orbital streak behind summit of eyes, also a median mark at anterior end of mesoscutum, the axillae and median mark on propodeum, as well as sides and sternum of thorax except a large dark mark on each side of mesopectus and an equally large mark on pleura just above. Abdomen yellow, a trifid mark at base of tergite 1 and narrow band at junction of tergites 1-2 to 4-5 fuscous. Legs yellow, the outer side of hind tibiae and tarsi and a narrow streak on outer margin of middle tibiae fuscous. Antennae yellow, the upper side of pedicel blackish, the upper margin of flagellum narrowly brown, the dark color mostly fading out beyond the middle joints. Tegulae yellow at base and broadly subhyaline on outer margin. Wings hyaline, the nervures and margins of stigma testaceous, the subcosta somewhat more brownish.

Head rotund, as broad as long, the cheeks evenly rounded, about as wide as the eyes. Mandibles ordinary, tapering, and acute. Facial foveae small, punctiform, a little longer than wide. Proboscis rather short, the galeae shorter than stipites. Parts of marginal cell beneath and beyond stigma about equal. Median lobe of tergite 7 about as long as wide and narrowed to the rounded apex. Vertex and mesonotum finely tessellate and rather shining, the yellow frons more opaque and impunctate, the mesoscutum with moderately close minute punctures. Pubescence white, moderately thin and erect, the hair of mesonotum hardly shorter than that elsewhere on head and thorax. Subgenital plate triangular with a short nipple-shaped apex, the apical part rather hairy. Caulis of genitalia less broadly oval than in *luteiceps*, the apical lobe on each side of the median fissure subtruncate instead of oblique, and the sagittae more acute at apex in both dorsal and lateral views. Length, about 4.5 mm.; anterior wing, 2 mm.

One male (holotype), Hinkley, San Bernardino Co., California, on *Aplopappus (Isocoma) acradenius*, Oct. 7, 1928 (Timberlake); and 8 males (paratypes), Victorville, on same flower, Sept. 28, 1938 (Timberlake).

Type in collection of the U. S. National Museum (No. 43,398), the paratypes in collection of the Citrus Experiment Station, Riverside.

Perdita flaviceps, n. sp.

(Figs. 548, 549, 676)

P. flaviceps and *trifida* are remarkably similar in markings, but *flaviceps* is a little more shining, with longer and finer pubescence and with distinctive genitalia.

Male.—Dark parts of head and thorax dark olive green, the propodium blue-green. Head mainly bright yellow, with median half of occiput and band across vertex, mostly behind the ocelli, green, but enclosing five yellow spots, the median one behind ocelli, two lateral ones behind summit of eyes, and two submedian ones on occipital margin and extending well onto the occiput. Pronotum yellow except a dark streak on each flank. Small irregular or unsymmetrical spot on scutellum, broad mark on middle of mesopectus extending laterally to cover anterior

half of mesepisternum and two spots on flanks of propodeum yellow. Abdomen yellow, with trifold band at base of tergite 1 and narrow band at junction of tergites 1-2 to 5-6 brown. Legs yellow, the outer margin of hind tibiae except basal third, outer margin of hind basitarsi, and the four apical joints of hind tarsi brownish. Antennae yellow, with a spot on pedicel and on next eight or nine joints above brown, but the spots becoming progressively smaller and fainter toward apex of flagellum. Tegulae yellow at base and subhyaline on outer margin. Wings hyaline, the nervures testaceous, the subcosta and margins of stigma a little browner.

Head slightly broader than long, the cheeks unarmed and about as wide as the eyes. Mandibles tapering, acute, and not quite reaching the far margin of proboscival fossa. Facial foveae small and nearly twice as long as wide. Marginal cell with the part beyond stigma somewhat longer than the part beneath. Vertex and mesonotum finely tessellate and rather shiny, the frons more minutely tessellate and dull; punctures of mesoseutum very minute and moderately sparse. Pubescence fine, whitish, moderately thin, and that on mesonotum rather long and erect. Subgenital plate in the form of a nearly equilateral triangle, with the apex slightly obtuse. Caulis of genitalia only slightly longer than wide and not much longer than the parameral lobes, which are only moderately wide in lateral view and somewhat tapering to the blunt apex; sagittae angulate at the middle and thence tapering to the acute apex, and moderately thickly fusiform as seen from the side. Length, about 4 mm.; anterior wing, 2.8 mm.

One male (holotype), Las Vegas, Clark Co., Nevada, Sept. 17, 1908 (J. C. Bradley), in collection of Cornell University.

Perdita abdominalis, n. sp.

(Figs. 550, 551, 677)

P. abdominalis is one of the smallest species of this group, with the abdomen of female usually almost uniformly dull yellow and the face marks restricted to clypeus and lateral marks. It collects pollen from the flowers of *Pectis papposa* in the deserts of southern California and Baja California.

Female.—Head and thorax dark olive green, the supraclypeal area black. Basal half of mandibles, clypeus except usual pair of dots and sometimes two narrow arcuate fuscous strips on disk, lateral face marks, not or barely reaching lower end of foveae, scape of antennae, collar of pronotum, mark on posterior corners of disk, and tubercles creamy white. Mandibles more or less testaceous at middle and reddened at apex. Labrum testaceous brown. Abdomen pale, dull yellow, a little tinged with ferruginous, sometimes entirely light, or with only a small, faint, pale-brownish spot on each side of apical margin of tergite 1 to 3 or 4, or more rarely with a distinct brownish-fuscous band at junction of tergites 1-2 to 4-5, and a spot on each side of the summit of basal declivity of tergite 1. Legs pale yellow, the hind tibiae except base and hind tarsi pale brownish or tinged with brown. Pedicel and flagellum of antennae brownish fuscous above and dull yellowish beneath. Tegulae yellow at base and subhyaline on outer margin. Wings slightly dusky hyaline, the nervures and margins of stigma testaceous, the subcosta more brownish.

Head rotund, about as broad as long. Proboscis short, not exceeding the proboscival fossa and the galeae of maxillae a little shorter than the stipites. Mandibles tapering and acute. Facial foveae a little broader than interval between them and margin of eyes, and not much longer than half the distance from antennal sockets to anterior ocellus. Marginal cell about equally long beneath and beyond the stigma. Pygidial plate rather variable, the sides arcuate or nearly straight, the moderately narrow apex usually with a distinct notch. Frons and vertex moderately strongly tessellate and dullish, the upper half of frons with minute moderately sparse punctures; mesonotum more delicately tessellate and shining than the frons and similarly punctured. Pubescence rather thin, whitish, and erect, moderately dense on cheeks, very short on frons and short on the mesonotum. Length, about 3.5-4.5 mm.; anterior wing, 2.4-2.7 mm.

Male.—Head and thorax dark green, the mandibles except red tips, face below level of antennae, cheeks very narrowly or commonly not at all at anterior end, collar of pronotum, mark

on posterior corners of disk, and tubercles pale yellow or nearly yellowish white. Lateral marks of face ending broadly and more or less truncate at anterior end of foveae, the supraclypeal mark generally intruding broadly between antennal sockets and sometimes sending a short parallel-sided extension onto frons. Abdomen more or less pale brown, with a dull yellow band on tergites 1 to 3 or 5, these bands usually constricted at outer ends, generally about as wide as, or a little wider than, the dark intervals and sometimes slightly interrupted medially; venter entirely yellowish. Legs yellow, the outer side of hind tibiae and the hind tarsi brownish. Scape of antennae and pedicel concolorous with face, the pedicel more or less fuscous above, the flagellum dull yellow beneath and fuscous above. Tegulae and wings as in female.

Head rotund, as broad as long, the cheeks hardly equaling the width of eyes. Mandibles tapering, acute, and reaching far margin of proboscival fossa. Facial foveae punctiform, or in larger specimens twice as long as wide. Sculpture and pubescence about as in the female, but the frons impunctate and punctures of mesoscutum faint. Apical lobe of tergite 7 about as long as wide and subacute at apex. Subgenital plate triangular, obtuse at apex, the disk with very fine sparse hair. Caulis of genitalia broadly oval and distinctly longer than the slender parameral lobes; fused body of sagittae broadly fusiform in dorsal view, not at all angulate on sides, moderately acute at apex, and narrowly fusiform in lateral view. Length, 3-4 mm.; anterior wing, 2.3-2.7 mm.

Three females, 14 males (holotype female, allotype, and paratype), Cathedral City, Riverside Co., California (the exact spot now occupied by an outdoor theater), Oct. 8, 1945 (Timberlake).

Also the following paratypes.—CALIFORNIA: Riverside Co., 1 female, Cathedral City, Oct. 15, 1945 and 3 females Nov. 14, 1945 (Timberlake); 1 female, 18 miles east of Desert Center, Oct. 23, 1951 (Timberlake); 19 females, 19 males, 18.1 miles west of Blythe, Oct. 24, 1951 (Timberlake and Hurd); 1 female, 2 males, 7.1 miles north of Oasis, Oct. 5, 1955 (R. C. Dickson).

BAJA CALIFORNIA: 1 female, 2 males, Canipole, Oct. 2, 1941 (Ross and Bohart); and 3 females, 8 males, San Pedro, Oct. 7, 1941 (Ross and Bohart).

The California material was all collected at flowers of *Pectis papposa*.

Types in collection of the Citrus Experiment Station, Riverside, and paratypes in collections of the University of California at Berkeley and California Academy of Sciences.

Perdita flavicauda flavicauda, n. subsp.

This is a very distinctive species with the face entirely light below level of antennae (a character common in males of *Perdita* but rare in females), and the abdomen and legs virtually all yellow. The head and thorax have conspicuous white hair as in *bridwelli* and the two species are similar but obviously distinct.

Female.—Head and thorax dark green, with a brassy luster on the frons and vertex. Anterior end of cheeks narrowly and contiguous orbits for a short distance, mandibles except red tips, labrum, face below level of antennae, anterior and posterior border of pronotum, and tubercles pale yellow or perhaps whitish in life. Lateral marks truncate at level of middle of antennal sockets, with a slight extension between foveae and margin of eyes. Abdomen pale yellow, with a fine dark line in the crease at base of tergite 1, and a small faint brown spot on each side of apical margin of the same segment; the lateral foveae of tergite 2 black. Legs entirely yellow. Antennae yellow, the pedicel and flagellum rather narrowly pale brownish fuscous above. Tegulae subhyaline on outer margin and yellowish at base. Wings whitish hyaline, the nervures pale yellowish, the subcosta at apex and margin of stigma a little brownish.

Head slightly broader than long. Proboscis fully extended in type and more than twice as long as the head, apparently too long to be included within proboscival fossa in repose, the galeae of maxillae as long as the stipites. Mandibles slender, curved, and very acute at apex. Facial foveae unusually broad for this group, extending from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus, their lower end reaching more than halfway from eye to margin of antennal socket and their width much greater than the narrow interval between them and eyes. Pterostigma rather large and nearly equaling width of sub-

marginal cells; marginal cell with the parts beneath and beyond stigma about equal. Pygidial plate as long as wide at base, the sides nearly straight, and the apical notch a little broader than the subacute points on each side of it. Frons, vertex, and mesonotum very minutely tessellate and moderately shining, the frons and mesonotum with fine rather close punctures. Pubescence white, dense, and conspicuous for a *Perdita*, the hair of mesonotum rather short and coarsely mosslike. Length, 6 mm.; anterior wing, 3.8 mm.

One female (holotype), 6 miles northwest of Indio, Riverside Co., California, on *Melilotus*, April 30, 1949 (Linsley, MacSwain, and R. F. Smith), in collection of the Citrus Experiment Station, Riverside.

***Perdita flavicauda formosa*, n. subsp.**

Female.—Head and thorax dark green. Mandibles except red tips, labrum, clypeus, lateral, supraclypeal and subantennal marks white, the face consequently nearly all white below level of antennae, but lower edge of subantennal plates obliquely black, and two short oblique stripes on upper half of disk of clypeus, between and above the usual pair of dark dots. Lateral marks almost squarely truncate at level of middle of antennal sockets. Anterior end of cheeks also very narrowly white. Collar of pronotum, tubercles, and hind border of disk, interrupted in middle, white. Abdomen pale yellow, becoming more testaceous toward apex; a small nubilous spot on lateral margins of disk of tergite 1 pale fuscous; line in median crease of tergite 1, extreme base very narrowly of tergites 2 to 4, and thin line on the gradulus of tergites 2 and 3 blackish; and the lateral foveae of tergite 2 black. Legs pale yellow, the coxae except at apex, blotch on anterior side of basal half of front and hind femora, basal half of middle femora on both sides except the dorsal and ventral margins black. Antennae pale yellow, spot on apex of scape, pedicel above and band or spot on anterior side at base of first four joints of flagellum fuscous, the following joints narrowly brownish above. Tegulae white at base and whitish hyaline on outer margin. Other characters including color, wings, structure, sculpture, and pubescence as in *flavicauda*. Length, about 5.8 mm.; anterior wing, 3.9 mm.

One female (holotype), 18 miles west of Blythe, Riverside Co., California, at flowers of *Nama hispidum*, April 18, 1958 (Timberlake), and 1 female (paratype) same locality, April 16 (J. Powell), in collection of the Citrus Experiment Station, Riverside.

***Perdita polygonellae* Timberlake**

(Figs. 552, 553, 678)

Perdita polygonellae Timberlake, 1954, Ent. News, 65:12, ♀, ♂.

The type locality of *polygonellae* is Holly Shelter, Pender County, North Carolina, where the species occurs at flowers of *Polygonella polygama* in September and October. The only necessary addition to the original description relates to the hidden characters of the male.

Male.—Subgenital plate triangular, with lateral margins arcuate, the apex moderately acute and the disk with fine, short, and rather sparse hair. Parameral lobes of aedeagus very broad in lateral view and tapering to the blunt apex, but appear slender and clavate at apex in dorsal view; the sagittae rather elongate, rather narrowly fusiform, obtusely angled in dorsal view at the middle of the length and thence tapering to acute apex.

***Perdita dilecta*, n. sp.**

(Figs. 554, 555, 679)

P. dilecta is similar to *polygonellae*, but has the abdomen paler and more orange ferruginous, with a suffused pale-yellow band on tergites 1 to 2, or 3, the labrum yellow and rounded at apex, and the pygidial plate apically notched instead of entire.

Female.—Head and thorax dark green, the mandibles except red tips, labrum, clypeus, triangular lateral marks nearly twice as high as wide, supraclypeal mark divided into two spots, collar of pronotum, large mark on each side of hind margin of disk continuous with mark on tubercles and two longitudinal marks on mesosternum (absent in the Texas specimen) sulphur yellow. The usual pair of dark dots on clypeus and two more or less abbreviated submedian dark stripes on disk. Abdomen orange ferruginous, or fulvous, with a suffused pale-yellow band on tergites 1 and 2 or 3. Legs yellow, the base of hind coxae, large blotch on hind femora, hind tibiae except base, hind tarsi, and streak on middle tibiae fuscous (in Texas specimen the dark color restricted mainly to hind tibiae and tarsi, and a slight streak on middle tibiae). Scape of antennae yellow, the flagellum brownish yellow beneath, and scape, pedicel, and flagellum dark brown above. Tegulae yellow at base and subhyaline on outer margin. Wings hyaline, the nervures testaceous yellow, the subcosta and margins of stigma slightly more brownish.

Head somewhat wider than long (or as wide as long in Texas specimen). Proboscis short, the galeae of maxillae about half as long as the stipites. Facial foveae linear, about as wide as interval between them and margin of eyes, and extending from upper level of antennae about two-thirds of distance to level of anterior ocellus. Pterostigma moderately narrow, and the part of marginal cell beyond stigma longer than the part beneath. Pygidial plate about as long as wide at base, distinctly notched at apex, with notch and points on each side subequal. Frons, vertex, and mesonotum minutely tessellate and moderately shining, the frons impunctate, the mesonotum with minute, rather close punctures. Pubescence rather abundant, whitish, erect, the hair of mesonotum short and rather finely mosslike. Length, 4–4.5 mm.; anterior wing, 2.7–2.9 mm.

Male.—Head and thorax dark green, the anterior end of cheeks broadly and posterior orbits to a little above middle of eyes, mandibles except red tips, labrum, face to level of foveae, pronotum except green band across disk, large T-shaped mark on mesosternum, extending a short distance onto pleura, and a small spot at posterior corners of flanks of propodeum clear yellow. Abdomen yellow, a band at base of tergite 1 and one at junction of tergites 1–2 ferruginous brown, a pale ferruginous band at junction of tergites 2–3 to 4–5, and a partly developed band at apex of tergite 5. Legs yellow, a streak on anterior side of hind femora, the outer side of hind tibiae except basal third, and hind tarsi brownish fuscous. Antennae yellow, the flagellum brown above, becoming darker toward base, the pedicel above, and spot at apex of scape fuscous. Tegulae and wings as in female.

Head somewhat broader than long, the cheeks about as broad as the eyes and unarmed. Facial foveae nearly twice as long as wide, but very small. Mandibles moderately long, curved, very acute at apex, and reaching slightly beyond far margin of proboscoidal fossa. Sculpture and pubescence about as in female. Apical lobe of tergite 7 a little wider across the base than long and obtusely rounded at apex. Subgenital plate triangular, acute at apex, and with sparse minute hair on the disk. Parameral lobes of aedeagus inserted low on sides of the caulis and slender in both dorsal and lateral view; sagittae rather narrowly fusiform in dorsal view, acute at apex, not angulated on sides, and as seen from side slender and slightly recurved at apex. Length, about 4 mm.; anterior wing, 2.6 mm.

Three females, 1 male (holotype female, allotype, and paratypes), Kanab, Kane Co., Utah, June 17, 1947 (G. F. Knowlton); and 1 female (paratype), 10–20 miles east of El Paso, Highway 62, El Paso Co., Texas, June 21, 1942 (H. A. Scullen).

Types in collection of the Citrus Experiment Station, Riverside, and one paratype returned to each of the collectors.

Perdita labergei, n. sp.

(Figs. 556, 557, 680)

P. labergei is known only from the vicinity of Hutchinson, Kansas, where it was found collecting pollen from *Euphorbia*. As in other species of *Perdita*, which are oligolectic on *Euphorbia*, the tongue is unusually short. In the ferruginous abdomen it is similar to *polygonellae*, but it differs in the rounded yellow labrum, the clypeus not at all dentate at sides of labrum, the face marks bright yellow

instead of whitish, and the hair of mesonotum much shorter and more mosslike. This species and *dilecta* may prove to be races of one species.

Female.—Head and thorax dark green, with a somewhat brassy luster. Mandibles except red tips, labrum, clypeus, lateral and supraclypeal marks, and sometimes small subantennal spots, collar of pronotum, mark on posterior corners of disk, and mark on tubercles almost confluent with preceding mark yellow. Lateral marks about twice as high as wide, narrowed gradually above and intruding slightly between foveae and eyes, or sometimes more or less broadened adjacent to the foveae and emarginate on the inner margin. Clypeus with the usual pair of dots faint and rarely with two abbreviated fuscous stripes on the disk. Abdomen uniformly ferruginous, except for the blackish lateral foveae of tergite 2. Legs yellow, the hind tibiae except at base and hind tarsi fuscous, a fainter dark stripe on posterior side of front and middle tibiae, and more rarely a blotch on hind femora and trochanters. Antennae yellow, the flagellum beneath slightly tinged with brownish, a spot on scape and pedicel and the upper side of flagellum fuscous. Tegulae yellow at base and subhyaline on outer margin. Wings slightly dusky hyaline, the nervures and margins of stigma brownish.

Head distinctly broader than long and a little broader than thorax. Proboscis short, the galeae of maxillae about half as long as the stipes and shorter than the maxillary palpi. Mandibles moderately curved, tapering, and acute at apex. Facial foveae linear, about their own width from margin of eyes and extending from level of upper margin of antennal sockets about two-thirds of the distance to level of anterior ocellus. Pterostigma but little more than half as wide as the submarginal cells, and the part of marginal cell beyond the stigma longer than the part beneath. Pygidial plate about as long as wide at base, the sides nearly straight and the notch at apex subequal to the points formed by the notch. Sculpture and pubescence as in *dilecta*. Length, 3.5–4 mm.; anterior wing, 2.7–2.9 mm.

Male.—Head and thorax dark green, the anterior end of cheeks and the posterior orbits rather narrowly to middle of eyes, mandibles except red tips, labrum, face to level of foveae, collar of pronotum, band on hind margin of the disk continuous with mark on tubercles, but interrupted medially, bright yellow. Green of frons descending broadly on each side into the yellow. The T-shaped mark of mesosternum found in *dilecta* evanescent or lacking. Abdomen ferruginous, with a rather faint and suffused yellowish band on tergites 1 to 3 and the lateral foveae of tergite 2 blackish. Legs yellow, a blotch on anterior and posterior sides of hind femora, hind tibiae except at base and hind tarsi fuscous, a streak on posterior side of middle tibiae, and sometimes a spot on front tibiae brownish. Flagellum of antennae brown, becoming darker above toward base and on the pedicel, and more yellowish beneath, the scape and underside of pedicel clear yellow. Tegulae and wing about as in female.

Agreeing with *dilecta* structurally in most characters. Subgenital plate and genitalia perhaps not differing significantly although with slight differences as brought out in the figures. The subgenital plate with lateral margins more distinctly sinuate than in *dilecta*. Dorsal lobes of caulis spreading apart obliquely in *labergei* and somewhat subtruncate apically in *dilecta*, and the parameral lobes of *labergei* tapering gradually to apex in lateral view. Length, about 4 mm.; anterior wing, 2.5–2.7 mm.

Seven females, 6 males (holotype female, allotype, and paratypes), 5 miles southeast of Hutchinson, Reno Co., Kansas, on *Euphorbia*, Sept. 2, 1951 (C. D. Michener and W. E. La Berge).

Types in collection of the University of Kansas, Lawrence, a pair of paratypes in collection of La Berge, and another pair kept by the author.

Perdita vittata Cockerell

Perdita vittata Cockerell, 1923, Proc. Calif. Acad. Sci., 12(4):98, ♀, ♂.

This species is known only from the five type specimens collected at La Paz, Baja California, June 3–4, 1921, by Van Duzee. I have two of the females, and the male has been included in the preceding key from the characters given by Cockerell.

Female.—Dark green, the cheeks, underparts of thorax, and the propodeum more bluish. Labrum brownish fuscous. Mandibles except reddish tips, three marks on disk of clypeus, and transversely quadrate lateral marks yellow. Thorax dark except yellow mark on tubercles. Abdomen yellow, more brownish toward apex, the first two tergites black or brownish fuscous, each with a broad enclosed yellow band, that on the first segment divided into two obpyriform marks; basal margin of tergite 3 and two small transversely oval subapical spots also dark (in present condition of specimens the brownish color on apical segments is not much apparent, and in one the third tergite except dark markings is as yellow as the bands on preceding segments). Antennae dark, the flagellum brownish beneath, and the extreme base of scape yellowish. Legs dark, the apex of femora, front and middle tibiae and tarsi, except a blotch on posterior side of the tibiae, and base of hind tibiae yellow. Tegulae hyaline on outer margin and yellow at base. Wings whitish hyaline, the stigma and nervures whitish, the subcosta pale brown.

Head distinctly broader than long. Mandibles rather stout, but simple and acute at apex. Facial foveae broader than the narrow interval between them and eye, rather short and reaching from level of middle of antennal sockets hardly more than halfway to level of anterior ocellus. Pterostigma rather large and nearly as broad as the submarginal cells; the part of marginal cell beyond the stigma a little longer than the part beneath; second submarginal cell narrowed nearly to a point above. Pygidial plate moderately wide, with the apex ogivally rounded. Frons and vertex finely tessellate, moderately shiny, and with sparse minute punctures. Thorax tessellate and rather shiny, becoming polished on scutellum and mesoscutum, except the tessellate anterior border of scutum and a narrow, minutely rugulose prescutellar band; mesonotum with very fine but distinct punctures, becoming widely separated on polished part of scutum and closer and a little stronger on the scutellum. Pubescence thin, whitish, the hair of mesonotum sparse, erect, and moderately long. Length, about 5 mm.; anterior wing, 3.1 mm.

Male.—Similar to female, according to Cockerell, but yellow of face extending well above antennae and nearly straight across, the labrum and anterior part of cheeks yellow, as well as greater part of antennae. Pronotum with some yellow on hind margin of disk and abdomen marked nearly as in female.

Two females (cotypes), La Paz, Baja California, June 3, 1921 (E. P. Van Duzee).

Perdita crotonis Cockerell

The type locality of *crotonis* is Albuquerque, New Mexico, but the species is now known to occur in such widely separated localities as Vera Cruz in Mexico, Kansas and Nebraska in the north, and southern Utah, Nevada, and California in the west. The species is unusually variable in response to local conditions, and it is necessary to recognize numerous races, including *undecimalis* Cockerell. The latter was described from San Miguel County, New Mexico, and may be restricted to a very circumscribed area, but its characters are as sharply marked and apparently as important as in the other races.

Female.—Head and thorax usually dark green and shining. Mandibles except red tips, usually two spots on labrum, clypeus, lateral and supraclypeal marks, and rarely small subantennal spots, scape of antennae, collar, two large spots on hind margin of disk of pronotum, and tubercles creamy white. Dark stripes on disk of clypeus, when present, rather close together and well separated from the usual pair of dark dots. Abdomen more or less creamy white on the three basal segments or banded with white, and orange fulvous or reddish on apical segments. Legs creamy white, the femora, hind tibiae, and tarsi more or less heavily marked with fuscous or black. Tegulae whitish at base and hyaline on outer margin. Wings varying from whitish hyaline to distinctly dusky hyaline.

Head somewhat broader than long, the mandibles simple, acute, and reaching when closed about to the middle of each other. Facial foveae rather short and well impressed, wider than interval between them and eyes, and reaching from level of antennal sockets about two-thirds

of distance to level of anterior ocellus. Pterostigma moderately large, and parts of marginal cell beneath and beyond stigma about equal. Pygidial plate about as long as wide at base, the sides subarcuately converging to the moderately narrow apex which is usually finely notched. Frons minutely tessellate, but shining and with very minute, moderately close punctures. Mesonotum varying from nearly polished to moderately dull and tessellate and with moderately close fine punctures. Pubescence whitish, moderately abundant, fine, erect and rather long.

Male.—Similar to female, but usually more bluish green. Face generally entirely white below level of antennae. Dark bands of basal tergites of abdomen more developed than in female, the white bands sometimes enclosed or even interrupted. Segments 4 to 7 colored like the apical segments of female.

Head distinctly broader than long, the labrum with a deep V-shaped emargination. Mandibles simple, tapering, and more acute than in female, but hardly longer. Apical tergite of abdomen acuminate produced, the terminal lobe longer, narrower, and more pointed than in allied species. Subgenital plate triangular, as long as wide at base, subacute at apex, and with fine, short, moderately sparse hair on the disk. Parameral lobes of caulis appearing long and slender as seen from above, although broad on basal half in lateral view; sagittae fused, except for the curved basal rods which are shorter than usual, the fused part widest and slightly angulate before the middle, thence tapering to the very acute apex, and with a slight downward curve at extreme tip as seen from the side.

Perdita crotonis crotonis Cockerell

(Figs. 558, 559, 681)

Perdita crotonis Cockerell, 1896, Proc. Acad., Sci., Phila., 48:64, ♀, ♂; Timberlake, 1929, Pan-Pac. Ent., 6:54.

Female.—Mandibles except reddish tips, lateral margins of labrum and clypeus white, the usual pair of dark dots present on clypeus, but the submedian dark stripes usually evanescent or absent. Lateral face marks much higher than wide and ending rather bluntly at level of antennae. Supraclypeal mark transversely quadrate, and sometimes a small white spot present on upper end of the subantennal plates. Marks on hind border of pronotum large, cuneate, and narrowly joined, or nearly joined, to the white mark on tubercles. Tergites 1 to 3 white, with a broad V- or W-mark at base of tergite 1 and a narrow band at junction of the segments pale brown or fuscous; apical margin of tergite 3 and following segments orange fulvous. Legs yellowish white, the front coxae, hind coxae at base, the femora except on apical fourth or half and inferior margin of front pair, a little more the apical half of hind tibiae, and the hind tarsi blackish. Scape of antennae white except at apex above, the pedicel and flagellum nearly black and narrowly whitish beneath. Wings slightly whitish hyaline, the nervures pale testaceous, the subcosta and margins of stigma more or less pale brown. Mesonotum almost polished, the fine erect hair minutely plumose. Length, about 4.5–5 mm.; anterior wing, 2.9–3.4 mm.

Male.—Head and thorax more bluish green than in female. Face below level of antennae white, with the lateral marks extending broadly a little above the antennae. White bands on tergites 1 to 3 subequal to the fuscous or blackish intervening bands, and the apical margin of tergite 3 more or less fuscous; tergites 4 to 7 orange or orange-fulvous. Legs nearly as in female, but the front femora sometimes white with a dark mark before and behind, and front and middle tibiae with a black mark beneath. Antennae similar, but flagellum broadly white beneath, except the two apical joints entirely dark, the antepenultimate only a little paler beneath and the first two joints often narrowly ringed with black. Length, about 4–4.5 mm.; anterior wing, 2.8–3.2 mm.

The following material examined.—NEW MEXICO: 6 females, 17 males, Isleta, Bernalillo Co., July 17, 1952 (R. H. and L. D. Beamer, C. Liang, and W. La Berge); 7 females, 29 males, 17 miles north of Socorro, 4,750 feet, Socorro Co., Aug. 4, 1946 (H. A. Scullen); 14 females, 14 males, Socorro, 4,579 feet, Aug. 4, 1946 (Scullen); 2 females, 1 male, Santa Fe, Santa Fe

Co., July 22-23, 1927 (E. C. Van Dyke). ARIZONA: 1 female, 1 male, Hassayampa, Maricopa Co., Aug. 26, 1927 (J. C. Bradley).

MEXICO, CHIHUAHUA: 2 females, 1 male, Samalayuca, on *Croton*, June 24, 1947 (C. D. Michener).

The females from Santa Fe have the lateral face marks no higher than wide, the supraclypeal mark narrowly transverse or divided into two spots, the labrum entirely dark, the white bands of abdomen tending to be subequal to the dark intervals, the hind tibiae white only at base, and the front and middle tibiae mainly brown beneath. In these characters they resemble *undecimalis* and possibly should be referred to that subspecies.

Perdita crotonis undecimalis Cockerell

Perdita crotonis undecimalis Cockerell, 1916, Ann. Mag. Nat. Hist. (8) 17:281, ♀.

Female.—Similar to typical *crotonis*, but light markings much less extensive. Head and thorax dark green, the mandibles except at tips, clypeus except anterior margin of disk and two broad submedian dark stripes, small lateral marks reaching not more than halfway to level of antennae, small marks on posterior corners of disk of pronotum, the collar narrowly, and tubercles white. Supraclypeal area black, the dark stripes of clypeus and labrum more brownish fuscous. Tergites 1 to 3 brownish fuscous, each with a narrow white band, which does not quite reach the lateral margins on tergites 2 and 3 and is pointed at outer ends on tergites 1 and 3; apical tergites and venter fulvous. Legs brownish fuscous, the apex of femora, front and middle tibiae, and tarsi, except blotch on posterior side of tibiae not reaching the base, and the base of hind tibiae white. Antennae fuscous, the flagellum more brownish beneath and base of scape white beneath. Tegulae white at base and subhyaline on outer margin. Wings slightly dusky hyaline, the nervures pale testaceous, the margins of stigma pale brown and the subcosta pale ferruginous. Length, 5.5 mm.; anterior wing, 3.6 mm.

One female (type), between Rowe and Old Pecos Pueblo, San Miguel Co., New Mexico, on *Croton*, Sept. 4 (W. P. Cockerell).

Perdita crotonis leucoptera, n. subsp.

Female.—Head and thorax dark green, the labrum entirely dark; clypeus usually entirely white, except the usual pair of dots, but incomplete dark discal stripes sometimes present; lateral marks usually as high as wide and the supraclypeal mark rather narrowly transverse. Marks on disk of pronotum small and separate from the white tubercles. Tergites 1 to 3 black, the white bands narrower than the dark intervals, those on tergites 2 and 3 abruptly narrowed close to lateral margins of the segments; tergites 4 to 6 bright reddish fulvous, except a dark spot at basal corners of tergite 4. Antennae blackish, the scape nearly all white, the flagellum narrowly whitish beneath. Legs black, the apex of all the femora, front and middle tibiae except behind, front and middle tarsi, and base of hind tibiae white. Tegulae white at base, and whitish hyaline on outer margin. Wings milky hyaline, the nervures nearly colorless, the subcosta and inner margin of stigma slightly brownish. Length, 4.5-5.5 mm.; anterior wing, 3-3.5 mm.

Male.—Similar to female. Face entirely white below level of antennae. Marks on hind margin of pronotum rather small but narrowly connected with white of tubercles. Tergites 1 to 3, black, the white bands narrow, those on tergites 2 and 3 narrowed and bent backward at outer ends, sometimes with a small separate spot on lateral margins of tergite 3, and band on tergite 1 sometimes interrupted medially and with a spot cut off on the reflexed margins of the segment. Legs white, the coxae black at base, the femora black except broadly at apex and on dorsal edge of front pair, the front and middle tibiae with a dark blotch behind, the hind tibiae black except on basal half and broadly beneath, and the small joints of hind tarsi dark. Subcosta and margins of stigma sometimes more distinctly brownish than in female. Length, about 4-4.5 mm.; anterior wing, 2.9-3.2 mm.

Fourteen females, 8 males (holotype female, allotype, and paratypes), Borego, San Diego Co., California, on *Croton californicus*, April 25, 1954 (Timberlake). Also the following paratypes, taken on the *Croton* except as noted.—SAN DIEGO Co.: 3 females, 2 males, Borego, April 24, 1954 (J. G. Rozen); 21 females, 24 males, Borego, April 25–26, 1954 (P. D. Hurd, Jr.); 15 females, 9 males, Borego, April 25–30, 1954 (M. Wasbauer); 2 males, Borego, May 26, 1954 (F. X. Williams); 6 females, 8 males, Borego, April 27, 1955 (Timberlake); 10 females, 26 males, Borego, April 24–27, 1955 (Wasbauer); 4 females, 5 males, Borego, on *Hoffmanseggia*, April 27, 1956 (R. R. Snelling). RIVERSIDE Co.: 2 females, 5 males, Mecca, June 1, 1956 (Wasbauer); 2 males, Mecca, Aug. 20, 1956 (Wasbauer). SAN BERNARDINO Co.: 1 female, 1 male, 13 miles west of Twentynine Palms, Aug. 4, 1933 (Timberlake); 1 female, 2 males, Rialto, Aug. 11, 1955 (J. C. Hall); 3 females, 1 male, Rialto, Aug. 15, 1956 (Timberlake).

Types in collection of the Citrus Experiment Station, Riverside; paratypes in collections of the University of California at Berkeley, the California Academy of Sciences, and Mr. Snelling

Perdita crotonis titusi, n. subsp.

Female.—Similar to *leucoptera* in most characters but abdomen comparatively pallid and the head and thorax brilliant blue. Lateral face marks small and triangular. White marks of pronotum narrowly united with the white of tubercles. White bands of tergites 1 to 3 even and a little narrower than the dark intervals; in holotype, the dark bands at apex of tergites 2 and 3 pale orange similar to the color of apical segments, but bands at junction of tergites 1 and 2 and at base of tergite 3 somewhat tinged with brown, and that at base of tergite 1 blackish; in paratype the dark bands more uniformly brown; three apical segments pale orange, the disk of tergite 4 suffused with white. Dark parts of antennae and legs more brownish than usual. Wings whitish hyaline, the nervures pallid, the subcosta hardly darker than other nervures. Length, 5 mm.; anterior wing, 3 mm.

Male.—Face white below level of antennae. Abdomen pale orange yellow, darker toward base and becoming almost fuscous at base of tergite 1; white bands of tergites 1 to 3 narrow, becoming much narrower at outer ends on tergites 2 and 3, and that on tergite 1 narrowly interrupted in middle and sometimes also close to outer ends. Antennae pale brown, the flagellum whitish below except on the two apical joints. Wings as in female. Length, 3.5–4.5 mm.; anterior wing, 2.8–3 mm.

Two females, 2 males (holotype female, allotype, and paratypes), Chino, Riverside Co., California, Sept. 13, 1907 (E. G. Titus).

Types in collection of the Citrus Experiment Station; the two paratypes returned to collection of the Utah State Agricultural College, Logan.

Perdita crotonis cucullata, n. subsp.

Female.—Distinguished from other forms of *crotonis* by subantennal marks, which curve downward on each side to form a sort of hood above the clypeus. Head and thorax dark green, the mandibles except tips, mark on each side of labrum, clypeus, large lateral marks, supra-clypeal and subantennal marks white. Marks on pronotum white, including band on collar, the band on posterior border of disk narrowed where it unites with mark on tubercles and quadrately notched in middle. First three tergites white, with narrow blackish bands at junction of segments, the band at base of tergite 1 in the shape of a V or W, or in holotype reduced to a line in the median crease and two dots obliquely aligned on each side; apical segments pale orange, but disk of tergite 4 more or less whitened and sometimes nearly as white as preceding segments. Antennae and legs colored nearly as in *leucoptera*, the scape except above, and the front and middle tibiae and tarsi entirely white. Wings almost clear hyaline, or only slightly whitened, the nervures testaceous, the subcosta pale brownish. Length, 4.5–5.7 mm.; anterior wing, 3.2–3.6 mm.

Male.—Similar to the male of *dilucida* and hardly separable, but wings a little whiter, with paler nervures, the white bands of abdomen a little broader and even, and the white on hind border of pronotum narrowly connected with white of tubercles although interrupted medially. Length, 3.9–4.8 mm.; anterior wing, 2.8–3.2 mm.

Five females, 12 males (holotype female, allotype, and paratypes), 2 miles east of Anza, Riverside Co., California, on *Croton californicus*, July 7, 1956 (E. G. Linsley and M. Washbauer). Types in collection of the University of California at Riverside and paratypes at Berkeley.

Perdita crotonis caerulea, n. subsp.

Male.—Head and thorax shining dark blue. Mandibles except tips, labrum, face below level of antennae, scape of antennae, narrow band on collar of pronotum, small marks at posterior corners of disk, and tubercles white. Tergites 1 to 3 brownish fuscous, each with a narrow white band; the bands on tergites 1 and 3 interrupted medially and with a cutoff spot on lateral margins of tergite 3; in type the band on tergite 1 reduced to two small transversely oval marks; band on tergite 2 notched medially or almost interrupted and more or less narrowed at outer ends. Tergites 4 to 7 orange fulvous with basal half of tergite 4 infuscated. Legs blackish, with the usual white parts. Wings nearly clear hyaline, the nervures testaceous, the subcosta and margins of stigma brown. Length, about 4–4.5 mm.; anterior wing, 3–3.3 mm.

One male (holotype), St. George, Washington Co., Utah, on *Croton longipes*, June 15, 1930 (E. W. Davis); 2 males (paratypes, one with abdomen missing), Glendale, Clark Co., Nevada, on *C. longipes*, May 12, 1930 (Davis).

Types in U. S. National Museum.

Perdita crotonis dilucida, n. subsp.

Perdita crotonis Timberlake, 1928, Proc. Hawaii. Ent. Soc., 7:151.

This race is more similar than the other forms to typical *crotonis*. It differs in having the dark band at junction of tergites 3 and 4 well infuscated and the disk of tergite 4 also with a white band in female.

Female.—Head and thorax dark green. Basal half of mandibles on outer side, clypeus, lateral and supraclypeal marks white; lateral marks generally higher than wide; anterior margin of clypeus very narrowly testaceous, the disk often with two short oblique brown lines on anterior border. Labrum testaceous to fuscous, usually without a white spot on each side. White marks on hind border of disk of pronotum generally well separated from each other and from the white tubercles. Tergites 1 to 4 each with an even white band, generally but little wider than the dark intervals between them, the base of tergite 1 and band at junction of tergites 1–2 to 3–4 fuscous or black, the apical margin of tergite 4 and following segments orange. Legs blackish, the apex of front and hind coxae, the trochanters, about the apical fourth of all femora, front and middle tibiae and tarsi, and basal third of hind tibiae white. Scape of antennae white, the pedicel and flagellum fuscous above and narrowly sordid whitish beneath. Wings slightly dusky hyaline, the nervures brownish testaceous, the subcosta and margins of stigma brown. Length, 4.5–5.5 mm.; anterior wing, 3.2–3.8 mm.

Male.—Similar to male of typical *crotonis*, the white bands less even, more narrowed at outer ends, that on tergite 1 sometimes interrupted at middle, and a white band more or less distinct on tergite 4, but often more or less interrupted and sometimes reduced to two small oval marks, with the base and lateral margins of the segment fuscous, the apical margin, however, usually orange like following segments. Wings a little more dusky than in typical *crotonis* as in the female. Length, about 4–5 mm.; anterior wing, 3–3.5 mm.

Forty-four females, 46 males (holotype female, allotype, and paratypes), 6 miles south of Wide Ruin, Apache Co., Arizona, 6,000 feet, July 23, 1950 (T. Cohn, P. Boone, and M. Cazier).

The following material from Kansas and Nebraska is included provisionally in *dilucida*, as a white band is more or less evident on tergite 4 of the female, but the male is not certainly distinguishable from typical *crotonis*.

One female, Phillips Co., Kansas, Aug. 30, 1912 (F. X. Williams); 1 male, Clay Co., Kansas, August (J. C. Bridwell); 2 females, 2 males, 5 miles east of Chadron, Dawes Co., Nebraska, on *Euphorbia*, Aug. 10, 1955 (W. E. La Berge).

Types of *dilucida* in collection of the American Museum of Natural History; eight paratypes retained at Riverside.

***Perdita crotonis subnitens*, n. subsp.**

This race and the two following have the mesonotum minutely tessellate and dullish, so that they appear at first sight to be distinct from *crotonis*. In *subnitens* the light marks are more reduced than in typical *crotonis*, with the supraclypeal mark often absent and the marks on disk of pronotum small and widely separated from the white tubercles.

Female.—Head and thorax dark blue-green. Mandibles except apical half, labrum, clypeus, and small triangular lateral marks white; the discal brown stripes of clypeus evanescent and mostly restricted to upper border of disk; supraclypeal mark lacking or sometimes represented by two small spots. Narrow band on collar of pronotum, small mark at posterior corners of disk, and tubercles white. Tergites 1 to 3 each with a yellowish white band, about equal to the dark intervals, that on tergite 1 much broadened in middle and narrowed at outer ends, and that on tergite 2 even and enclosed; fuscous band at junction of tergites 3-4 well developed; apical segments orange. Legs with the usual dark markings, the front and middle femora black becoming briefly white at apex, their tibiae marked with fuscous behind, the hind femora pallid only at the extreme apex and the hind tibiae white only on the basal fourth. Wings faintly dusky hyaline, the nervures and margins of stigma testaceous, the subcosta brown. Frons strongly tessellate and dull, with usual punctures obscure. Mesonotum distinctly but not strongly tessellate, moderately dullish, with punctures a little more separated and the pubescence thinner than in typical *crotonis*. Length, 4.5-5 mm.; anterior wing, 3-3.4 mm.

Five females (holotype and paratypes), Hutchinson, Reno Co., Kansas, on *Croton monanthogynus*, Sept. 4, 1949 (Michener and Beamer).

Types in collection of the University of Kansas, except one paratype retained at Riverside.

***Perdita crotonis decipiens*, n. subsp.**

Similar to *subnitens*, but thorax greener, somewhat less dull, and with the punctures and pubescence about normal for *crotonis*.

Female.—Head and thorax dark green. Mandibles except red tips, clypeus, small triangular lateral marks, and a transversely quadrate supraclypeal mark white. Labrum brown. Collar of pronotum white, the marks on posterior border of disk narrowly separated medially and narrowly united with white of tubercles. White bands on tergites 1 to 3 broad and entire, that on tergite 1 extending to base, with a dark oblique mark on each side, but bands on tergites 2 and 3 no wider than the blackish intervals, the dark band at apex of tergite 3 narrow and not reaching the lateral margins; tergites 4 to 6 orange, with basal half of tergite 4 almost whitish. Legs mainly white, the usual dark marks of femora small, brownish, and restricted to anterior side of basal half, the hind tibiae except basal third and the hind tarsi blackish. Wings dusky hyaline, the nervures brownish testaceous, the subcosta and margins of stigma brown. Length, 5 mm.; anterior wing, 3.4 mm.

Male.—Dark green, the mandibles, labrum, and face below level of antennae white, but sutures of subantennal plates green, or the plates sometimes green with a small white spot near lower end. White marks on hind border of disk of pronotum widely separated from each other and from the white mark on tubercles. Tergites 1 to 3 brownish fuscous, each with a narrow white band, which is narrowly interrupted, or almost so, in middle, and that on tergite 1 sometimes interrupted close to outer ends; tergites 4 to 7 orange. Legs yellowish white, the hind coxae broadly black at base on outer side, the blackish mark on front and middle femora small to moderately large and on the posterior side, that on hind femora sometimes nearly encircling the segment, and the apical half of hind tibiae on outer side and hind tarsi blackish. Antennae about normal for *crotonis*, with scape broadly white beneath and the two apical joints of flagellum dark. Wings as in female. Length, about 4.2 mm.; anterior wing, 3 mm.

One female, 2 males (holotype female, allotype, and paratype), Victoria, Victoria Co., Texas, Aug. 25 (J. D. Mitchell), in U. S. National Museum.

Perdita crotonis australis, n. subsp.

The race *australis* differs from other forms of *crotonis* by having the wings strongly dusky in comparison and by the rather narrow white band on tergite 4 which is distinctly interrupted medially; it is similar to *subnitens* and *decipiens* in the somewhat dullish mesonotum but differs in the well-developed dark stripes on disk of clypeus.

Female.—Head and thorax dark green, or sometimes slightly blue-green. Mandibles except the reddish testaceous apical half and inner margin, clypeus, small triangular lateral marks, and two supraclypeal spots white; disk of clypeus with two black stripes, not quite reaching the upper margin, and widened below where they unite with the narrow dark anterior margin of the sclerite. Collar and tubercles of pronotum white, the marks on hind margin of disk well separated from each other, but sometimes sending a thin extension to the white of tubercles. A broad black band at base of tergite 1 and at junction of tergites 1-2 to 3-4; the white bands on these segments narrow, that on tergite 4 abbreviated, interrupted medially and enclosed apically with orange fulvous, but the median interruption and sometimes an oval subapical spot on each side black; white band on tergite 3 also sometimes slightly interrupted; tergites 5 and 6 orange fulvous. Antennae and legs about as usual, the apex of femora sometimes only briefly white, the front tibiae dark on inner side, the middle tibiae broadly white at base and beneath, and black on upper and posterior side. Wings distinctly dusky hyaline, the nervures testaceous brown, the subcosta and margins of stigma more or less fuscous. Sculpture and pubescence as usual, except that the mesonotum is minutely tessellate and moderately dullish. Length, 5 mm.; anterior wing, 3.4 mm.

Male.—Head and thorax bluer green than in female. Face marks sometimes nearly normal, with the green slightly intruding between lateral and subantennal marks; but the latter marks sometimes lacking (allotype) and the lateral marks in that case triangular and somewhat higher than wide. Pronotal marks small, with the collar and tubercles dark in one specimen. Tergites 1 to 3 black and also base of tergite 4 more or less broadly; white bands on tergites 1 to 3 narrow, interrupted and abbreviated, but that on tergite 2 often extending narrowly to lateral margins, and those on tergites 1 and 3 either with or without a cutoff spot on lateral margins. Legs and wings as in female. Antennae about normal for *crotonis*, with the scape blackish above nearly to the base and the two apical joints of flagellum entirely dark. Length, 3.4-4.5 mm.; anterior wing, 2.8-3.2 mm.

Two females, 4 males (holotype female, allotype, and paratypes), Vera Cruz, Mexico, Dec. 29, 1940 (G. E. Bohart); 2 females, 1 male (paratypes), Vera Cruz, June 20, 1951 (P. D. Hurd, Jr.).

Types in collection of the California Academy of Sciences, San Francisco; paratypes in collections of the University of California at Berkeley and Riverside.

The specimens collected in June are more like other forms of *crotonis*. The females have the black stripes on clypeus thin or nearly absent, the supraclypeal mark normal, the white bands on tergites 1 to 4 as broad as the dark intervals and that on tergite 4 hardly interrupted and in one specimen narrow and nearly concealed by the preceding segment. In the male the white bands of abdomen are entire and reach lateral margins, or are barely interrupted on tergite 3, and the base of tergite 4 is narrowly black, with remainder of segment orange fulvous, although with an oval paler area on each side just beyond the black base.

Perdita picturata, n. sp.

(Figs. 560, 561, 682)

P. picturata is known from only three specimens from the counties of Victoria and Aransas, Texas; these unfortunately have the abdomen partly discolored; the apical segments, however, appear to be ferruginous, or at least not the clear yellow of the basal segments. This species is closely allied to *P. crotonis* Cockerell.

Female.—Head and thorax dark blue-green, with the mandibles except red tips, labrum, clypeus, supraclypeal and lateral marks, collar of pronotum, hind border of the disk of pronotum, continuous with a large mark on tubercles, pale yellow. Supraclypeal mark small and transversely quadrate. Lateral marks broad below, narrowing gradually above and ending rather bluntly at level of antennae, their inner margin forming a broad concave arc. First three tergites of abdomen pale yellow, with a rather broad and even brownish fuscous band at junction of segments 1-2 to 2-3. The three apical tergites and apparently the apical margin of tergite 3 rather pale brownish, but perhaps more ferruginous in life. Venter much discolored, but probably uniformly pale yellowish in life. Scape and underside of next two joints of antennae pale yellow, the rest of flagellum narrowly pale brown beneath, a spot at apex of scape, pedicel and flagellum above brownish fuscous. Legs, including coxae pale yellow, the front and middle femora blotched with brownish fuscous except at apex, the blotch of front femora on posterior side and that of middle pair mostly on anterior side, the hind tibiae also dark except on a little less than basal half and on the inferior margin. Tegulae pale yellow, with outer margin subhyaline. Wings whitish hyaline, the nervures and stigma pale yellow, the subcosta slightly tinged with brown.

Head somewhat broader than long, with disk of clypeus large and rounded above. Proboscis of moderate length, and when retracted probably included within the proboscoidal fossa. Mandibles simple at apex. Facial foveae well impressed, slightly wider than the interval between them and eyes and reaching from slightly above level of antennae about two-thirds of distance to level of anterior ocellus. Marginal cell slightly longer beyond the stigma than the part beneath. Pygidial plate moderately wide at base, with the sides converging to the ogivally rounded apex. Frons and vertex strongly tessellate, dull but not opaque, and with sparse, very minute, and obscure punctures. Thorax finely tessellate and becoming lineolately tessellate on mesonotum, which is moderately shiny, with minute punctures more distinct than those of frons. Pubescence whitish, moderately dense, that on the mesonotum short, fine, and erect. Length, 5 mm.; anterior wing, 3.2 mm.

Male.—Similar to female, the face marks of the same pattern, but the supraclypeal mark not transverse and the lateral marks nearly straight on inner margin and acute above. Yellow on hind margin of pronotum interrupted medially and laterally. Abdomen fuscous at base, with a narrow enclosed yellow band on tergites 1 to 3; the band on tergite 3 broader than the preceding ones, and the disk beyond the band brown, except for an elongate oval fuscous spot far to each side, which does not quite unite with the fuscous color at base of segment; following tergites brown (ferruginous in life?), becoming testaceous on segments 6 and 7; the venter testaceous. Antennae more brownish than in female, the flagellum broadly dull yellowish beneath, the scape pale yellow except at apex above. Legs pale yellow, the base of middle coxae, large mark on outer side of hind coxae, blotch on posterior side of front femora, not covering the apex, middle and hind femora except at apex and on under margin, mark on front and middle tibiae behind, close to apex, and apical half of hind tibiae except the extreme apex and the under margin, fuscous. Tegulae and wings as in female.

Head as broad as long, the cheeks narrow and simple. Labrum distinctly emarginate at apex. Mandibles tapering to the acute apex. Facial foveae well impressed and only slightly more than twice as long as wide. Venation, sculpture, and pubescence virtually the same as in female. Disk of subgenital plate in the form of a nearly equilateral triangle, with the apex slightly rounded. Aedeagus about normal for the group, the parameral lobes rather short, and in lateral

view broad across the base; sagittae moderately thickly fusiform, and not angulated at the thickest part. Length, 4.5 mm.; anterior wing, 2.9 mm.

One female and male (holotype female and allotype), Aransas Co., Texas, Aug. 6, 1928 (R. H. Beamer), in collection of the University of Kansas; and 1 male (paratype), Victoria, Victoria Co., Texas, Aug. 25 (J. D. Mitchell), in the U. S. National Museum.

***Perdita knowltoni*, n. sp.**

(Figs. 562, 563, 683)

This little-known species has the face marks of female reduced to a small spot on middle of clypeus. The male is much different with about the anterior half of the face yellow, as well as the legs and abdomen in large part, but the types were taken at the same time and I have no doubt that they belong together.

Female.—Head and thorax dark green, the labrum, clypeus, and supraclypeal area black. Mandibles except red apical third, small oval spot in median line of anterior part of disk of clypeus, tubercles, and narrow collar of pronotum white. Abdomen yellowish white, with last two segments, lateral margins of tergites 3 and 4, and the venter testaceous; broad bands at base of tergite 1 and at juncture of tergites 1-2 to 5-6 brownish black, with that part of the bands at base of tergites 3 to 5 very narrow except at outer ends; the white bands on tergites 1 to 4 subequal to the dark intervals; basal part of disk of tergite 5 paler than the apical part and possibly whitish in life, and the segment has a small blackish mark on middle of disk. Antennae blackish, the pedicel and flagellum brownish yellow beneath. Legs blackish, the apex of front and middle femora, and front and middle tibiae and tarsi yellow, but the middle tibiae dark behind. Tegulae hyaline on outer margin and whitish at base. Wings faintly dusky hyaline, the nervures testaceous, the subcosta brown.

Head somewhat longer than wide. The mandibles simple, tapering, and acute, each reaching about to the middle of the other when closed. Proboscis moderately elongate, briefly exceeding the proboscoidal fossa in repose. Facial foveae well impressed, linear, a little less than their width from margin of eyes and extending from a little above level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma of normal size for group, the parts of marginal cell beneath and beyond the stigma about equal; second submarginal cell narrowed about two-thirds above. Pygidial plate a little broader across the base than long, with sides converging to the ogival and distinctly notched apex. Face and vertex tessellate and moderately dull, the clypeus faintly tessellate, and supraclypeal area polished; punctures of frons very fine and sparse, those of supraclypeal area equally sparse but more distinct like the minute close punctures on convex area between antennal sockets. Thorax finely tessellate, and moderately dull, the mesoscutum and scutellum with moderately close, fine setigerous punctures; pronotum more shining than other parts, the posterior half of disk minutely closely punctured, but pronotum hairless except on collar and tubercles. Pubescence whitish, fine, moderately short, and erect on mesonotum and rather long on vertex, cheeks, and pleura. Length, about 5 mm.; anterior wing, 3.9 mm.

Male.—Head and thorax dark green. Mandibles except red tips, labrum, anterior half of face and gular region, and posterior orbits narrowly almost to middle of eyes, bright yellow; the yellow of face extending medially on frons about halfway to level of anterior ocellus, and the green descending broadly on each side about halfway between level of foveae and antennal sockets, with the yellow intruding between foveae and eyes. Collar of pronotum rather broadly, mark on each posterior corner of disk and tubercles yellow, the last two marks distinctly confluent on each side. Abdomen yellow, the base of tergite 1 and narrow bands at junction of first three or four segments blackish, with an oval transverse subapical spot on each side of the segments more deeply colored, the bands becoming successively weaker, with that at juncture of tergites 3-4 faint and brownish, and two transverse subapical spots on tergite 3 a little infuscated; two pale-brown subapical spots also discernible on tergite 4. Legs yellow, the base of hind coxae broadly black, a short, fine streak at base of front femora behind, the

middle and hind femora behind, and also the hind tibiae and tarsi behind brown or fuscous. Antennae yellow, the pedicel and flagellum fuscous above (but flagellum lacking beyond the first joint in type). Tegulae and wings about as in the female.

Head barely longer than wide, the disk of clypeus high and occupying about one-third of the width of space between the eyes; subantennal plates narrow, thrice as long as wide and acutely oblique at lower end. Mandibles similar to those of female but relatively shorter. Facial foveae about three times longer than wide. Wings as in female, except for the usual obsolescence of nervures bounding the distal side of second discoidal cell. Sculpture and pubescence as in female, except the frons and vertex much more opaque and virtually impunctate. Subgenital plate triangular, a little broader than long, the apex nearly rectangular and the disk with fine, rather close-set hairs. Parameral lobes of caulis rather wide as seen in dorsal view, with the sharp dorsal edge continued as a semicircular carina on the inner surface subapically; fused sagittae angulate at the middle, thence tapering to the acute apex, and moderately thickly fusiform as seen in lateral view. Length, about 4 mm.; anterior wing, 3 mm.

One pair (holotype female and allotype), Moab, Grand Co., Utah, Sept. 15, 1943 (G. F. Knowlton) in collection of the Citrus Experiment Station, Riverside.

Perdita rhodura Cockerell

(Figs. 564, 565, 684)

Perdita rhodura Cockerell, 1897, Ann. Mag. Nat. Hist. (6)20:511, ♀, ♂.

Perdita gutierreziae Swenk and Cockerell, 1907, Ent. News, 18:56 (excluding ♂).

This species was described from Embudo, Rio Arriba County, New Mexico, on *Bigelovia* (presumably *Aplopappus heterophyllus*), and in 1907 Swenk and Cockerell recorded the female from Glen, Sioux County, Nebraska, but wrongly associated it with the male of *P. gutierreziae* Cockerell.

Female.—Head and thorax dark olive green. Mandibles except tips, labrum, clypeus, and lateral marks white; supraclypeal area and upper border of disk of clypeus fuscous, the fuscous on clypeus descending triangularly on each side to middle of disk; a fuscous spot also on lateral extensions of clypeus, with a slight extension into the base of the lateral marks (in the Nebraska female the clypeus is almost all white); lateral marks narrowly triangular and ending more or less bluntly just above level of antennae. Collar of pronotum, narrow hind margin of disk on each side, and tubercles white. Abdomen with a broad white band on tergites 1 to 3 or 4, the base and apex of the segments brownish, or brownish fuscous, forming bands subequal to the light bands, the dark color on tergites 2 to 4 extending backward along lateral margins, and the dark band at apex of tergite 4 faint or abbreviated; apex of abdomen otherwise pale orange fulvous, the venter yellowish. Antennae brownish fuscous, the scape white, and the flagellum yellowish beneath. Legs brownish or fuscous, the trochanters, apex of femora more or less broadly, front and middle tibiae and tarsi, except posterior side of middle tibiae, and the base of hind tibiae white (in Nebraska female the dark color of middle femora forms a broad ring incomplete on ventral edge). Tegulae testaceous hyaline, with a white spot at base. Wings clear hyaline, the nervures and margins of stigma brown, the subcosta more ferruginous.

Head rotund, about as broad as long. Proboscis when folded in repose somewhat exceeding the proboscoidal fossa. Mandibles tapering and acute at apex. Facial foveae narrow, no wider than interval between them and eyes and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Venation normal for group, the marginal cell only slightly longer beyond than beneath the stigma. Pygidial plate as broad as long, with sides converging nearly straight to apex, which is wide enough to bear a distinct notch. Frons and vertex finely tessellate, dull, and impunctate; mesoscutum finely tessellate, moderately dullish, and with fine, moderately sparse setigerous punctures. Pubescence whitish, rather long and abundant on cheeks, sparse on face, and short and erect on mesonotum. Length, about 5 mm.; anterior wing, 2.8–3.1 mm.

Male.—Head and thorax dark green, with extensive yellow markings. Face yellow to or above level of the foveae, the green usually descending triangularly on each side to middle of frons, and the yellow ascending on lateral margin and linearly in middle to anterior ocellus, but with much variation or irregularity, and sometimes with a yellow spot enclosed in the green in front of each lateral ocellus. Anterior half, or more, of underside of head yellow, the yellow sometimes ascending narrowly on orbits to summit of eyes. Prosternum and pronotum yellow, the latter with a narrow green band from flank to flank. A broad yellow T-mark on mesopectus and usually a yellow spot behind the tubercles, the two marks sometimes confluent. In some specimens one or two yellow spots present on flanks of propodeum. Abdomen orange yellow, paler toward base, the base of tergite 1 with a more or less trifold fuscous band; disk of tergites 1 to 3 often more yellowish, with a faint and narrow apical more orange band (in the Nebraska male the yellow bands on these tergites more evident, with a definite fuscous band at junction of tergites 1-2 and a narrow brownish band at apex of tergite 2, and with the yellow band on tergite 1 narrowed at outer ends and narrowly interrupted in middle). Legs yellow, the hind tibiae behind and hind tarsi on outer margin fuscous (in the Nebraska male the hind femora also fuscous behind and a dark streak present on middle tibiae). Antennae yellow, the pedicel and flagellum pale brown above. Tegulae and wings as in female.

Head as long as wide, the cheeks narrow. Mandibles slender, tapering, and reaching far margin of proboscival fossa. Facial foveae punctiform. Sculpture and pubescence about as in the female, the frons, however, with rather abundant, short, erect hair. Subgenital plate triangular, as long as wide, with apex rounded and the disk with sparse fine hair. Aedeagus oval in outline, the parameral lobes slender; sagittae rather short, much widened and angulate at middle as seen from above, thence tapering to acute apex, and as seen from side narrowly fusiform. Length, about 3-4 mm.; anterior wing, 2.4-3 mm.

Material examined as follows.—NEW MEXICO: 2 females, 2 males, Embudo, Rio Arriba Co., on "*Bigelovia*," Sept. 25 (Cockerell). ARIZONA: 6 males, 26 miles west of Holbrook, Navajo Co., on *Zinnia grandiflora*, Sept. 3, 1930 (Timberlake); 1 male, 36 miles east of Holbrook, Apache Co., on *Gutierrezia sarothrae*, Sept. 3, 1930 (Timberlake). NEBRASKA: 1 female, 1 male, Glen, Sioux Co., on *Gutierrezia sarothrae*, Aug. 22, 1906 (L. Bruner).

Perdita mimula, n. sp.

This little-known species from the Colorado Desert seemed at first sight to belong in the *zonalis* group of species on account of the evenly banded abdomen, and shining, although not polished, mesonotum. The slender acute mandibles, however, indicate that it is placed more correctly here.

Female.—Head and thorax dark green, a large mark on mandibles, labrum, clypeus, and lateral marks creamy white. Mandibles rufotestaceous on apical half and inner margin, and red at apex. A small blackish spot on extreme outer ends of lateral extensions of clypeus, confluent with a small spot on adjacent margin of lateral plates of face; also a small oblique fuscous spot on each side of upper part of disk of clypeus. Lateral marks broad below, about twice as high as wide, and ending bluntly at lower end of foveae. Tubercles and disk of pronotum pale yellow, the flanks dark. Abdomen creamy white, with a blackish band at base of tergite 1 and at junction of tergites 1-2 to 4-5, the basal band trifold, with a slender median spur extending about halfway across the white band; otherwise the light and dark bands about equal. Tergite 6 orange, the venter probably whitish in life and without dark markings. Legs pale yellow, the coxae, the hind tibiae except more or less beneath, and a streak on outer margin of middle tibiae fuscous. Antennae fuscous, the scape except on apical half above and underside of pedicel white, the underside of flagellum dull yellowish. Tegulae hyaline, with a white mark at base. Wings hyaline, the nervures testaceous, margins of stigma brownish, the subcosta reddish brown except at base.

Head as broad as long. Proboscis moderately short and probably included within the fossa in repose. Mandibles slender, acute, and reaching to far margin of proboscival fossa. Facial

foveae well impressed, a little wider than the interval between them and eyes and extending from slightly above level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma moderately large, about three times longer than wide; marginal cell with parts beneath and beyond stigma about equal. Pygidial plate as long as broad at base, with sides moderately converging to the broadly truncate apex. Frons and vertex granular tessellate, moderately dull, and with rather close, minute, and obscure punctures. Mesonotum finely tessellate, but shining and with fine, moderately close punctures. Pubescence whitish, moderately long, and erect, rather thin on face, moderately dense on cheeks and occiput and thinner on the thorax. Length, about 5.1 mm.; anterior wing, 3.5 mm.

One female (holotype), Whitewater, Riverside Co., on *Aplopappus acradenius*, Oct. 27, 1934, and 1 female (paratype), Indio, Riverside Co., on same flower, Nov. 12, 1932 (Timberlake). Types in collection of the Citrus Experiment Station, Riverside.

Perdita indioënsis, n. sp.

(Figs. 566, 567, 685)

P. indioënsis is one of the largest species of the group and differs from most of the species in having the mesonotum polished. The mandibles are rather stout but simple and acute at apex.

Female.—Head and thorax dark green, the labrum and supraclypeal area blackish. Base of mandibles, clypeus, and lateral marks white; the mandibles rufotestaceous on apical half, becoming deeper red at apex. Clypeus usually with two fuscous or black stripes on upper half of disk, which are more or less arcuate and convergent above. Lateral marks broad at lower end and abruptly and more or less strongly narrowed before reaching level of summit of clypeus, then continuing narrowly to level of antennae where a short, slender spur intrudes between fovea and eye. Disk of pronotum yellow except a green spot at middle of hind margin and sometimes a small spot on each side, but the flanks, except tubercles, broadly green. Abdomen creamy white, having a broad fuscous band at junction of tergites 1-2 to 4-5, with that part of the bands on apical border of tergites 2 to 4 a little abbreviated. Base of tergite 1 with a median triangular mark and a fuscous spot or a longitudinally oval mark on lateral borders, or the basal half of the declivity sometimes dark straight across, making the subapical white band narrow. Tergite 5 varying from nearly all white except basal dark band to entirely dark except for an irregular, abbreviated and interrupted white band across the middle. Tergite 6 more or less infuscated at base, with the pygidial plate rufotestaceous. Legs fuscous, the apex of femora, front and middle tibiae except behind, front and middle tarsi and base of hind tibiae pale yellow. Antennae fuscous, the scape broadly pale yellow beneath and across the base above, and the flagellum brownish yellow beneath. Tegulae hyaline, with a white mark at base. Wings whitish hyaline, the nervures pale yellowish, the subcosta except at base and margins of stigma slightly brownish.

Head slightly broader than long. Proboscis included within the fossa in repose, the tip of the galeae not quite reaching base of stipites. Facial foveae strongly impressed, about twice as wide as interval between them and eye and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Venation normal, the parts of marginal cell beneath and beyond stigma about equal. Pygidial plate broader than long, with sides arcuately converging to the notched apex, the notch broader than deep. Frons minutely tessellate, shining, with close, fine, distinct punctures, the punctured area extending below antennae, the punctures rather dense on subantennal plates, but sparse on supraclypeal area. Mesonotum polished, or at most very weakly tessellate, with rather close fine punctures. Pubescence white, abundant, rather short and erect on mesonotum, becoming dense to form a broad band in front of scutellum, but face below antennae nearly nude. Length, 6-7.5 mm.; anterior wing, 4-4.8 mm.

Male.—Head and thorax dark green. Anterior end of cheeks, including hardly more than one-eighth of the inferior orbits, mandibles except red tips, labrum, and face to slightly above

level of antennae pale yellow; the green of frons sometimes descending on each side to antennal sockets but generally falling a little short, with the yellow reaching obliquely to foveae on each side and extending much more broadly in middle to about the same level. Collar of pronotum and moderately wide and interrupted band on hind margin of disk, narrowly connected on each side with mark on tubercles, yellow. Abdomen fuscous or blackish, with a white band on tergites 1 to 5, the bands usually rather narrow and often interrupted medially, that on tergite 4 often interrupted also close to outer ends and that on tergite 5 commonly represented by four more or less small spots. Antennae yellow, the flagellum darker yellow except basally, the pedicel and flagellum rather narrowly fuscous above, but the two apical joints almost entirely dark. Legs, tegulae, and wings as in female, except subcosta and margins of stigma distinctly brown.

Head slightly broader than long. Mandibles slender, acute, and almost reaching far margin of proboscis fossa. Facial foveae obscure and punctiform. Triangular lobe at apex of tergite 7 slightly longer than wide, obtuse at apex, and pale testaceous. Most of other characters, including sculpture and venation as in female, the pubescence throughout a little longer and at least on the cheeks a little denser. Subgenital plate triangular, as wide as base as long, slightly rounded at apex, and with fine, sparse hair on the disk. Caulis of genitalia deeply incised above at base of parameral lobes as seen from side, with acute submedian spurs in dorsal view; parameral lobes broad at base and obtuse at apex, with a thin vertical expansion on apical half; fused body of sagittae broad but hardly angulated at middle and thence tapering to the acute apex, and narrowly fusiform in lateral view; volsellae more exposed than usual and with numerous fine tubercles. Length, 4-5-6 mm.; anterior wing, 3.3-4.4 mm.

Type series taken at Indio, and vicinity, Riverside Co., California, at flowers of *Aplopappus acradeniis*. One female, 1 male (holotype female and allotype), Indio, Oct. 15, 1947 (Timberlake), and the following paratypes: 6 females, 4 males, Indio, Oct. 28, 1933; 1 female, 3 males, 6 miles northwest of Indio, Oct. 15, 1947; 9 females, 8 males, 2.8 miles southeast of Indio, Oct. 23, 1951 and Nov. 1, 1953; 13 females, 11 males, 4 miles southeast of Indio, Nov. 1, 1953 (Timberlake); 10 females, 5 males, Indio, Oct. 26, 1952 (E. G. Linsley and R. F. Smith); and 3 females, 1 male, Indio, Nov. 1, 1953 (J. C. Hall).

Types in collection of the Citrus Experiment Station, Riverside, and paratypes in collections of the University of California at Berkeley and Davis.

Perdita elegans, n. sp.

(Figs. 568, 569, 686)

This is one of the rarer species of the Colorado Desert and only twenty-five specimens have been examined. It is a small, shining, blue-green bee, with head longer than wide, the face marks white, the abdomen with five white bands and the wings milky hyaline. The preferred flower is *Palafoxia linearis*.

Female.—Dark blue-green, the labrum, upper border of disk of clypeus, and supraclipeal area black. Mandibles except red tips, anterior half of clypeus and lateral marks white; the white of clypeus more or less notching the black in median line; lateral marks broad at anterior end, but abruptly narrowed before reaching level of summit of clypeus, then continued broadly to level of antennae, where they are truncate or extend obliquely to foveae. Thorax entirely dark except collar of pronotum and white tubercles. Abdomen black, with a white band on tergites 1 to 5, the light bands narrower than the dark intervals, notched or sometimes narrowly interrupted medially, bent backward and dilated at outer ends on tergites 2 to 4, and that on tergite 5 covering disk, except a dark enclosed subapical band, which may be broken into three spots or reduced to a small median spot. Venter dark, except on reflexed parts of tergites. Legs black, the apex of femora briefly, front and middle tibiae except behind, base of hind tibiae, and the tarsi white. Antennae brown, the scape and pedicel white beneath, the flagellum brownish yellow beneath. Tegulae hyaline, with a white mark at base. Wings milky hyaline, the nervures nearly colorless, the stigma yellowish, the subcosta tinged with brown except basally.

Head about one and one-half times longer than wide. Proboscis moderately long, the galeae somewhat surpassing the stipes in repose. Facial foveae wider than the interval between them and eyes, and reaching from upper level of antennal sockets not much more than halfway to level of anterior ocellus. Mandibles rather stout, but simple and reaching far margin of proboscoidal fossa. Pterostigma a little more than half as wide as the submarginal cells, and the parts of marginal cell beneath and beyond stigma subequal. Pygidial plate as long as wide, with the sides converging nearly straight to the moderately narrow and notched apex. Face and vertex tessellate, but shining, the mesonotum weakly tessellate or polished; both face and mesonotum with fine and moderately close punctures. Pubescence white and moderately short, that on mesonotum rather coarse, erect, and close-set, elsewhere a little longer and rather dense on cheeks, occiput, and vertex; scopal hair of hind tibiae fully twice as long as width of joint. Length, about 4.5 mm.; anterior wing, 3-3.2 mm.

Male.—Head and thorax dark blue. Line across anterior end of cheeks, narrow postorbital line nearly to middle of eyes, mandibles except reddish tips, labrum and face to level, or somewhat above level, of antennae white; an oblong or triangular median lobe of the blue of frons descending between the antennal sockets, sometimes spreading laterally to involve the upper inner margins of the sockets, but the white of sides of face often extending narrowly inward above sockets so that they are wholly enclosed by the white. Mark on posterior corners of disk of pronotum, as well as the collar and tubercles white. Abdomen fuscous or blackish, with a white band on tergites 1 to 6, but the white bands very variable; sometimes those on tergites 2 to 6 broad, with the apical dark band on tergites 2 to 5 reduced to a rather large quadrate mark halfway between middle and lateral margin on each side, with these marks on tergite 4 almost uniting with the basal dark band, and those on tergite 5 only weakly developed, and the white band on tergite 1 enclosed, much broadened and slightly interrupted in middle, with each half emarginate on the outer side; in the type, the white bands are narrower than the dark intervals, that on tergite 1 narrowed on outer ends, those on tergites 2 and 3 abruptly bent backward to become subapical at outer ends, the apical dark band on these segments abbreviated and showing some degree of obliteration part way across the middle, and the white bands on tergites 4 to 6 apical, almost broadly interrupted on each side by a broad posterior lobe from the basal dark area, but widened at the middle to join two irregular white marks; at the other extreme (paratype from Palm Springs) the white bands are very narrow, almost obliterated on tergite 1, divided into a transverse and interrupted basal streak and a subapical spot on each side on tergites 2 and 3, and divided, or almost so, into three subapical marks on tergites 4 to 6. Legs as in female, except that the hind tibiae are mainly white with a dark mark behind on apical half and sometimes a mark on anterior side. Scape white, with a brown mark on dorsal margin, the pedicel and flagellum pale brown above and broadly pale brownish yellow beneath but becoming more whitish on basal joints and with the apical joint nearly all pale brown. Tegulae and wings as in female except subcosta and margins of stigma more brownish.

Head longer than wide, the cheeks narrow. Mandibles slender, tapering and reaching far margin of proboscoidal fossa. Facial foveae punctiform. Tergite 7 produced into subacute testaceous lobe. Sculpture and pubescence about as in female, except that the frons is more strongly tessellate and moderately dull. Subgenital plate as long as wide, with convexly arcuate sides converging to the rounded apex, and with sparse fine hair on the disk. Caulis of aedeagus a little longer than broad, with the parameral lobes broad at base and slender and finger-shaped at apex as seen from above; fused body of sagittae widening to a little beyond the middle, where it is angulated, then rapidly narrowing to the slender apex, and as seen from the side narrowly fusiform and minutely curved. Length, 4-5 mm.; anterior wing, 3.1-3.2 mm.

One female, 1 male (holotype and allotype), Cathedral City, Riverside Co., California, on *Pectis papposa*, Oct. 8, 1944 (Timberlake). Paratypes as follows.—CALIFORNIA: Riverside Co.: 1 female, 6 miles south of Palm Springs, on *Palafoxia linearis*, Nov. 14, 1945; 1 male, Palm Springs, on *Palafoxia*, April 14, 1946; 1 male, 2 miles south of Oasis, on *Palafoxia*, March 8, 1936; 1 female, Box Canyon, on *Palafoxia*, April 9, 1958 (Timberlake); 1 female, Indio, on *Melilotus*, April 22, 1950 (E. G. Linsley). San Diego Co.: 1 female, Borego, April 2, 1953 (P.

D. Hurd, Jr.). Imperial Co.: 6 females, 4 males, on *Abronia*, and 3 females, 3 males on *Larrea*, Coyote Wells, April 8, 1956 (R. R. Snelling). ARIZONA: 1 female, Yuma, Yuma Co., on Spanish dagger (*Palafoxia* ?), April 13, 1955 (Butler and Werner).

Types in collection of the Citrus Experiment Station, Riverside, and paratypes in the collections of the University of California at Berkeley, the University of Arizona, and of Mr. Snelling.

Perdita fasciata, n. sp.

The type of this species was collected with specimens of *P. bigeloviae* Cockerell at Crook, Colorado, and determined as that species (the label, I believe, written by Grace Sandhouse, although the specimens of *bigeloviae* bear determination labels in Cockerell's handwriting), but it differs in having the mesonotum almost polished, the frons duller, the face marks large and more extensive, and the abdominal white bands broader. Because of the shining mesonotum it runs next to *elegans* in the key, but has a much larger and broader head.

Female.—Thorax dark green, the head more bronzy olive green. Mandibles on basal half, clypeus, large lateral marks, broad supraclypeal mark and dot on subantennal plates adjacent to antennal sockets, yellowish white; the lateral marks very broad below, narrowed one-half at level of antennae, then intruding between foveae and margin of eyes; mandibles rufotestaceous at middle and red at apex, the labrum orange testaceous. Collar of pronotum, mark on each side of hind margin of disk, and tubercles white. Abdomen brown, with a broad white band on tergites 1 to 5 (the base of tergite 1 dark and a dark band at junction of tergites 1-2 to 5-6), that on tergite 1 much broadened medially but almost interrupted by the dark median crease. Legs brownish fuscous at base, with apex of femora broadly, front and middle tibiae except behind, front and middle tarsi and base of hind tibiae white, the hind tarsi brownish with the basal joint paler. Spot at apex of scape, pedicel, and flagellum dark brown, the flagellum brownish yellow beneath and the scape otherwise yellowish white. Tegulae white at base and testaceous on outer margin. Wings whitish hyaline, the nervures testaceous brown, the subcosta reddish brown.

Head large and somewhat broader than long. Proboscis rather short and probably included within the fossa when folded in repose. Facial foveae well impressed, somewhat widened at upper end and more narrowed below, distinctly wider than the interval between them and margin of eyes and extending from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma normal for group, and marginal cell with parts beneath and beyond the stigma about equal. Pygidial plate rather small, about as long as wide, with moderately wide and truncate apex somewhat notched. Frons minutely and densely tessellate, dull, and with rather sparse, minute, and obscure punctures. Mesonotum faintly tessellate, or almost polished and with minute, widely spaced punctures. Pubescence whitish, moderately abundant, rather short and erect on mesonotum and much denser than usual on the cheeks. Length, about 5.75 mm.; anterior wing, 3.8 mm.

One female (holotype), Crook, Logan Co., Colorado, Aug. 22, 1923 (Grace Sandhouse), in collection of the Citrus Experiment Station, Riverside.

Perdita hirticeps, n. sp.

There are two forms of this species which have been collected commonly in California, the typical one from the cismontane area and the other from the desert regions. In addition, two other forms, which are known only from three females, seem to be too close to *hirticeps* to be distinct species. These are from Antioch, California, and Oak City, Utah. *P. hirticeps* is distinguished by the abundant rather long fine hair of head and thorax, the four or five strongly arcuate, narrow

or rather narrow, light bands of the abdomen, and by the distinctly punctured face. The two better-known races collect pollen from *Stephanomeria*.

***Perdita hirticeps hirticeps*, n. subsp.**

(Figs. 570, 571, 687)

Typical *hirticeps* has one or three white marks on anterior part of disk of clypeus, the bands of abdomen narrow and pale yellow, that of tergite 5 usually evanescent, and the wings slightly dusky, at least in comparison with the whitish wings of *apicata*.

Female.—Head and thorax dark green, the ground color of clypeus, the labrum, and the supraclypeal area black. Mandibles rufotestaceous, redder at apex and with a large white mark at base. A median mark on clypeus, often a transverse spot near anterior margin of disk on each side, and rather small lateral marks creamy white. The lateral marks rounded toward clypeus, somewhat emarginate on the inner margin and reaching level of antennae. The lateral and clypeal marks when well developed form a broad U-shaped figure or a reversed arch, with the keystone mark on middle of clypeus jutting upward. Collar of pronotum, transverse spot on posterior corners of disk, and the tubercles white. Abdomen blackish, or brownish fuscous, with a narrow pale-yellow band on tergites 1 to 5, the bands more or less notched medially, or sometimes slightly interrupted on one or two segments, those on tergites 2 to 4 strongly arcuate and extending backward at outer ends, and that on tergite 5 generally evanescent. Legs fuscous or brownish fuscous with a yellowish streak on anterior side of front tibiae. Antennae fuscous, the flagellum more or less brown or brownish yellow beneath except on the basal and apical segment. Tegulae testaceous brown at base and hyaline on outer margins. Wings slightly dusky hyaline, the nervures testaceous, the margins of stigma brown or fuscous and the subcosta somewhat darker.

Head large, slightly broader than long, with inner orbits parallel. Proboscis moderately long, slightly exceeding the fossa in repose. Mandibles stout, simple, and nearly reaching far margin of labrum when closed. Facial foveae well impressed, wider than interval between them and eyes, and reaching from level of middle of antennal sockets nearly three-fourths of distance to level of anterior ocellus. Pterostigma about normal for group, the parts of marginal cell beneath and beyond stigma about equal. Pygidial plate rather large, as broad as long, the sides converging to the rounded apex, which is slightly notched. Frons and vertex tessellate and moderately dullish, the entire face, including clypeus, with rather close, strong but fine punctures, those on the subantennal plates somewhat finer. Mesonotum polished, the punctures moderately close and finer than those of frons. Pubescence abundant, erect, rather long, dense on cheeks as usual, the scopal hair on outer margin of hind tibiae about twice as long as width of tibiae. Length, about 5.5–6 mm.; anterior wing, 3.8–4 mm.

Male.—Head and thorax dark green or blue-green. Mandibles, except rufotestaceous apical third and inner margin, labrum, clypeus, supraclypeal and lateral marks white; more rarely the subantennal plates are also white, but usually green or blue-green. Upper margin of disk of clypeus sometimes with two small fuscous marks. Lateral marks broad to level of antennae, then obliquely narrowed to orbits, or subtruncate with a short, slender orbital extension. Pronotal marks as in female. Abdomen fuscous with a yellow band on tergites 1 to 4, and rudiments of a band on tergite 5, the bands generally narrowly interrupted medially, abruptly bent backward to become subapical at outer ends, on tergites 2 to 4, and that on tergite 4 sometimes with lateral subapical parts discrete. The band on tergite 5, when present, represented by two submedian and two subapicolateral spots, or by either two separately. Legs fuscous, the extreme apex of femora, anterior side of front and middle tibiae yellow, the tarsi brown, paler brown on front and middle pair, the front basitarsi yellow. Antennae fuscous, with about four middle joints of flagellum brown or yellowish brown beneath. Tegulae with a whitish spot at base, the tegulae otherwise and wings as in female.

Head as long as wide, with narrow cheeks. Mandibles moderately stout, tapering, and reaching far margins of proboscis fossa. Facial foveae shallow, oval, about twice as long as wide. Apical lobe of tergite 7 a little longer than wide, and moderately narrowed to the rounded apex. The sculpture and pubescence rather similar to female, but frons dull with fine faint punctures, and punctures of lower face little developed, the punctures and pubescence of mesonotum also sparser. Subgenital plate subtriangular, broader than long, the apex produced somewhat nipplelike, the disk with moderately abundant fine hair. Lateral lobes of caulis ending bluntly on each side over the base of the parameral lobes; the latter broad at base and with broad rounded apices; the fused body of sagittae angulately widened at middle, and thence tapering to the acute apex, and as seen from side narrowly fusiform and sinuate. Length, about 4.5-5 mm.; anterior wing, 3.4-3.9 mm.

This bee was described years ago in a manuscript that never was published and the types there listed are as follows: 1 male (holotype), Cascada, Fresno Co., California, 6,000 feet, July 29, 1919 (E. P. Van Duzee); 2 males (paratypes), Lompoc, Santa Barbara Co., Sept. 9, 1908 (J. C. Bradley); 1 female (allotype), Claremont, Los Angeles Co. (Baker); and 1 male (paratype), Riverside, Riverside Co., at flowers of *Hemizonia*, July 30, 1929 (Timberlake). Additional paratypes.—CALIFORNIA. Riverside Co.: 5 males, 6 females, Riverside, on *Stephanomeria exigua*, Sept. 19 to Oct. 13, 1932; 1 male, Riverside, on *Coreopsis lanceolata*, July 1, 1934, and 3 females on *Stephanomeria*, Oct. 19, 1934; 2 males, Cabazon, on *Stephanomeria*, June 11, 1954 (Timberlake). Santa Barbara Co.: 2 females, Casitas Pass, on *S. virgata*, Sept. 12, 1950 (Timberlake). San Bernardino Co.: 2 males, near South Fork Camp, San Bernardino Mts., 6,400 feet, on *S. exigua* var. *coronaria*, Aug. 22, 1952 (Timberlake); 4 males, 2 females, Rialto, on *S. exigua*, Aug. 15, 1956 (P. D. Hurd, Jr.). San Diego Co.: 1 male, San Diego, Aug. 7, 1937 (E. I. Beamer).

Holotype in collection of California Academy of Sciences, San Francisco (No. 2,989); allotype in U. S. National Museum (No. 43,397); and paratypes in collections of Cornell University, University of California at Riverside and Berkeley, and the University of Kansas.

Perdita hirticeps apicata, n. subsp.

Female.—Similar to typical *hirticeps*, but head and thorax blue-green or blue, abdominal bands white (yellow only in one female from The Narrows, San Diego County), and the wings whitish hyaline, with the nervures pale testaceous, margins of stigma pale brownish at the most, and subcosta pale ferruginous. Length, about 5-6.8 mm.; anterior wing, 3.1-4.3 mm.

Male.—Similar to the typical male, but head and thorax blue, the face almost always entirely white below level of antennae, and abdominal bands white. Antennal scape broadly white beneath, the first eight joints of flagellum yellowish or whitish beneath, but pedicel and the two apical joints, or sometimes also the antepenultimate joint, entirely dark. Wings whitish hyaline, the subcosta and margins of stigma more brownish than in the female. Apex of femora, front and middle tibiae except behind, hind tibiae beneath and all the tarsi white, or the hind tarsi sometimes pale brown. Length, 4-6 mm.; anterior wing, 3-4.5 mm.

Holotype female and allotype male, Morongo, San Bernardino Co., California, on *Stephanomeria exigua*, Sept. 30, 1944 (Timberlake). Paratypes as follows.—CALIFORNIA. San Bernardino Co.: 47 females, 38 males, taken with the types, Sept. 26-30, 1944; 1 female, Lucerne Valley, June 5, 1948 (D. J. and J. N. Knull). Imperial Co.: 1 male, 2 miles north of Plaster City, on *S. pauciflora*, May 1, 1952 (Timberlake). San Diego Co.: 1 male, Palm Canyon, Borego, on *S. pauciflora*, April 28, 1954; 29 males, 12 females, Borego, on same flower, April 29-30, 1954, and 1 male on *S. exigua*, April 28; 1 female, Borego, on *Malacothrix glabrata*, April 20, 1954; 1 male, 6 females, Borego, on *S. exigua* and 1 male on *S. pauciflora*, April 26-29, 1955; 1 female, The Narrows, 10 miles west of Ocotilla, on *S. pauciflora*, Nov. 12, 1939 (Timberlake); 11 males, 9 females, Borego, on *S. pauciflora* and 1 male, 1 female, on *S. exigua*, April 28 and 30, 1950 (P. D. Hurd, Jr.); and 9 males, Borego, on *Stephanomeria*, April 30, 1954 (M. Wasbauer).

Types in collection of the Citrus Experiment Station, Riverside; paratypes in the collections of the University of California at Berkeley, the University of Kansas, the Ohio State University, and the U. S. National Museum.

***Perdita hirticeps luteocincta*, n. subsp.**

There is little or no doubt that this is a form of *hirticeps*, differing only in coloration.

Female.—Head and thorax dark green, with white markings only slightly larger than in typical *hirticeps*. Abdomen fuscous, with five broad, pale yellow, or almost creamy-white bands, which are about as broad as the dark intervals, those on tergites 2 to 5 arcuate and curved backward at outer ends, notched slightly in the middle behind and that on tergite 5 eroded or subinterrupted near the outer ends. Legs brownish fuscous, the apex of femora briefly and anterior side of front and middle tibiae yellow, the tarsi and hind tibiae rather pale brown. Triangular mark on dorsal side of scape, reaching nearly to base, the pedicel and flagellum above fuscous, the scape otherwise yellow and the flagellum dullish yellow. Tegulae testaceous hyaline, with a whitish mark at base. Wings more tinged with brown than in typical *hirticeps*, the nervures and stigma testaceous, the subcosta pale ferruginous. Length, 6 mm.; anterior wing, 3.9 mm.

One female (holotype), Antioch, Contra Costa Co., California, Sept. 9, 1935 (R. M. Bohart); and 1 female (paratype), Antioch, on *Gutierrezia californica*, Sept. 8, 1936 (C. D. Michener).

Type in collection of the Citrus Experiment Station, Riverside, the paratype in collection of the University of Kansas.

***Perdita hirticeps candidipennis*, n. subsp.**

This subspecies is similar to *apicata*, but head smaller, the wings whiter, with pallid nervures and stigma, and the ground color of head and thorax bluer.

Female.—Head and thorax dark blue, with white markings as in other forms of *hirticeps*, those of face rather large and those of pronotum small. Abdomen blackish, with five white bands as in *apicata*. Legs fuscous, the knees very narrowly and front and middle tarsi whitish, the anterior side of front tibiae pale yellow. Antennae fuscous, the flagellum more brownish above and dull yellowish beneath, the scape and pedicel entirely dark. Tegulae whitish hyaline, opaque at base, without a more definitely colored mark. Wings milky hyaline, the stigma and nervures pallid, the subcosta pale brown.

Much like other forms of *hirticeps* in structure, sculpture, and pubescence, but the head is smaller and no broader than long, and apex of pygidial plate retuse, with the notch broader than deep. Length, 5 mm.; anterior wing, 3.5 mm.

One female (holotype), Oak City, Millard Co., Utah, on *Helianthus* sp., June 24, 1949 (G. E. Bohart), in collection of the Citrus Experiment Station, Riverside.

***Perdita numerata numerata* Cockerell**

(Figs. 572, 573, 688)

Perdita numerata Cockerell, 1895, Trans. Amer. Ent. Soc., 22:296, ♀; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:80; Cockerell, 1916, Ann. Mag. Nat. Hist. (8)17:281, ♂.

This species is easily recognized by dark stigma, and in the female by the two dark stripes on the clypeus. The type locality is Las Cruces, New Mexico, where it was taken on *Salix*. A western form, common on the deserts of California, is separated as the race *hesperia*, and is usually found on *Prosopis*, from which the female collects pollen.

Female.—Head and thorax dark green, the face and propodeum more bluish, the mesonotum with a brassy luster. Mandibles, except red apical third, clypeus, lateral and supraclypeal marks white. Labrum and two submedian stripes on clypeus fuscous or black, the stripes usually not

involving the customary pair of dots. Lateral marks ending bluntly at level of antennae. Collar of pronotum, large marks on hind margin of disk, sometimes narrowly confluent with mark on tubercles, white. Abdomen blackish, with five white bands, that on tergite 1 represented by two transversely oval marks at summit of the basal declivity and a cutoff mark on each lateral margin, those on following segments even and reaching lateral margins, except sometimes on tergite 2, and about as broad as the dark intervals. Legs blackish, the trochanters in all, apex of femora broadly, front and middle tibiae except posterior blotch, their tarsi and base of hind tibiae white or pale yellow. Antennae fuscous above, the flagellum more brownish toward apex, the basal joints of flagellum and pedicel beneath, and scape except narrowly above pale yellow, the flagellum otherwise beneath becoming more pale brownish toward apex. Tegulae white at base and whitish hyaline on outer margin. Wings hyaline, the nervures testaceous brown, the stigma brown or fuscous except at base, and the subcosta concolorous with stigma.

Head broader than long, with inner orbits parallel. Mandibles tapering, acute, and reaching far margin of proboscival fossa. Proboscis rather short, the galeae not reaching base of stipes when folded in repose. Facial foveae well impressed, a little wider than interval between them and eyes, widening somewhat at anterior end and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Pterostigma rather broad, but not equaling width of submarginal cells and not much more than twice as long as wide. Marginal cell broadened basad, with the part beneath stigma shorter than the part beyond. Pygidial plate triangular, about as long as wide, narrowly retuse at apex or weakly notched. Frons and vertex tessellate and moderately dull, with fine, shallow, and rather sparse punctures. Mesonotum tessellate but shining and with fine, well-separated punctures. Pubescence white, fine, erect, and moderately abundant, that on the mesonotum rather short. Length, 5-6.5 mm.; anterior wing, 3.8-4 mm.

Male.—Head and thorax dark green. Anterior end of cheeks, posterior orbits to middle of eyes, mandibles except red tips, labrum, and face to level of foveae yellow, although the face paler anteriorly; margin of green of frons uneven, with a lobe projecting on each side almost, or sometimes quite, to antennal sockets. Pronotum except a more or less narrow green band from flank to flank, which has narrow median extension on disk to hind margin, the prosternum entirely or in large part, and a T-shaped mark on mesospectus, sometimes reduced to an anterior spot on each side, or even entirely absent, yellow. Abdomen yellow, with tergite 1 in large part, and band at junction of tergites 1-2 to 5-6 brownish fuscous or blackish; apical dark band on tergite 6 sometimes reduced to a spot on each side; yellow band on tergite 1 usually enclosed and narrow, and the dark band at apex of tergites 2 to 5 with a broad anterior bulge on each side. Legs yellow, including coxae almost entirely, a short streak on posterior side of front and middle tibiae, apical half to two-thirds of hind tibiae on outer side and hind tarsi brown or fuscous. Antennae yellow beneath and brownish fuscous above, the dark color on scape reduced to a more or less small triangular spot at apex. Tegulae and wings as in female, except that the former are more yellowish at base.

Head considerably broader than long, the inner orbits parallel. Mandibles tapering, acute, and reaching far margin of proboscival fossa. Facial foveae oval, about twice as long as wide. Sculpture, pubescence, venation very nearly as in the female. Tergite 7 tapering from base into an acute median lobe. Subgenital plate somewhat longer than wide, with the sides rather arcuately convergent on basal half, thence more strongly convergent to the acuminate and sharply pointed apex. Caulis of aedeagus shallowly emarginate at apex above, the parameral lobes appearing slender as seen from above and nearly uniformly broad in lateral view; fused body of sagittae narrowly fusiform, very acute at apex and not at all angulate at middle. Length, 4.5-5 mm.; anterior wing, 3.4-3.8 mm.

Nineteen females, 26 males, Las Cruces, Dona Ana Co., New Mexico, on *Actinea* and *Salix*, April 25, 1954 (R. H. and L. D. Beamer); 1 female, Hot Springs, Big Bend Park, Brewster Co., Texas, on *Prosopis*, April 11, 1949 (Michener and Beamer).

A set of 6 females, 7 males, Phoenix, Maricopa Co., Arizona, one of the males on *Salix*, April 11, 1897 (R. E. Kunze) Baker Nos. 2340 and 2341, is placed here, but the specimens begin

to show some of the characters of *hesperia*. One female, 1 male, Needles, California, April 1-7, 1918 (J. C. Bradley) seem to be typical *numerata*, but more material is needed to show whether or not the female is a light specimen in a population of *hesperia*.

***Perdita numerata hesperia*, n. subsp.**

Perdita numerata Timberlake, 1928, Pan-Pac. Ent., 8:25.

Female.—Similar to typical *numerata* in most characters. Black stripes on disk of clypeus broad, usually confluent with the customary black dot on each side, but variable in shape, sometimes united across anterior margin of disk and sometimes each confluent with the dark color above clypeus. Supraclypeal mark usually notched above or divided or almost absent. Marks on pronotum smaller, the posterior marks of disk usually well separated from mark on tubercles. Abdomen blackish with narrow white bands, that on tergite 1 represented by two small transverse marks, and those on tergites 2 to 5 generally enclosed and strictly basal. Legs with the pale-yellow markings less extrusive, the trochanters entirely dark, the front and middle femora broadly dark behind, the hind femora light only briefly at apex and hind tibiae light only on the extreme base. Antennae similar, but the scape often less broadly yellow beneath. Length, 5-6.5 mm.; anterior wing, 3.2-4.1 mm.

Male.—Not distinguishable by any constant characters from typical *numerata*. The genitalia have been compared with those of a male from Las Cruces and found to be in close agreement. Length, 4-5 mm.; anterior wing, 3.1-4 mm.

Six females, 5 males (holotype female, allotype, and paratypes), Palm Springs, Riverside Co., California, on *Prosopis juliflora*, April 10, 1932 (Timberlake). Additional paratypes as follows.—CALIFORNIA. Riverside Co.: 1 female, Palm Springs, on *Larrea*, April 9, 1932; 1 male, Coachella, on *Prosopis*, April 23, 1927; 1 male, Indio, on *Prosopis*, April 4, 1936; 9 males, Indio, on *Prosopis*, April 7, 1936; 1 female, 4 males, 5.5 miles northwest of Indio, April 9, 1936 (Timberlake); 27 females, 2 males, 6 miles northwest of Indio, on *Melilotus*, April 30, 1949 (E. G. Linsley, J. W. MacSwain, and R. F. Smith); 1 male, 2 miles west of Edom, on *Larrea*, April 29, 1936 (Linsley); 3 females, 4 males, 5 miles northwest of Indio, on *Prosopis*, April 10 (C. D. Michener). Imperial Co.: 10 females, 51 males, 2 miles south of Travertine Rocks (about 5 miles south of Oasis), on *Prosopis*, March 29, 1936 (Timberlake, F. Platt, and R. M. Bohart); 1 female, 5 miles southeast of Kane Springs, on *Prosopis* (R. C. Dickson); 1 female, 5 miles northwest of Kane Springs, June 6, 1939 (Michener). San Diego Co.: 1 male, Borego, April 26, 1954 (J. G. Rozen); 1 female, sand dunes, Borego, on *Geraea canescens*, April 26, 1955 (Timberlake); 1 female, Borego, April 8, 1950 (W. F. Barr). San Bernardino Co.: 1 female, 6 males, Cronise Valley, on *Prosopis*, April 29, 1956 (M. Wasbauer, B. J. Adelson, and J. Powell).

MEXICO, BAJA CALIFORNIA: 1 male, El Mayor, April 3, 1939 (Michener).

Types in collection of the Citrus Experiment Station, Riverside; paratypes in collections of the University of California at Berkeley and Davis, the University of Idaho, and the University of Kansas.

***Perdita trimaculata*, n. sp.**

(Figs. 574, 575, 689)

Perdita trimaculata is one of the largest species of the group and flies in late fall at flowers of *Chrysothamnus*. It is easily recognized by the three light marks on the face, the robust subdilated but simple mandibles, the broad, weakly impressed facial foveae, and by the broad rounded apex of the pygidial plate.

Female.—Head and thorax olive or bluish green, the mesonotum more brassy, the labrum, clypeus, and supraclypeal area black. A median longitudinal clypeal mark, narrowly ampuliform in shape and widest on anterior half, and transversely oblique lateral marks, usually not extending much above level of summit of clypeus, creamy white, but sometimes with a small additional spot on each side of disk of clypeus and lateral marks reaching broadly on orbits to level of

antennae. Mandibles rufotestaceous, or ferruginous, becoming white at base and red at apex. Collar of pronotum, transverse mark on each side of hind margin of disk, and the tubercles white. Abdomen black, with broad creamy-white bands, that on tergite 1 narrowly interrupted in middle, that on tergite 2 broadened at outer ends and that on tergite 5 abbreviated. Legs blackish, the apex of femora briefly, anterior side of front and middle tibiae and the front tarsi pale yellow, the front tarsi slightly brownish above, and the middle tarsi mostly pale brown. Antennae fuscous, darker on the scape and more brownish on the flagellum, the underside of scape, pedicel, and first three joints of flagellum yellowish white, the remainder of flagellum brownish yellow beneath. Tegulae testaceous hyaline, with a white mark at base. Wings nearly clear hyaline, the nervures testaceous brown, the subcosta and margins of stigma fuscous.

Head nearly as long as wide, the clypeus produced and rather prominent, the inner orbits slightly diverging below. Mandibles stout, dilated within, strongly curved on outer margin, and simple and acute at apex. Proboscis included within the fossa in repose. Facial foveae weakly impressed, broad and narrowly separated from eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma moderately narrow and about four times longer than wide; the part of marginal cell beneath the stigma generally shorter than the part beyond. Pygidial plate about as long as broad at base and evenly rounded at apex. Frons and vertex granular tessellate, dull, and with obscure, minute, moderately close punctures. Mesonotum moderately shining and tessellate, the punctures like those of frons but much more distinct. Pubescence whitish, fine, moderately long and erect, rather thin on the mesoscutum and dense on cheeks, front coxae and mesopectus. Length, 6-8 mm.; anterior wing, 4.2-5 mm.

Male.—Ground color of head and thorax as in female. Cheeks narrowly at anterior ends, posterior orbits to middle of eyes, mandibles except red tips, labrum, and face to a little above level of antennae bright yellow. Pronotal marks yellow, the posterior marks of disk narrowly confluent with large mark on tubercles. Abdomen, including venter, yellow, with seven black bands, one at base of tergite 1, five at junction of tergites 1-2 to 5-6, and a subapical and abbreviated band on tergite 6; or abdomen black above, with five narrow yellow bands, which are usually enclosed and sometimes narrowly interrupted at middle, and the venter with a dark band across each segment. Legs yellow, including underside of hind tibiae, but base of hind coxae, the posterior side of femora except at apex, streak or blotch on posterior side of front and middle tibiae, and the hind tibiae and tarsi black. Antennae yellow, the flagellum more brownish beneath toward apex, a spot at apex of scape and flagellum above brown or pale fuscous, with the pedicel usually a little darker. Tegulae and wings as in female.

Head as broad as long, the inner orbits slightly diverging below. Mandibles rather slender, acute, and reaching far margin of proboscis fossa. Disk of clypeus a little broader than high. Facial foveae faint and about twice as long as wide. Sculpture and pubescence about as in female, the frons virtually impunctate and the punctures of clypeus and supra-clypeal area faint. Tergite 7 with an ogival median lobe, which is about as long as wide at base. Subgenital plate triangular, distinctly broader than long, the apex in an angle of about 90 degrees, the disk with sparse short setae. Caulis of genitalia oval, with subacute apical lobes above, the interior with a high septum at base; parameral lobes broad and incised on inner side between the middle and apex, and as seen from side much the broadest subbasally; fused sagittae rather short, broadly angulate beyond the middle, acute at apex, and thinly fusiform and sinuate in lateral view; volsellae unusually long, the superior and inferior pairs about equal. Length, 6-7 mm.; anterior wing, 4-4.9 mm.

Five females, 12 males (holotype female, allotype, and paratypes), 5 miles south of Palm Springs, Riverside Co., California, on *Chrysothamnus paniculatus*, Nov. 18, 1933 (Timberlake). Additional paratypes as follows.—CALIFORNIA. Riverside Co.: 56 females, 33 males, Nov. 11, 1939, 8 females, 10 males, Nov. 26, 1939, 13 females, 2 males, Dec. 12, 1944, 20 females, 25 males, Nov. 13, 1945, all on *C. paniculatus*, 5-6 miles north of Palm Springs (Timberlake); 1 female, Indio, Oct. 26, 1952 (E. G. Linsley and R. F. Smith). San Bernardino Co.: 1 female, 3 males, Yucca Valley, on *Gutierrezia lucida*, Oct. 5, 1934 (A. J. Basinger and A. L. Melander); 1 female, Oro Grande, on *C. nauseosus*, Oct. 25, 1934; 4 females, 1 male, 5 miles south of Adelanto, on

C. nauseosus, Oct. 21, 1951 (Timberlake); 2 males, Morongo Valley, Nov. 26, 1946 (Grace H. and John L. Sperry); 1 female, Chubbock, Oct. 17, 1951 (Linsley). Kern Co.: 3 females, 4 males, Red Rock Canyon, on *C. paniculatus*, Oct. 25, 1955 (M. Wasbauer); 1 male, Red Rock Canyon, Sept. 26, 1957 (J. C. Hall). ARIZONA: 1 male, 27 miles northeast of Yucca, Mohave Co., Oct. 30, 1952 (Linsley and Smith).

Types in collection of the Citrus Experiment Station, Riverside; paratypes in collections of the University of California at Berkeley, the University of Kansas, the California Academy of Sciences, the American Museum of Natural History, and the U. S. National Museum.

***Perdita chloris*,¹ n. sp.**

(Figs. 576, 577, 690)

Female.—Head and thorax dark bluish green, the labrum, clypeus, and supraclypeal area black. Mandibles except broad red tips, rather large lateral marks, which end bluntly at level of lower end of foveae, sometimes two small supraclypeal spots, the collar of pronotum, small narrow spot on posterior corners of disk and the tubercles white. Abdomen blackish, with white bands on tergites 1 to 5, that on tergite 1 narrow and interrupted medially and those on following segments successively broader, with that on tergite 5 covering the disk, so that only the basal corners, two quadrate subapical marks, and generally a small, slightly less apical mark in the middle remain dark. Pygidial plate pale amber and the venter mainly fuscous. Legs brown or blackish, the extreme apex of femora, anterior side of front and middle tibiae, and base of hind tibiae pale yellow, the front and middle tarsi also yellowish, but more or less brownish above. Antennae fuscous, the flagellum pale brownish yellow beneath. Tegulae whitish hyaline, with a white mark at base. Wings hyaline, with a slight whitish opacity, the nervures and margins of stigma pale testaceous brown, the subcosta slightly darker.

Head a little broader than long, the inner orbits of eyes parallel. Mandibles slender, acute, and reaching far margin of proboscival fossa. Proboscis moderately long, with the galeae falling a little short of base of stipites when folded in repose. Facial foveae but little wider than interval between them and eyes and reaching from level of middle of antennal sockets a little more than two-thirds of distance to level of anterior ocellus. Pterostigma about three times longer than wide, and parts of the marginal cell beneath and beyond the stigma about equal. Pygidial plate as long as wide at base, with the sides converging to the rather narrow and slightly notched apex. Frons and vertex minutely tessellate and rather dull, with close, minute, rather obscure punctures; the rather numerous punctures of clypeus and supraclypeal area larger but shallow. Mesonotum tessellate, shining, and with punctures more distinct and less close than those of frons. Pubescence whitish, fine, erect, moderately abundant, a little thinner on the mesonotum than on the face or cheeks, and longer on sides of thorax than on the notum. Length, 5–5.5 mm.; anterior wing, 3.5–3.6 mm.

Male.—Head and thorax dark green. Anterior end of cheeks and short postorbital stripe, mandibles except reddish tips, labrum, and face to, or slightly above, level of antennae creamy white, the white extending narrowly on orbits to middle of frons and sometimes broadly for a short distance above antennae in median line, but the green almost or quite touching the dorsal margin of antennal sockets. Collar of pronotum, small marks on posterior margin of disk, and tubercles white. Abdomen creamy white, with a fuscous band at base of tergite 1 and at junction of tergites 1–2 to 4–5, with that part of the dark bands at apex of tergites 2 to 4 almost always reduced to a large oval spot on each side before the apical depression, and similar spots more or less developed on tergite 5. Legs pale yellow, the base of hind coxae, blotch on posterior side of the femora, blotch or streak on posterior side of front and middle tibiae, posterior side of hind tibiae except at base and the hind tarsi fuscous. Antennae above brown or pale fuscous, the two terminal joints entirely dark, the flagellum otherwise brownish yellow beneath and the scape yellowish white beneath. Tegulae and wings as in female.

Head slightly broader than long. Mandibles slender and very acute at apex. Facial foveae faint and about twice as long as wide. Median lobe of tergite 7 short and broadly rounded at

¹ Chloris, another name for Flora, the goddess of flowers in Ovid's *Fausti*.

apex. Sculpture similar to that of female, but tessellation of mesonotum fainter, the punctures much sparser, especially those of the scutum, with those of clypeus not evident. Pubescence similar to that of female. Subgenital plate about as broad as long, with sides strongly convergent to the acuminate and sharp apical part. Caulis a little longer than wide and produced into a short submedian lobe above on each side; parameral lobes long, rather slender and only moderately widened across the base as seen from the side; fused body of sagittae narrowly fusiform as seen from above and in profile, not at all angulate at middle, moderately acute at apex and slightly sinuate with the apex curved downward in lateral view. Length, 4-4.5 mm.; anterior wing, about 3.4 mm.

One female (holotype), Big Pine, Inyo Co., California, on *Dalea polyadenia*, June 8, 1937 (C. D. Michener); 1 female, 2 males (allotype male and paratypes), Glacier Lodge, Big Pine, June 8, 1937 (E. C. Van Dyke); 1 female, Lone Pine, Inyo Co., June 13, 1937 (from the Cazier collection and collected perhaps by N. W. Frazier); 3 females, 1 male (paratypes), Yerington, Lyon Co., Nevada, July 27, 1909 (J. C. Bradley); 9 females, 7 males (paratypes) 23 miles east of Fallon, Churchill Co., Nevada, on *Dalea polyadenia*, July 21, 1958 (J. W. MacSwain); and 1 male (paratype), Wellton, Yuma Co., Arizona, May 5-6, 1918 (Bradley).

Type in collection of the Citrus Experiment Station, Riverside; allotype and paratypes in collection of the California Academy of Sciences; paratypes in collection of Cornell University and University of California at Berkeley.

Perdita paroselae, n. sp.

(Figs. 578, 579, 691)

This species is allied to *chloris*, but larger, with disk of mesonotum of female somewhat blackish, the pronotum entirely dark, the white bands of abdomen narrower, and the wings slightly dusky. The male has the face incompletely white below level of antennae. This bee collects pollen from *Dalea californica* and *D. emoryi*.

Female.—Head and thorax dark blue, the posterior half of disk of mesonotum and the scutellum blackish, and the labrum, clypeus, and supraclypeal area black. Base of mandibles and lateral face marks, rounded below and ending bluntly at level of antennae, creamy white. Mandibles otherwise rufotestaceous, becoming redder at apex. Thorax entirely dark. Abdomen blackish, with narrow white bands on tergites 1 to 4, or 5, which are a little arcuate and bent backward at outer ends, except on tergite 1, that on tergite 1 and sometimes those on tergites 2 and 5 interrupted medially and that on tergite 5 sometimes abbreviated or absent. Legs blackish, the extreme apex of front and middle femora, anterior side of front and middle tibiae and underside of front tarsi yellowish white, the front tarsi brownish above. Antennae blackish, the flagellum brownish yellow beneath. Tegulae testaceous at base and testaceous hyaline on outer margin. Wings slightly dusky hyaline, the nervures testaceous brown, the margins of stigma and subcosta fuscous.

Head barely broader than long, the inner orbits of eyes parallel. Proboscis included within the fossa in repose, with apex of galeae falling a little short of the base of stipites. Mandibles slender, acute, and reaching far margin of proboscival fossa. Facial foveae well impressed, a little broader than the interval between them and the eyes, reaching from near the level of lower margin of antennal sockets about three-fourths of distance to level of anterior ocellus. Pterostigma moderately broad, and the marginal cell generally a little longer beyond than beneath the stigma. Pygidial plate about as broad as long, rather narrowly ogival, and shallowly notched at apex. Frons and vertex finely granular tessellate and dull, the frons with fine close punctures, the clypeus and supraclypeal area shining and with more distinct but sparser punctures than the frons. Mesonotum finely tessellate, shining, and with fine, distinct and moderately sparse punctures on the scutum and closer punctures on the scutellum. Pubescence whitish, moderately dense and erect, that on mesonotum rather short. Length, 5-6.5 mm.; anterior wing, 3.4-4 mm.

Male.—Head and thorax dark blue, and the mesoscutum often a little more greenish and not blackish as in female. Sometimes a small spot on inferior orbits at anterior end of eyes, mandibles

except red tips, labrum, and most of face below level of antennae white; customary dots of clypeus unusually large and two rather wide divergent and abbreviated stripes on upper part of disk black, all of these sometimes confluent to form a large median black patch; lower margin of subantennal plates black, or rarely the plates entirely dark. Collar of pronotum sometimes pale brownish or whitish, a small transverse white mark on each side of hind margin of disk, but the tubercles dark. Abdomen blackish with a yellowish white band on tergites 1 to 5 and often traces of a band on tergite 6, the bands narrower than the dark intervals, bent backward and becoming subapical at outer ends, more or less distinctly and broadly emarginate behind on each side, with those on tergites 4 and 5 often erose, interrupted on each side, or reduced mainly to lateral marks; band on tergite 1 often interrupted medially or sometimes also on each side, and in darkest specimens the bands on tergites 2 and 3 much narrowed across the middle and sometimes interrupted medially. Legs black, the apex of femora, anterior side of front, and middle tibiae pale yellow, and front and middle tarsi pale brown, with anterior pair yellow beneath. Antennae brownish fuscous, becoming paler toward apex, the scape pale yellow beneath and the flagellum brownish yellow beneath. Tegulae and wings as in the female.

Head about as broad as long, the cheeks as wide as the eyes. Mandibles simple, acute, and reaching far margin of proboscoidal fossa. Facial foveae unusually long and about three or four times longer than wide. Apical lobe of tergite 7 rather large, as long as wide at base and narrowed to the ogival apex. Sculpture and pubescence nearly as in female, but punctures of face less apparent and those of mesoscutum considerably sparser. Subgenital plate similar to that of *chloris*, with apical half very narrowly acuminate and pointed. Genitalia also similar, the caulis broader and the sagittae longer, with the fused body long, tapering, and acute on apical half. Length, 4.75–5.5 mm.; anterior wing, 3.2–3.7 mm.

Nine females, 54 males (holotype female, allotype, and paratypes) about 5 miles northwest of Palm Springs, Riverside Co., California, on *Dalea californica*, May 10, 1941 (Timberlake). Additional paratypes as follows.—CALIFORNIA. Riverside Co.: 4 males, at type locality,² May 10, 1941 (E. C. Van Dyke); 2 females, 6 miles northwest of Palm Springs, Nov. 11, 1939; 1 female at type locality, June 25, 1941; 1 female, 8 males, 6 miles northwest of Palm Springs, May 6, 1946; 3 males, 6 miles northwest of Palm Springs, April 28, 1948, all on *D. californica*; 8 females, 9 males, at type locality, on *D. emoryi*, June 11, 1954 (Timberlake); 4 females, 3 males, 6 miles northwest of Palm Springs, on *D. californica*, June 23, 1955 (W. P. Stephen); 7 males, Whitewater, May 20, 1951 (E. I. Schlinger); and 2 females, 1 male, Banning, June 26, 1952 (J. W. MacSwain and W. V. Garner).

Types in collection of the Citrus Experiment Station, Riverside; paratypes in collections of the California Academy of Sciences, the University of California at Berkeley and Davis, and Oregon State College.

Perdita hirsuta Cockerell
(Figs. 580, 581, 692)

Perdita hirsuta Cockerell, 1896, Proc. Acad. Sci., Phil., 45:79, ♂.

P. hirsuta is closely allied to the two preceding species but is easily distinguished by having the mesonotum much duller. Only the unique male type, collected near Las Cruces, New Mexico, has been recorded up to this time.

Female.—Head and thorax dark blue-green, the dark marks of clypeus and the supraclypeal area black. Mandibles, except reddish tips, clypeus except anterior margin, and two broad stripes on disk, and more or less small lateral marks white; dark stripes of clypeus convergent above and sometimes fused and enlarged, leaving only a narrow median white line and a narrow white streak on lateral margins of the disk; lateral marks generally no higher than wide and hardly reaching above level of summit of clypeus. Sometimes a supraclypeal mark is represented by two small white spots. Collar of pronotum, tubercles, and generally a small transverse mark

² The localities here listed as 5 or 6 miles northwest of Palm Springs are probably more accurately defined as about 3 or 4 miles southeast of the intersection of Highways 99 and 111.

at posterior corners of disk of pronotum white. Abdomen blackish, with narrow white bands on tergites 1 to 5, that on tergite 1 much narrower than following bands, well notched medially or slightly interrupted, those on tergites 2 to 4 bent backward but not broadened at outer ends except on tergite 2, that on tergite 4 sometimes with a cutoff spot on lateral margins and that on tergite 5 represented by two oval marks or transverse streaks. Legs black, the apex of the femora very briefly, anterior side of front and middle tibiae, and underside of front tarsi yellowish white, the front tarsi above and middle tarsi pale brownish. Antennae fuscous, the scape black, the flagellum broadly yellowish brown beneath. Tegulae hyaline, with a whitish opacity, the nervures brownish testaceous, the margins of stigma and subcosta brown.

Head as broad as long, well rounded in outline, the inner orbits parallel. Proboscis moderately short, the galeae falling short of base of stipites when folded in repose. Mandibles simple, acute, and nearly reaching far margin of proboscis fossa. Facial foveae narrow, hardly wider than interval between them and eyes, and reaching from level of middle antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma moderately broad, and the parts of marginal cell beneath and beyond stigma subequal; second submarginal cell generally narrowed considerable more than one-half above. Pygidial plate as broad as long, narrowed to the ogival apex, which is notched, the points on each side of the notch rounded. Frons, vertex, and mesonotum strongly tessellate, rather dull, but not opaque, the punctures of mesonotum minute and moderately close, those of frons obsolete; clypeus and supra-clypeal area with a few considerably coarser punctures, those of clypeus mainly restricted to the black stripes. Pubescence whitish, moderately fine and dense, that of mesonotum rather short and erect. Length, 4.5-6 mm.; anterior wing, 3.2-3.7 mm.

Male.—Similar to female, but markings yellow instead of white. Anterior end of cheeks and inferior orbits nearly to middle of eyes, mandibles except reddish tips, labrum, and face to a little above level of antennae pale yellow; the blue of frons either or not descending more or less narrowly to antennal socket on each side. Markings of pronotum much larger than in female, the posterior marks of disk uniting with yellow of tubercles. Abdomen blackish or dark brown, the venter and a rather broad band on tergites 1 to 6 yellow; dark bands at base of segments complete and nearly even; and the subapical ones on tergites 2 to 4 abbreviated, with those on tergites 5 and 6 reduced to transversely oval marks; light band on tergite 1 and sometimes those on tergites 4 and 5 narrowly interrupted medially. Legs yellow, the hind coxae except at apex, a blotch on posterior side of all the femora (sometimes extending to the antero-inferior side, especially on the hind pair), blotch on posterior side of front and middle tibiae, and posterior side of hind tibiae except at base, and hind tarsi fuscous. Antennae yellow, the flagellum more orange yellow beneath, a spot at apex of scape and following joints narrowly fuscous above. Tegulae pale yellow at base, but tegulae otherwise and the wings as in female.

Head somewhat broader than long. Mandibles gently curved, tapering, and nearly reaching far margin of proboscis fossa. Facial foveae about twice as long as wide. Apical lobe of tergite 7 rather narrow and rounded at apex. Sculpture and pubescence nearly as in female, the punctures of lower part of face faint. Subgenital plate triangular, with the apical half very narrow and acute, the disk with fine short setae. Aedeagus similar to same parts in *chloris*, the fused sagittae more broadly fusiform and blunter at apex, and the parameral lobes narrower as seen from side. Length, 4-5 mm.; anterior wing, 3-3.4 mm.

The type male from Las Cruces, Dona Ana Co., New Mexico, May 2, 1895 (A. M. Holt), in U. S. National Museum, has been examined and compared with following materials.—12 females, 30 males, Abeytas, Socorro Co., New Mexico, on *Dalea scoparia*, Aug. 26, 1931 (Timberlake); and 3 females, 1 male, 25 miles west of Tularosa, Otero Co., New Mexico, July 1, 1940 (D. E. Hardy and L. J. Lipovsky); and 3 females, 9 males, Willecox, Cochise Co., Arizona, on *Dalea*, Aug. 18, 1958 (P. D. Hurd, Jr.).

Perdita gerardiae Crawford
(Figs. 582, 583, 693)

Perdita gerardiae Timberlake, 1928, Amer. Mus. Novitates, 321:5 (*nomen nudum*); Crawford, 1932, Proc. Ent. Soc. Wash., 34:75, ♂, ♀; Michener, 1947, Amer. Midland Nat., 38:447.

This is a large dull blue-green species, with a black abdomen, which collects pollen from *Gerardia* in the southern states. It has been recorded from the flowers of *Gerardia fasciculata* and *G. purpurea*, and there are no other records of a *Perdita* visiting a scrophulariaceous flower.

Female.—Head and thorax dark blue-green, the base of mandibles, clypeus and small lateral marks white. Mandibles otherwise dark rufotestaceous and the labrum black. Upper border of disk of clypeus with two black marks, which generally extend to the middle of disk or more rarely to the apical margin, the white between the marks extending nearly to the base. Lateral marks triangular, widest on orbits, and not extending above level of summit of clypeus. Thorax entirely dark. Abdomen black, sometimes entirely, or with a short white line, or transverse mark, on each side of the base of tergite 2 and sometimes tergite 3. Pygidial plate rufotestaceous. Legs blackish, the front and sometimes the middle knees and anterior side more or less of front tibiae white. Antennae blackish, the flagellum brown beneath. Tegulae brownish testaceous, with the base fuscous. Wings dusky, the nervures fuscous, the subcosta almost black.

Head as long as wide, with the inner orbits of eyes parallel. Proboscis moderately long and not exceeding the broad fossa. Mandibles rather long, tapering, acute, and reaching far margin of proboscidial fossa. Facial foveae moderately impressed, a little wider than the interval between them and eyes and reaching from lower level of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma moderately wide, with the part of marginal cell beneath it somewhat shorter than the part beyond. Pygidial plate not much longer than wide at base, narrowed about one-half to apex, which has the median notch narrower than the blunt point on each side. Frons, vertex, and mesonotum very minutely and densely tessellate and impunctate, the mesonotum a little more shining than the subopaque frons. Abdomen also a little dullish except on the apical depression of tergites. Pubescence whitish, fine and dense for a *Perdita*, short and erect on head, very fine and appressed, with sparse erect hairs interspersed, on the mesonotum; hair on outer side of middle tibiae brownish fuscous. Length, about 8 mm.; anterior wing, about 4.3 mm.

Male.—Colored much like the female. Mandibles except rufotestaceous apical half, labrum, clypeus, and lateral marks white. Blackish mark on upper border of disk of clypeus confined to the margin or absent. Lateral marks sometimes larger than in the female and going slightly above level of summit of clypeus. Abdominal marks as in female. Knees of all legs more definitely white than in female, as well as anterior side of front and middle tibiae, the tarsi testaceous or brownish testaceous. Flagellum of antennae broadly brownish yellow beneath.

Head as broad as long, the cheeks somewhat broader than the eyes. Mandibles simple, curved, tapering, and reaching far margin of proboscidial fossa. Facial foveae faint, about twice as long as wide. Tergite 7 with a short rounded median lobe, which is smooth on the disk. Sculpture and pubescence as in female, except hair of legs entirely whitish. Subgenital plate triangular, not quite as long as wide at base, acute at apex and with moderately close-set, fine setae on the disk. Caulis of genitalia considerably longer than wide, the dorsal submedian lobes ending obliquely, the parameral lobes unusually broad, furrowed on inner face to form a subacute projection on upper side near apex as seen from side; fused body of sagittae rather broadly fusiform in dorsal view, subacute at apex, and much more slender in lateral view. Length, about 5–7 mm.; anterior wing, 3.7–4.3 mm.

The type locality is Southern Pines, Moore Co., North Carolina, and the species was recorded by Crawford also from Gliden, Chowan Co., and McCullers, Wade Co., North Carolina. I have examined material from Holly Shelter, Pinder Co., North Carolina, as well as from Southern Pines and Gliden, and from the previously recorded localities of Gainesville, Florida, and Hattiesburg, Mississippi.

***Perdita plucheae*, n. sp.**

(Figs. 584, 585, 694)

Perdita plucheae, one of the larger species of this group, has been found only in the Colorado Desert of California and Arizona. It collects pollen from the arrowweed.

Female.—Head and thorax dark green, the propodeum more bluish. Base of mandibles, clypeus, lateral, supraclypeal, and subantennal marks creamy white; clypeus with two abbreviated black stripes on disk, which are broad enough to cover the usual pair of dots, and with a dark mark on anterior margin of the lateral extensions; lateral marks abruptly narrowed at level of summit of clypeus and ending broadly and obliquely at level of antennae; supraclypeal mark notched above or sometimes divided into two spots; subantennal marks generally restricted to upper end of plates, but sometimes continued downward along the outer margin. Mandibles rufotestaceous at middle and becoming redder at apex. Labrum testaceous or whitish, with a medium blackish mark. Pronotum pale yellow, but the flanks green and a small green mark more or less developed at middle of posterior margin of disk; the median transverse suture of disk also infuscated or with a faint dark line on each side. Abdomen brownish fuscous or blackish, with a broad, pale-yellow band on tergites 1 to 5, the bands all even and reaching lateral margins except on tergite 5, and that on tergite 1 covering most of the basal declivity. Legs blackish, or tinged with brown, the apex of femora, anterior side of front, and middle tibiae pale yellow, the tarsi pale brownish. Antennae fuscous, the scape broadly whitish and the flagellum pale yellowish brown beneath. Tegulae pale yellow at base and broadly subhyaline on outer margin. Wings hyaline, with a brownish tinge, the nervures testaceous, the margins of stigma and subcosta testaceous brown.

Head somewhat broader than long, the inner orbits parallel. Mandibles moderately stout, tapering, and acute at apex, and reaching slightly beyond far margin of proboscis fossa. Proboscis of moderate length, the tips of galeae in repose slightly exceeding base of the stipites. Facial foveae very narrow, slightly arcuate, about their own width from margin of eyes and about two-thirds as long as space between antennal sockets and anterior ocellus. Pterostigma about four times longer than wide, somewhat narrower than first submarginal cell, and the part of the marginal cell beneath it somewhat shorter than the part beyond. Pygidial plate large, as broad as long, with the rather narrow apex slightly notched. Frons and vertex granular tessellate, dull, and obscurely punctate, the face below antenna shining and with faint, sparse, minute punctures. Mesonotum minutely tessellate and moderately shining, the punctures very minute and moderately close. Pubescence whitish, moderately long, and dense for this group, fine and erect, that on mesonotum sparser and that on middle of face shorter than elsewhere, the disk of mesoseutum with some very short, fine hairs interspersed. Length, 6.5–7.75 mm.; anterior wing, 4.3–4.8 mm.

Male.—Head and thorax dark bluish green. Mandibles except reddish tips, labrum, and face below level of antennae white, the lateral marks extending broadly above antennae nearly to level of foveae. Pronotum dark, except tubercles and a small white spot at posterior corners of disk, or these marks sometimes confluent on each side. Abdomen blackish, with a narrow, somewhat abbreviated and narrowly interrupted white band at base of tergites 2 to 4, or 5, and sometimes two small white marks on tergite 1. Apical lobe of tergite 7 ferruginous. Legs, antennae, and tegulae about as in the female, but with the light parts more whitish. Wings somewhat more dusky hyaline than in female, the nervures darker, the subcosta and margins of stigma subinfuscated.

Head a little broader than long, with disk of clypeus hardly broader than high, the lateral extensions very broad and mainly visible in frontal view. Mandibles tapering, acute, and reaching far margin of proboscis fossa. Facial foveae faint and about twice as long as wide. Apical lobe of tergite 7 narrowed somewhat more than one-half to apex, which is slightly rounded or subtruncate. Sculpture about as in female, the entire face virtually impunctate, the

fine punctures of mesonotum somewhat sparser than in female. Pubescence similar to that of female. Subgenital plate longer than broad at base, with the sides converging slightly arcuately to an apical part, which is about as broad as long, and bidentate or slightly fishtail-shaped at end; disk of main part of plate set with moderately close, fine setae. Caulis of genitalia about as broad as long, broadly rounded at apex above on each side; the parameral lobes inserted low on sides of caulis, slender as seen from above and not wider in lateral view, but narrowed before the apex, which is nearly as wide as the base; fused body of sagittae a little angulate at middle, with apical half tapering to the very acute apex, and as seen from the side rather slenderly fusiform and subsinuate; volsellae very disproportionate in size, the superior pair short, the inferior pair unusually large, clavate, convex on outer side, which is armed with numerous dark tubercles and fine, short, erect setae. Length, about 4-5.5 mm.; anterior wing, 3.3-4 mm.

One female, 1 male (holotype female and allotype), Blythe, Riverside Co., California, on *Tamarix gallica*, May 7, 1947 and 1948 (E. G. Linsley). Paratypes, all except the first at flowers of *Pluchea sericea*, as follows.—CALIFORNIA: 1 female, Blythe, June 24, 1945 (Ray F. Smith); 2 females, 2 miles west of Westmoreland, Imperial Co., May 5, 1959 (R. C. Dickson); 3 females, 4 miles, Seeley, Imperial Co., May 27, 1956 (R. R. Snelling). ARIZONA: 1 female, 2 males, Gila River, southeast of Agua Caliente, Maricopa Co., May 15, 1955 (R. A. Flock); and 1 male, Yuma Co., May 31, 1955 (G. Butler).

Types in collection of the Citrus Experiment Station, Riverside, and paratypes in collections of the University of California, at Berkeley, the University of Arizona, and Mr. Snelling.

Perdita nitidella Cockerell

(Figs. 586, 587, 695)

Perdita nitidella Cockerell, 1895, Proc. Acad. Sci., Phila., 47:16, ♂; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:86, ♀.

P. nitidella is one of the species collected by Cockerell at Las Cruces, New Mexico, and not since recorded. I have not seen the female. According to Cockerell's description of this sex, it has the face marks white, restricted to the clypeus and lateral marks, and the abdomen yellow, banded with brown or fuscous much as in the male. I have been unable to include this sex in my key with any degree of accuracy from Cockerell's brief description, but it probably would run out close to *bigeloviae* in couplet 45. This species was recorded by Cockerell from *Bigelovia wrightii* (= *Aplopappus heterophyllus*).

Male.—Head and thorax dark blue-green. Anterior half of gular region, inferior orbits to middle of eyes, mandibles except reddish tips, labrum, and face to level of foveae on each side and also in middle, bright yellow. Green of frons normally sending a triangular extension to the antennal socket on each side (but this falling short in the specimen from Las Cruces). Pronotum and prosternum yellow, the notum with a green band from flank to flank. Thorax otherwise dark, except for a yellow T-mark on mesosternum, with the anterior arms rather narrow and extending only briefly to the pleura. Abdomen yellow, with a brown band at the base of tergite 1 and others at junction of tergites 1-2 to 5-6, and a faint band across apex of tergite 6; the yellow bands usually at least as wide as the dark bands, and that part of the latter at apex of segments broader than basal part and sometimes the two parts narrowly joined along lateral margins, so that the yellow is enclosed on one or more of the basal segments. Legs yellow, with outer side of hind tibiae, except at base, and of hind tarsi brownish or pale fuscous. Antennae yellow, the scape clearer yellow than flagellum, the latter and pedicel above pale brown. Tegulae pale yellow at base and broadly subhyaline on outer margin. Wings hyaline, the nervures testaceous, the subcosta and margins of stigma more brownish.

Head somewhat broader than long, the cheeks narrower than eyes, the inner orbits parallel. Proboscis of moderate length and not exceeding the proboscoidal fossa in repose. Mandibles tapering, acute, and reaching nearly to far margins of proboscoidal fossa. Facial foveae broadly

oval, about one and one-half times longer than wide. Pterostigma about one-half as broad as the first submarginal cell, and the part of the marginal cell beneath and beyond the stigma subequal. Median lobe of the apical tergite about as long as broad and rounded at apex. Frons, vertex, and mesonotum tessellate and moderately dull, the mesonotum only moderately more shining than the frons; punctures of frons and mesonotum minute, faint, and very sparse, the face below antennae impunctate. Pubescence whitish, fine, erect, and rather short, thin on face and mesonotum and moderately dense on cheeks. Subgenital plate triangular, about as long as wide, the disk with fine short setae. Caulis of genitalia broadly oval, with each half rounded at apex above; the parameral lobes moderately long, broad across the base and rather narrow at apex; fused body of sagittae angulate a little beyond the middle and acute at apex, and as seen from side slenderly fusiform, and gently sinuate. Length, 3.5-3.75 mm.; anterior wing, about 2.3 mm.

Males from Arizona recorded below are slightly larger, with yellow bands of abdomen all complete, the dark bands more fuscous, a small green mark present on lower margin of sub-antennal plates, the facial foveae about twice or thrice as long as wide, and genitalia differing in some slight details. Length, about 4 mm.; anterior wing, 2.8 mm.

Three males, Las Cruces, Dona Ana Co., New Mexico, on "*Bigelovia*," September (Cockerell); and 4 males, near southern entrance to Petrified Forest, Navajo Co., Arizona, on *Gutierrezia sarothrae*, Aug. 27, 1931 (Timberlake).

Perdita bigeloviae Cockerell
(Figs. 588, 589, 696)

Perdita bigeloviae Cockerell, 1896, Proc. Acad. Sci., Phila., 48:87, ♂, ♀; Cockerell, 1923, Ann. Mag. Nat. Hist. (9)11:264.

The type locality of *bigeloviae* is Albuquerque, New Mexico, and it has been recorded by Cockerell also from near the Agricultural College in Mesilla Valley and from Crook, Colorado. It was taken by Cockerell at flowers of *Bigelovia wrightii*, now known as *Aplopappus heterophyllus*.

Female.—Dark blue-green, the base of mandibles, clypeus, lateral marks, and often two supra-clypeal spots creamy white; lateral marks narrowed on upper half and ending rather broadly where they touch the lower end of facial foveae. Mandibles otherwise rufotestaceous, becoming redder at apex. Labrum rufotestaceous or fuscous. Collar of pronotum, large mark on each side of posterior border of disk, and the tubercles white. Abdomen brown or blackish, with a white band on tergites 1 to 5, the bands generally, but not always, nearly as wide as the dark intervals, all reaching the lateral margins except sometimes that on tergite 5, and that on tergite 1 usually much broadened at middle but divided more or less completely by a dark line in the median crease. Legs brown or fuscous, the apical third of front and middle femora, the front and middle tibiae except behind, their tarsi and the hind knees pale yellow. Antennae fuscous, the scape yellowish white beneath, and flagellum more brownish beneath, especially toward apex. Tegulae whitish at base and broadly subhyaline on outer margin. Wings slightly dusky hyaline, the nervures testaceous, the subcosta more brownish.

Head somewhat broader than long, the inner orbits parallel. Mandibles tapering, acute, and hardly reaching the far margin of proboscival fossa. Facial foveae slender, well impressed, no wider than the interval between them and eyes and reaching from the level slightly below upper margin of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma about four times longer than wide, the part of marginal cell beyond it somewhat longer than the part beneath. Pygidial plate small, with the sides converging to the rather narrow apex, which is notched, with the points on each side subacute. Frons and vertex tessellate, moderately dull, the frons and the shining face below antennae with minute sparse punctures. Mesonotum tessellate, but rather shiny and with minute punctures which are sparser than those of frons. Pubescence whitish, rather short, thin, and erect, becoming longer on the sides and sternum of thorax. Length, about 5-5.5 mm.; anterior wing, 3.2-3.5 mm.

Male.—Head and thorax dark blue-green. Underside of head to posterior end of proboscoidal fossa, anterior two-thirds of cheeks (or anterior half in Colorado specimens), mandibles except red tips, labrum, and face to level of foveae bright yellow; demarcation of the yellow on frons uneven, but the green not going much below or the yellow much above level of the foveae. Pronotum yellow, sometimes (male from Las Cruces) almost entirely, or with a green band across disk to middle of each flank. Mesopectus with a broad-limbed yellow T-mark, with anterior arms very broad and spreading over more than the anterior half of the mesepisternum. Prosternum entirely yellow. Abdomen yellow, with a brown or fuscous band at base of tergite 1 and at junction of tergites 1-2 to 4-5 (or 5-6), but the preapical dark band on tergite 5 sometimes not, and that on tergite 6 probably never, supplemented by infuscation across base of following segment. Legs yellow, the hind tibiae and tarsi brown or fuscous, except the base and lower half of anterior side of tibiae. Antennae yellow, the upper side of pedicel fuscous and upper side of flagellum brown, becoming paler toward apex. Tegulae and wings as in female except tegulae more yellow at base.

Head considerably broader than long, the cheeks about as wide as the eyes. Mandibles tapering, acute, and nearly reaching far margin of labrum. Facial foveae oval, somewhat less than twice as long as wide. Apical lobe of tergite 7 short, with the apex moderately wide and truncate. Frons and vertex tessellate, rather dull, the frons with faint rather sparse punctures. Mesonotum distinctly tessellate but shining and with fine sparse punctures. Pubescence about as in female. Subgenital plate triangular, as long as wide at base, with the side a little convexly arcuate to the acute apex, the disk with fine rather close-set setae. Caulis of genitalia oval, nearly twice as long as wide, the dorsal lobes on each side rounded at apex; the parameral lobes much shorter than the caulis and broad across their base and subacute at apex as seen in lateral view; fused body of sagittae narrowly fusiform, not angulated at widest part and tapering to acute apex, and as seen from side rather strongly arcuate, with the apical part slender and curled upward at tip; volsellae fairly long and subequal to each other. Length, 4-5.5 mm.; anterior wing, 2.9-3.5 mm.

One female, Albuquerque, New Mexico, on *Bigelovia* (Cockerell), apparently one of the original type series; 1 female, 2 males, Las Cruces (Cockerell); 2 females, 1 male, Laguna, Valencia Co., on *Aplopappus heterophyllus*, Sept. 4, 1930 (Timberlake); 2 males, 3.5 miles south of Ysleta, El Paso Co., Texas, Aug. 19, 1952 (E. E. Gilbert and C. D. MacNeill); and 1 male, Crook, Logan Co., Colorado, Aug. 17, 1920 (Grace Sandhouse).

Perdita croceipes, n. sp.

(Figs. 590, 591, 697)

This species is similar to *bigeloviae*, but the legs are almost entirely yellow, and the yellow bands on tergites 2 and 3 are sometimes enclosed. The genitalia also distinguish it from that species.

Male.—Head and thorax dark green, the anterior half of gular region, posterior orbits to middle of eyes, mandibles except red tips, labrum, and face to level of foveae bright yellow, the green of frons sending a short broad lobe on each side a little below the foveae. Prosternum and pronotum yellow, the latter with a green band from flank to flank. Mesopectus with a yellow T-mark, with the anterior arms narrow, although broadened at base and ending some distance below and behind the tubercles. Abdomen yellow, with the basal third of tergite 1, rather narrow band at apex of tergites 1 to 5, together with basal region of tergites 2 to 5 fuscous, but apical band on tergite 5 represented by two transverse marks; the basal and apical bands on tergites 2 and 3 sometimes narrowly joined along the lateral margins of the segments to enclose the yellow band. Legs yellow, with a brown streak in middle of outer margin of the hind tibiae. Antennae yellow, the flagellum duller yellow beneath, and it and the pedicel narrowly fuscous above. Tegulae pale testaceous hyaline, with a yellow spot at base. Wings clear hyaline, the nervures pale testaceous, the subcosta and margins of stigma brownish.

Head rotund, as broad as long, the cheeks no wider than the eyes. Proboscis moderately short. Mandibles tapering, acute, and reaching far margin of proboscoidal fossa. Facial foveae puncti-

form, or at least only slightly longer than wide. Pterostigma rather large, but not equaling width of first submarginal cell; the parts of marginal cell beneath and beyond it about equal. Median lobe of tergite 7 moderately developed and rather broad and rounded at apex. Frons and vertex granular tessellate, dull, and impunctate, the mesonotum distinctly tessellate but shining and with rather sparse minute punctures. Pubescence whitish, fine, erect, and moderately abundant, with that on mesonotum rather short. Subgenital plate about as long as wide at base, with the sides converging into a short, narrow, acute point at apex. Caulis oval, the submedian lobes above rather narrowly rounded at apex; the parameral lobes long, just perceptibly clavate as seen from above and moderately wide at base as seen from side; fused body of sagittae rather strongly angulated at middle, thence tapering to acute apex, and moderately thickly fusiform in lateral view. Length, 4-4.5 mm.; anterior wing, 3.1-3.3 mm.

Four males (holotype and paratypes), 7 miles southeast of Camp Verde, Yavapai Co., Arizona, on *Gutierrezia microcephala*, Sept. 18, 1953 (Timberlake), in collection of the Citrus Experiment Station, Riverside.

Perdita media, n. sp.

(Figs. 592, 593, 698)

Perdita media is a species of medium size, which visits *Aplopappus acradenius* in the deserts of California. The female is distinguished from closely allied species by the broadly truncate and slightly retuse apex of the pygidial plate. The male is similar to *gutierreziae* but is more shining, with the yellow markings less extensive on the face, cheeks, and pleura. These two species are sometimes in flight together, with hardly any deviation in their flower-visiting habits, although the *Aplopappus* and *Gutierrezia* may grow side by side.

Female.—Head and thorax dark blue-green, the mesonotum sometimes brassy green, the supraclypeal area, part of clypeus, and anterior corners of face black, and the labrum dark testaceous or brownish. Basal half or more of mandibles, clypeus, and rather small lateral marks white; clypeus sometimes almost entirely white, except a mark on each side of upper margin of disk, but usually with the lateral and anterior margins and two stripes on the disk dark, or the white sometimes reduced to a median mark and a smaller sublateral spot on each side of disk. Lateral marks moderately wide below, separated from the clypeus by a dark interval and reaching narrowly to level of antennae. Mandibles rufotestaceous at apex. Disk of pronotum and tubercles yellowish white, the flanks green, or the disk frequently with a fuscous mark on each side confluent with the green of flanks, and another dark spot at posterior middle. Abdomen blackish with a broad white band on tergites 1 to 4, and sometimes a broken or evanescent band at base of tergite 5. Pygidial plate ferruginous. Legs blackish, the front and middle tibiae except behind, the front and middle tarsi and apex of the femora yellowish white; sometimes the front and middle femora nearly all white except lower half of posterior side of front pair and dorsal margin of middle pair. Antennae fuscous above, the flagellum more brownish toward apex and pale brownish yellow beneath, the scape pale yellow at base and beneath. Tegulae white at base and broadly testaceous hyaline on outer margin. Wings hyaline, the nervures testaceous, the subcosta and margins of stigma pale brownish.

Head as broad as long. Proboscis just included within the fossa in repose. Mandibles simple, tapering, and not quite reaching far margin of the fossa. Facial foveae somewhat wider than the interval between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Parts of marginal cell about equal beneath and beyond the stigma. Pygidial plate as long as broad, with the sides converging moderately to the broadly truncate or concavo-truncate apex. Frons, vertex, and mesonotum tessellate, the frons rather dull and the mesonotum more shining; punctures across the upper part of frons obscure and moderately close, and those of mesoscutum distinct, fine, and well separated. Pubescence whitish, moderately abundant, rather fine and erect, with that of mesonotum rather short. Length, about 5-6 mm.; anterior wing, 3.3-3.5 mm.

Male.—Head and thorax dark blue-green. Gular region, cheeks rather narrowly to middle of eyes, mandibles except red tips, labrum, and face to level of upper end of foveae bright yellow, the green generally going but little below level of foveae and the yellow but little above. Pronotum yellow, with a dark spot on flanks in front of tubercles. Prosternum except anteriorly and a T-mark on mesopectus yellow, the broad arms of the T reaching the tubercles. Abdomen yellow, with a moderately broad brown or fuscous band at base of tergite 1 and at junction of tergites 1-2 to 5-6; the yellow band on tergite 1 narrowed at outer ends and sometimes interrupted medially. Legs yellow, a stripe on outer margin of middle tibiae, a short, more or less faint streak on front tibiae, the hind tibiae except beneath and hind tarsi fuscous, and sometimes a brown streak or spot on inner side of hind femora. Antennae yellow, the pedicel and basal joints of flagellum fuscous above, the infuscation fading out toward apex of flagellum. Tegulae and wings about as in female, except base of tegulae yellow instead of white.

Head slightly broader than long, the cheeks subequal to width of eyes. Mandibles acute and barely reaching the far margin of proboscoidal fossa. Facial foveae punctiform, or but slightly longer than wide. Tergite 7 narrowed gradually to a short rounded median lobe. Sculpture and pubescence much as in the female. Subgenital plate and aedeagus similar to same parts of *gutierreziae*, but the dorsal submedian lobes of caulis narrower and rounder at apex. Length, 3.5-4.75 mm.; anterior wing, 2.8-3.4 mm.

Thirty-three females, 32 males (holotype female, allotype, and paratypes), Indio, Riverside Co., California, on *Aplopappus acradenius*, Nov. 13, 1932 (Timberlake). Additional paratypes on the same flower except as noted.—CALIFORNIA: 9 females, 29 males, Indio, Oct. 28, 1933; 6 females, 1 male, Indio, Nov. 14, 1945; 9 males, Indio, Oct. 15, 1947; 2 males, 6 miles northwest of Indio, Oct. 15, 1947; 3 females, 2.8 miles southeast of Indio, Oct. 23, 1951; 7 females, 3 males, 2.8 miles southeast of Indio, Nov. 1, 1953; 6 females, 9 males, 4 miles northeast of Indio, Nov. 1, 1953; 30 females, 25 males, Whitewater, Riverside Co., Oct. 27, 1934; 7 females, 19 males, Morongo, San Bernardino Co., Oct. 5, 1934; 11 females, 43 males, Morongo, Sept. 27, 1941 (six of the males on *Gutierrezia lucida*); 8 males, Morongo, Sept. 25, 1944; 1 male, Morongo, on *Solidago confinis*, Sept. 26, 1944 (Timberlake). Also 4 females, 2 males, Whitewater, Oct. 27, 1934 (C. D. Michener); 15 females, 33 males, Whitewater, Oct. 26, 1952 (E. G. Linsley and R. F. Smith); 1 female, Indio, Oct. 26, 1952 (Linsley and Smith); and 2 males, Indio, Nov. 1, 1953 (J. C. Hall).

Types in collection of the Citrus Experiment Station, Riverside; paratypes in collections of the University of California at Berkeley and Davis, the University of Kansas, the California Academy of Sciences, the American Museum of Natural History, and the U. S. National Museum.

Perdita gutierreziae Cockerell

(Figs. 594, 595, 699)

Perdita gutierreziae Cockerell, 1896, Proc. Acad. Sci., Phila., 48:85, ♂; Swenk and Cockerell, 1907, Ent. News, 18:56 (excluding ♀).

The type locality of *gutierreziae* is Albuquerque, New Mexico, where it was taken at flowers of *Gutierrezia sarothrae*. It was recorded by Swenk and Cockerell also from Glen, Sioux County, Nebraska, on the same flower, but the female which they thought belonged with *gutierreziae* was actually *P. rhodura* Cockerell. The true female will be described here for the first time. The male of *gutierreziae* varies considerably in the extent of the yellow markings on the head and sides of the thorax, with the markings smaller in California males and larger in males from Nebraska and some parts of New Mexico and Arizona, but the type and some other males from New Mexico agree closely with California material. There is also some variation in the degree of dullness of the mesonotum in both sexes, with eastern material tending to be duller than western, but differential characters seem to be too inconstant to distinguish subspecies, and adequate material of the female sex is lacking from eastern localities.

Female.—Head and thorax dark green, the propodeum bluer. Base of mandibles, clypeus, supraclypeal mark or two spots, and lateral marks creamy white. Remainder of mandibles rufotestaceous, the labrum testaceous brown. Clypeus with two arcuate dark stripes, usually reduced to oblique lines on upper part of disk. Lateral marks broad below, but becoming rather narrow above and extending along orbits to anterior end of foveae. Pronotum yellowish white with a green band from flank to flank, from which a median lobe nearly interrupts the white on posterior margin of disk. Abdomen blackish, with a broad, even white band on tergites 1 to 5, the bands a little broader than the dark intervals between them; the pygidial plate rufotestaceous. Legs pale yellow, the posterior side, except apex, of the femora, and the hind tibiae and tarsi brown or fuscous. Scape pale yellow, a spot above at apex, and upper side of pedicel and flagellum fuscous, the underside of flagellum brownish yellow. Tegulae white at base, and testaceous hyaline on outer margin. Wings slightly dusky hyaline, the nervures testaceous, the subcosta and margins of stigma brownish.

Head rotund, slightly broader than long. Proboscis not exceeding the fossa. Mandibles tapering, acute, and reaching far margin of the fossa. Facial foveae extending from upper level of antennal sockets hardly more than halfway to level of anterior ocellus, and slightly wider than the interval between them and the eyes. Pterostigma moderately wide and the parts of the marginal cell beneath and beyond it about equal. Pygidial plate about as long as wide at base, narrowed about one-half to apex, with a shallow median notch, the median smooth area continued to the base of the segment. Frons, vertex, and mesonotum tessellate and moderately dull, the upper half of the frons and the mesonotum with moderately close fine punctures. Pubescence whitish, fine, erect, and moderately thin. Length, about 4.5–5 mm.; anterior wing, 3–3.2 mm.

Females from Tecolote, New Mexico, have the white bands of abdomen somewhat narrower, the femora dark except at apex, with the hind tibiae at base, the front and middle tibiae except a spot or blotch on posterior side, and front and middle tarsi yellowish white; the pronotum dark, with the collar, mark on each side of hind margin of disk, and tubercles white; the frons a little duller, with less evident punctures, and the pygidial plate a little narrower than usual at apex.

Male.—Head and thorax blue-green. Undersurface of head except occiput, cheeks broadly to somewhat above middle of eyes, mandibles except reddish tips, labrum, face to a little above level of foveae, pronotum, prosternum, and large T-mark on mesopectus, with very broad anterior arms, bright yellow. Yellow at sides of face sometimes reaching level of anterior ocellus, with the margin of the green uneven, and the yellow of thorax sometimes covering entire mesopectus and pleura except the hypopimeral area and the metapleura. Pronotum either entirely yellow, or with two green spots on the disk and a short thin line on the flanks, or with a more definite dark band from flank to flank. Abdomen yellow with a brown or fuscous band at base of tergite 1 and at junction of tergites 1–2 and 5–6, the yellow band on tergite 1 widened at middle and deeply notched by a dark line in the median crease. Legs yellow, the outer side of hind tibiae except at base, the hind tarsi, and sometimes a streak on middle tibiae fuscous. Antennae yellow, the pedicel and flagellum brownish fuscous above, with the pedicel darker than the flagellum. Tegulae and wings as in female, except the tegulae yellow at base.

Head only slightly broader than long, with cheeks nearly as broad as eyes. Mandibles tapering, acute, and nearly reaching far margin of fossa. Facial foveae small, punctiform, or sometimes twice as long as wide. Median lobe of tergite 7 about as long as wide at base and broadly rounded at apex. Frons, vertex, and mesonotum tessellate and moderately dull, with sparse minute punctures, those of frons faint. Pubescence about as in female. Subgenital plate triangular, slightly broader than long, with sides convexly arcuate and converging to the nipple-like apex. Caulis of genitalia broadly ovate, the dorsal lobes subtruncate, the parameral lobes long and narrow as seen from above and wide at base in lateral view; fused body of sagittae strongly angulate beyond the middle and acute at apex, and slenderly fusiform and moderately sinuate as seen from side. Length, 4–4.5 mm.; anterior wing, 2.7–3.1 mm.

Material of *gutierreziae* examined as follows.—NEBRASKA: 13 males, Glen, Sioux Co., 4,000 feet, on *Gutierrezia sarothrae*, Aug. 18 and 22, 1906 (L. Brunner and M. H. Swenk). COLORADO: 1 male, Fort Garland, Costella Co., on *Chrysothamnus*, Aug. 9 (Brunner). NEW MEXICO: 1 male

(type), Albuquerque, Bernalillo Co., on *Gutierrezia*, Aug. 15 (Cockerell); 3 males, near Rowe, San Miguel Co., on *G. sarothrae*, Sept. 5, 1930; 4 females, near Tecolote, San Miguel Co., on *Gutierrezia*, Sept. 5, 1930; 1 male, near Santa Fe, Santa Fe Co., on *Gutierrezia*, Aug. 25, 1931; 2 females, 7 males, near Correo, Valencia Co., Sept. 4, 1931 (Timberlake); 1 female, Santa Fe, Sept. 2, 1951 (W. P. Stephen); 1 male, Torrance Co., July, 1935 (C. H. Martin); 3 males, 17 miles east of Deming, Luna Co., on *Gutierrezia*, Sept. 13, 1957 (R. C. Dickson). TEXAS: 1 male, El Paso Co., on *Aplopappus heterophyllus*, Sept. 13, 1950 (H. V. Daly). ARIZONA: 16 males, 36 miles east of Holbrook, Apache Co., on *Gutierrezia*, Sept. 3, 1930; 4 males, southern entrance to Petrified Forest, Navajo Co., on *Gutierrezia*, Aug. 27, 1931; 2 males, near Seligman, Yavapai Co., on *Gutierrezia*, Aug. 29, 1931 (Timberlake); 1 male, Tsegi Canyon, Aug. 13, 1936 (D. D. Jensen). CALIFORNIA: 10 females, 32 males, Yucca Valley, San Bernardino Co., on *Gutierrezia lucida*, Oct. 5, 1934 (A. L. Melander); 2 females, 26 males, Morongo, San Bernardino Co., on *G. lucida*, except one male on *Aplopappus acradenius*, Oct. 5, 1934; 5 females, 14 males, Morongo, on *Gutierrezia*, Sept. 27, 1941; 1 female, 7 males, Morongo, on *Solidago confinis*, except one male on *Gutierrezia*, Sept. 26, 1944; 1 female, 9 males, Morongo, on *Gutierrezia*, Sept. 29, 1944; 1 female, Morongo, on *Gutierrezia*, Oct. 14, 1951; and 11 males, Cushenbury Springs, San Bernardino Co., on *G. lucida*, Sept. 1, 1936 (Timberlake).

Perdita laticincta Swenk and Cockerell

(Figs. 596, 597, 700)

Perdita laticincta Swenk and Cockerell, 1907, Ent. News, 18:52, ♂, ♀; Stevens, 1919, Canad. Ent., 51:206; Cockerell, 1923, Ent. News, 34:46, 47; Timberlake, 1929, Jour. New York Ent. Soc., 37:112.

Swenk and Cockerell described this bee from Glen, Sioux County, Nebraska and recorded paratypes from Warbonnet Canyon, Crawford, Niobrara, and Neligh, Nebraska. It is easily recognized by the comparatively long head, the broad yellow bands of the abdomen, and the dull sculpture, and is closely allied to *P. dolithophoda* Swenk and Cockerell and *P. tridentata* Stevens.

Female.—Head and thorax brassy green, the mesonotum sometimes with a coppery tinge. Mandibles except red tips, clypeus, small lateral marks, and sometimes a supraclypeal mark yellow; two brown or blackish stripes on disk of clypeus, or the clypeus mainly dark, with a median pyriform yellow mark and a line on lateral margin of disk; lateral face marks more or less slender and L- or gamma-shaped, the part along orbits often reaching level of antennae and the anterior arm oblique and usually widened. Pronotum sometimes entirely dark, but tubercles and a small spot on posterior corners of disk usually yellow. Abdomen brownish fuscous, with a very broad yellow band on tergites 1 to 5, the pygidial plate amber color. Legs brown or fuscous, the front and middle knees and anterior side of front tibiae yellow. Antennae brown, the scape and flagellum yellowish beneath. Tegulae hyaline, becoming yellow at base. Wings milky hyaline, the nervures and stigma uniformly pale yellow.

Head distinctly although not greatly longer than wide. Proboscis rather long for this group, the glossa in repose nearly reaching front coxae. Mandibles simple, acute, and falling short of far margin of proboscoidal fossa. Facial foveae linear, about their own width from margin of eyes and reaching from upper level of antennal sockets hardly more than halfway to level of anterior ocellus. Pterostigma normal for this group, the parts of marginal cell beneath and beyond the stigma equal. Pygidial plate about as long as broad, oval at apex with a distinct median notch. Frons, vertex, and mesonotum minutely granular tessellate and impunctate, but the clypeus shining with distinct, rather close punctures. Pubescence whitish, short on vertex, cheeks and sides of thorax, rather long on front coxae and mesopectus, and very short, fine and appressed on mesonotum, with coarser, short, suberect hairs interspersed. Length, about 5-6 mm.; anterior wing, 3.5-3.8 mm.

Male.—Colored much like the female, but anterior end of cheeks, inferior orbits nearly to

middle of eyes, mandibles except red tips, labrum, and face below level of antennae, except the subantennal plates, bright yellow. Lateral marks of face nearly as broad above as below and reaching level of foveae. Supraclypeal mark extending onto frons and usually ending at the same level as the lateral marks. Collar of pronotum, posterior margin of the flanks, mark on tubercles more or less confluent with mark on posterior corners of disk yellow. Abdomen dark, with a broad yellow band on tergites 1 to 5, with the bands on tergites 4 and 5 usually enclosed; the two apical segments usually dark but the sixth may be more or less yellowish and the seventh is testaceous at apex. Legs brown or fuscous, with the front pair except posterior side of femora and tibiae, the anterior side of middle femora and tibiae and sometimes anterior side of hind femora yellow. Antennae yellow, the pedicel and about five of the basal joints of flagellum brownish above. Tegulae and wings as in female.

Head longer than wide, with the cheeks wider than the eyes. Mandibles tapering, acute, and nearly reaching far margin of proboscival fossa. Facial foveae about twice as long as wide. Apical lobe of tergite 7 nearly as long as wide, and varying from ogival to rather sharply pointed at apex. Sculpture and pubescence about as in the female, but the hair on the broad part of cheeks noticeably short and subappressed. Subgenital plate wider at base than long, rectangular at apex, with the angles slightly rounded off, and the apical half of disk set with fine setae. Caulis of aedeagus oval, the apical lobes above rounded and oblique, the parameral lobes about two-thirds as long as the caulis, and moderately wide at the base and tapering as seen from the side; fused body of sagittae fusiform in both dorsal and lateral views, not at all angulated near middle and subacute at apex. Length, about 4-5.5 mm.; anterior wing, 2.9-3.6 mm.

This species has been recorded from Nebraska, North Dakota, and Colorado, and the following material has been examined in this study.—NORTH DAKOTA: 2 females, 2 males, Pleasant Lake, Benson Co., on *Helianthus petiolaris*, Aug. 11, 1913; 1 female, 2 males, Logging Camp Ranch, Slope Co., on same flower, July 2, 1949; 1 female, 3 males, Sheldon, Ransom Co., on same flower, Aug. 20, 1949 (O. A. Stevens); 1 male, Dickinson, Stark Co., on same flower, July 20, 1912 (C. H. Waldron). NEBRASKA: 3 males, Glen, Sioux Co., Aug. 15, 1905; 3 males (two of them cotypes), Glen, on *Helianthus*, Aug. 17 and 20, 1906 (H. S. Smith); 22 males (one a cotype), Warbonnet Canyon, Sioux Co., on *Melilotus* and *Helianthus*, July 10 and 20, 1901 (M. Cary); 3 females, 1 male, Monroe Canyon, Sioux Co., on *Helianthus*, Aug. 6, 1908 (R. W. Dawson); 5 males, Monroe Canyon, on *H. petiolaris* July 1, 1924 (Dawson); 1 female, 31 males, Harrison, Sioux Co., on *Helianthus*, Aug. 9, 1908 (Dawson and C. H. Gable); 1 female, 16 males, Harrison, on *H. petiolaris*, Aug. 12, 1912 (Dawson); 1 female, 3 males, Crawford, Dawes Co., on *Helianthus*, July 28-29, 1901 (M. A. Carriker); 1 male, Mitchell, Scotts Bluff Co., on *H. petiolaris*, July 11, 1912 (M. H. Swenk); 1 female, 1 male, Mitchell, on same flower, Aug. 5, 1912 (L. M. Gates); 2 males, Niobrara, Knox Co., on *Helianthus*, Aug. 13, 1902 (W. D. Pierce); 2 males, Neligh, Antelope Co., July (Cary); 3 males, Neligh, on *Helianthus*, Aug. 7, 1901 (Cary); 1 male, 7 miles west of Grant, Perkins Co., on *H. petiolaris*, July 22, 1954 (E. W. Hamilton); 1 male, 10 miles northeast of Ravenna, Buffalo Co., on same flower, Aug. 8, 1955 (W. La Berge). KANSAS: 1 female, 3 males, Chase, Rice Co., on *Aplopappus ciliatus*, Sept. 4, 1949 (Michener and Beamer); 2 females, 2 males, Hutchinson, Reno Co., on *Helianthus petiolaris*, except one male on *A. ciliatus*, Sept. 4, 1949 (Michener and Beamer); 1 female, 7 males, 5 miles southeast of Hutchinson, on *H. petiolaris*, Sept. 2, 1951 (Michener and La Berge); 2 males, 2 miles east of St. John, Stafford Co., on same flower, Sept. 2, 1951 (Michener and La Berge); 5 males, Marysville, Marshall Co., on *Amorpha canescens*, July 5, 1951 (Michener); 3 females, 3 males, 9.5 miles south of Garden City, Finney Co., on *Helianthus*, Aug. 26, 1956 (A. F. Shinn); 1 male, 4 miles south of Garden City, on *Helianthus*, Aug. 27, 1956 (Shinn); 2 females, 10 miles north of Hutchinson, Reno Co., on *Helianthus*, Aug. 22, 1956 (Shinn). COLORADO: 1 male, "eastern Colorado," July, 1899; 1 female, Fort Collins, Larimer Co., Aug. 18, 1896, No. 2105 (C. F. Baker); 1 female, about 7 miles west of Xenia, Washington Co., (Cockerell); 1 male, White Rocks, Boulder Co., July 31, 1925 (C. H. Hicks); 1 female, Prospect, Wild Co., on *Helianthus petiolaris*, July 20, 1950 (Michener). WYOMING: 2 males, Cheyenne River, 33 miles south of Newcastle, Niobrara Co., July 10, 1949 (Amer. Museum). NEW MEXICO: 1 male, Broadview, Curry Co., on composite, Aug. 30, 1950 (J. W. MacSwain).

Perdita melanostoma Swenk and Cockerell

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

Like *laticincta* this species was described from Glen, Sioux County, Nebraska, but from the flowers of *Gutierrezia sarothrae* instead of *Helianthus*. It seems to be rare, and I have examined only twelve specimens from the type locality and two other specimens. The male remains unknown, although I have studied two unique males, which have been considered as possible mates, but which disagree in sculpture and in other ways and which were taken far away from the known range of *melanostoma*. These two specimens will be described herein as *P. atriventris* and *P. translineata*.

Female.—Head and thorax dark green, the clypeus, anterior corners of face, and supraclypeal area black, the labrum fuscous or blackish. Mandibles except reddish apical third or half, sometimes a small spot on each side of face adjacent to the clypeus, and rarely a small median spot on clypeus and a spot on each side of the disk, yellowish white. Pronotum entirely dark, or the tubercles tipped with white. Abdomen blackish, with a moderately wide, yellowish-white band, notched medially behind, or slightly interrupted on tergites 1 to 3, or 4. Legs blackish, the anterior side of front and middle tibiae and front tarsi pale yellow. Antennae fuscous, the flagellum becoming brownish above and dull yellow beneath. Pygidial plate rufotestaceous. Tegulae hyaline, with the base yellowish white. Wings hyaline, the nervures pale testaceous brown, the margins of stigma and subcosta brown.

Head somewhat broader than long, the proboscis slightly exceeding the proboscoidal fossa when retracted in repose. Mandibles tapering, acute, and reaching about far margins of the fossa. Facial foveae somewhat wider than interval between them and eyes and reaching from level of middle of antennal sockets somewhat more than halfway to level of anterior ocellus. Pterostigma of medium size for this group and the parts of marginal cell beyond and beneath it about equal. Pygidial plate somewhat broader at base than long, the apex distinctly notched, with the points on each side of the notch obtuse. Head and thorax strongly tessellate, the frons and vertex rather dull, the mesonotum a little more shining; face below antennae weakly tessellate, shining and with distinct moderately sparse punctures; punctures of frons and mesonotum obscure. Pubescence whitish, rather thin, fine, erect, and moderately short. Length, about 4–5 mm.; anterior wing, 2.9–3.1 mm.

Twelve females, Glen, Sioux Co., 4,000 feet, Nebraska, on *Gutierrezia sarothrae*, Aug. 22, 1906 (L. Bruner), including holotype, the others perhaps paratypes, although only one is labeled; 1 female, near Rowe, San Miguel Co., New Mexico, on *Gutierrezia*, Sept. 5, 1930; and 1 female, 36 miles east of Holbrook, Apache Co., Arizona, on *Gutierrezia*, Sept. 3, 1950 (Timberlake).

Perdita albocincta, n. sp.

In Cockerell's key (1896) this species runs out with *bigeloviae*, *nitidella*, and *snowii* (couplets 70 to 71). The characters separating it from *bigeloviae* and *snowii* are given in the preceding key; it cannot be *nitidella* for the mesonotum is as dull as in *snowii*, and though the abdomen is not so obviously dark as in *bigeloviae*, the tergum has only four light bands which are distinctly narrower than the light bands of *snowii*.

Female.—Head and thorax dark green, the face, underparts of thorax, and propodeum more tinged with blue than in *snowii*, the supraclypeal area black. Mandibles except red apical half, clypeus, and small lateral marks white, the labrum brown; clypeus with two blackish stripes which diverge below and fail to reach the anterior margin of disk; lateral marks oblique and

not much widened at inner end and reaching only slightly above level of summit of clypeus. Collar of pronotum, small mark on posterior corners of disk, and the tubercles pale yellow. Abdomen brownish fuscous, with a white band on tergites 1 to 4, the bands about equal to the dark intervals, even, and reaching lateral margins, all notched medially behind and that on tergite 1 notched also in front. Venter pale brown, except the reflexed sides of the tergites which are yellowish white. Legs fuscous, the knees, anterior side of front and middle tibiae, and front tarsi pale yellow. Antennae fuscous, the pedicel and flagellum dull yellowish beneath, the scape very narrowly white beneath. Tegulae testaceous hyaline, with a pale yellowish base. Wings hyaline, the nervures pale brown, the subcosta and margins of stigma hardly darker.

Head somewhat broader than long, with cheeks a little narrower than eyes. Proboscis not exceeding the proboscoidal fossa in repose. Mandibles normal for this group and not quite reaching far margin of the fossa. Facial foveae about equaling width of interval between them and eyes and extending from just above level of middle of antennal sockets hardly more than halfway to level of anterior ocellus. Pterostigma not much more than three times longer than wide, the parts of the marginal cell beneath and beyond it equal. Pygidial plate somewhat wider than long, the sides a little convexly arcuate, and the points on each side of the median notch at apex obtuse. Frons, vertex, and mesonotum strongly tessellate and dull, the mesonotum hardly more shining than the frons; the puncturation fine and sparse, the punctures of frons and mesonotum rather faint, those of face below antennae except on clypeus more distinct. Pubescence whitish, moderately thin, rather fine and erect and that on mesonotum moderately short. Length, 4.75 mm.; anterior wing, 2.9 mm.

One female (holotype), Laguna, Valencia Co., New Mexico, on *Aplopappus heterophyllus*, Sept. 4, 1930 (Timberlake), in collection of the Citrus Experiment Station, Riverside.

Perdita scitula scitula, n. subsp.

This species is another segregate of the little group clustered around *bigeloviae* and *gutierreziae*. It has been encountered so far only at two localities in California, and these localities are sufficiently isolated so that two races may be distinguished. Typical *scitula* occurs in Inyo County and collects pollen from *Chrysothamnus nausiosus*.

Female.—Head and thorax olive green, becoming a little bluish on the propodeum, the supra-clypeal area and anterior corners of face, and sometimes also the clypeus, except a small median mark, and the labrum black. Base of mandibles, more or less of the clypeus and lateral marks yellowish white; mandibles otherwise rufotestaceous and red at apex; labrum sometimes testaceous across the apex and dark at base; clypeus light except anterior margin, the usual pair of dark dots, and two blackish submedian stripes on the disk, or the dark parts enlarged and the white reduced to a small median spot; lateral marks small, rather narrow and oblique, sometimes with a slender extension to lower end of foveae, or more or less widening anteriorly, nearly obliterating the black at anterior corners of face and ending obtusely at level of antennae. Small spot at posterior corners of disk of pronotum and tubercles white, or these marks enlarged and narrowly confluent, and the collar also white. Abdomen fuscous, with a white band on tergites 1 to 4, and sometimes traces of a band at base of tergite 5; the bands rather wide, but not equaling the dark intervals, reaching the lateral margins, those on tergites 2 and 3 somewhat widened at outer ends and that on tergite 1 notched medially in front or slightly interrupted. Legs blackish, the apex of femora, front and middle tibiae except a dark blotch on posterior side, front tarsi, basal joint of middle tarsi, and base of hind tibiae yellowish white. Antennae black, the flagellum dull yellowish beneath, the scape entirely dark or narrowly pale yellow beneath. Tegulae whitish at base and hyaline on outer margin. Wings almost clear hyaline, the nervures and margins of stigma fuscous.

Head hardly broader than long, the cheeks not quite equaling the width of eyes. Proboscis moderately long, a little exceeding the proboscoidal fossa in repose. Mandibles tapering, acute, and reaching far margin of the fossa. Facial foveae well impressed, somewhat wider than the

interval between them and eyes, and reaching from level of middle of antennal sockets somewhat less than two-thirds of distance to level of anterior ocellus. Pterostigma normal for the group, the part of marginal cell beneath it somewhat shorter than the part beyond. Pygidial plate as long as wide at base, the sides converging arcuately to the ogival apex which is slightly notched. Frons, vertex, and mesonotum strongly tessellate and rather dull, the mesonotum about equaling the frons in dullness; frons and mesonotum with fine, moderately close punctures, which are fainter than similar punctures on the face below the antennae. Pubescence white, rather fine, erect, and moderately long and becoming somewhat shorter on the frons and disk of mesonotum. Length, 5-6 mm.; anterior wing, 3.4-3.6 mm.

Male.—Head and thorax dark olive green. Anterior half, or a little more, of the gular region, cheeks narrowly to middle of eyes, mandibles except red tips, labrum, and face to level of foveae bright yellow, the green of frons dipping more or less below that level on each side. Pronotum yellow, with a broad green band from flank to flank. Posterior half of prosternum and T-mark on mesopectus yellow, the anterior arms of the T broad but usually ending considerably below the level of tubercles. Abdomen yellow, with six or seven moderately narrow fuscous bands, the apical band on tergite 6 sometimes reduced to two spots or absent. Legs including coxae yellow, the hind tibiae except beneath and hind tarsi fuscous, a dark line on posterior edge of middle tibiae, and often a blotch on posterior side of middle and hind femora, or the blotch on middle femora absent when that on hind pair is reduced to a small spot at the base, and rarely a short dark streak on posterior side of front femora. Antennae yellow, becoming more orange yellow toward apex of flagellum, the pedicel and flagellum narrowly brownish or fuscous above, but apical joint entirely pale. Tegulae and wings as in female, except outer nervures of second discoidal cell, especially the second recurrent, are faint.

Head distinctly broader than long, the cheeks nearly as broad as the eyes. Mandibles normal and reaching far margin of the fossa. Facial foveae punctiform, or barely longer than wide. Apical lobe of tergite 7 about as long as wide at base and rounded at apex. Sculpture and pubescence nearly as in female but punctures and pubescence of mesonotum sparser. Subgenital plates somewhat wider than long, with a short nipple-shaped apex and with extremely fine setae on disk. Dorsal submedian lobes of caulis truncate at apex; parameral lobes nearly as long as the caulis, broad at base and moderately narrow at apex as seen both from above and from the side; the fused sagittae moderately wide, angulate at middle and acute at apex. Length, about 4.5-5 mm.; anterior wing, 3-3.4 mm.

Five females, 19 males (holotype female, allotype, and paratypes), 11.4 miles south of Big Pine, Inyo Co., California, on *Chrysothamnus nauseosus* var. *gnaphalodes*, Oct. 1, 1956 (Timberlake), in collection of Citrus Experiment Station, Riverside.

Perdita scitula antiochensis, n. subsp.

(Figs. 598, 599, 701)

Female.—Agrees closely with typical *scitula*, but smaller, the clypeus tending to be entirely white, with the black stripes on disk usually evanescent or absent (more rarely well developed) and the lateral marks always large and almost or quite obliterating the black spot at anterior corners of face. Abdomen with five white or pale yellow bands, the band on tergite 5 almost well developed. Wings more dusky hyaline. Length, 4-4.5 mm.; anterior wing, about 3 mm.

Male.—Similar to typical *scitula*, but arms of the T-mark of mesopectus approach the tubercles closely or touch them, the yellow band on tergite 1 often slightly interrupted, the front and middle femora entirely yellow, and wings more dusky. The yellow bands of abdomen usually reach the lateral margins, but are sometimes enclosed on tergites 3 to 5, or 6. Length, about 3.5-4 mm.; anterior wing, 2.6-2.8 mm.

One female, 3 males (holotype female, allotype, and paratypes), Antioch, Contra Costa Co., California, on *Eriogonum*, Sept. 12, 1936 (E. G. Linsley). Additional paratypes as follows.—CALIFORNIA. Contra Costa County: 1 female, Antioch, Sept. 9, 1935 (R. M. Bohart); 2 females, Sept. 10, 1936 (R. M. and G. E. Bohart); 1 female, Oct. 18, 1936 (R. C. Dickson); 2 females, 3 males, on *Gutierrezia californica*, Sept. 8, 1936 (C. D. Michener); 1 female, Sept. 22, 1938

(J. W. MacSwain); 1 female, 3 males, Sept. 8, 1948 (MacSwain); 2 males, Sept. 8, 1948 (P. D. Hurd, Jr.); 5 females, 7 males, on *Lessingia glandulifera*, and 2 females, 1 male, on *Heterothea grandiflora*, Sept. 22, 1954 (Hurd); 1 female, 2 males, Sept. 4, 1958 (W. R. Kellen); 1 female, Oct. 25, 1955 (Don Burdick); and 1 female, Oakley, Oct. 23, 1938 (MacSwain).

Types in collection of Citrus Experiment Station, Riverside; paratypes in collections of the University of California at Berkeley and Davis, and the University of Kansas.

***Perdita aridella*, n. sp.**

(Figs. 600, 601, 702)

This little bee has been found only in Utah and northern Arizona. The female runs out in Cockerell's table (1896) to *snowii*, from which it is distinguished in the preceding key. The male runs near *P. biparticeps* Cockerell, which apparently is known only from the type, and differs in the brassy green, duller, more hairy thorax, and in the clearer wings, with pale nervures.

Female.—Head and thorax brassy or yellowish green, the supraclypeal area black. Base of mandibles, labrum, clypeus, and lateral marks pale yellow or almost creamy white; summit of disk of clypeus with two black marks, which may be their own width apart or sometimes enlarged and separated by a triangular extension of the light color. Mandibles otherwise rufotestaceous, becoming red at apex. Pale-yellow marking of pronotum restricted to collar, small marks on posterior corners of disk, and tubercles. Abdomen pale yellow or whitish, with a dark band at base of tergite 1 and at junction of tergites 1-2 to 4-5, and one more or less developed across apex of tergite 5, the light bands usually broader than the dark intervals. Pygidial plate pale testaceous. Legs blackish, the apex of femora, front and middle tibiae and tarsi, and basal third of hind tibiae yellow, the underside of middle tibiae and hind tarsi pale brown, the basal joint of the tarsi more yellowish. Apex of scape above, pedicel and flagellum brown, the remainder of scape and underside of pedicel clear yellow, the underside of flagellum more brownish yellow. Tegulae yellowish at base and nearly clear hyaline on outer margin. Wings clear or slightly whitish hyaline, the nervures testaceous yellow, the subcosta and margins of stigma slightly brownish.

Head about as long as wide, the cheeks narrower than the eyes. Proboscis somewhat exceeding the fossa. Mandibles rather long, tapering, acute, and reaching far margin of the proboscidal fossa. Facial foveae close to margin of eyes and extending from level of middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Pterostigma rather small, about three times longer than wide, the part of marginal cell beneath it distinctly shorter than the part beyond. Pygidial plate about as long as wide at base, with the sides arcuately converging to the rounded apex, which is entire or weakly notched. Frons and mesonotum strongly tessellate, the frons dull, obscurely punctured, the mesonotum sometimes nearly as dull as frons, or moderately more shining, and with widely spaced, minute punctures. Face below antennae with sparse and rather obscure punctures. Pubescence whitish, fine, erect, that on mesonotum moderately sparse and short. Length, about 3.5-4.5 mm.; anterior wing, 2.6-3 mm.

Male.—Head and thorax brassy green. Anterior end of cheeks and orbits narrowly nearly to middle of eyes, mandibles except red tips, labrum, and face to level of foveae bright yellow, the margin of the green only slightly descending below that level on each side. Collar of pronotum, interrupted band on hind margin of disk, large mark on tubercles, and inferior margin of flanks yellow. Abdomen yellow with narrow fuscous or brownish bands at base of tergite 1 and at junction of tergites 1-2 to 4-5 and sometimes at apex of tergite 5. Legs yellow, a blotch on posterior side of front and middle femora, hind coxae, hind femora except apex, apical half or two-thirds of hind tibiae except beneath, and small joint of hind tarsi brown or fuscous. Antennae yellow, the flagellum more brownish yellow beneath, the pedicel and flagellum broadly brown above. Tegulae and wings as in female, except subcosta and margins of stigma more distinctly brownish.

Head as long as wide, the cheeks nearly as wide as the eyes. Mandibles slender, tapering,

and acute. Facial foveae small, about twice as long as wide. Apical lobe of tergite 7 short and usually not much narrowed to the rounded apex. In sculpture and pubescence similar to the female, with the mesonotum about as dull as the frons and obscurely punctured. Subgenital plate broader than long, the apex rectangular, the disk very minutely setose. Dorsal lobes of caulis rounded at apex, the parameral lobes rather broad, with less than half of the inner surface exposed in dorsal view; fused body of sagittae fusiform, not at all angulate at middle, more than usually obtuse at apex for this group, and moderately thick and sinuate in lateral view, with the apex thinly depressed. Length, about 3-4 mm.; anterior wing, 2.7-2.9 mm.

Nine females, 2 males (holotype female, allotype, and paratypes), Oak City, Millard Co., Utah, on *Helianthus* sp., June 24, 1947 (G. E. Bohart); 1 male (paratype), Delta, Millard Co., June 29, 1949 (Bohart); 1 female (paratype), Delta, Aug. 4, 1949 (Bohart); 1 male (paratype), Jensen, Uinta Co., on *Helianthus petiolaris*, June 23, 1950 (C. D. Michener); and 1 male (paratype), near southern entrance to Petrified Forest, Navajo Co., Arizona, on *Gutierrezia sarothrae*, Aug. 27, 1931 (Timberlake).

Types in collection of the Citrus Experiment Station, Riverside; paratypes in collections of Dr. G. E. Bohart, the Utah State Agricultural College, and the University of Kansas.

Perdita rectangulata Cockerell

(Figs. 602, 603, 703)

Perdita rectangulata Cockerell, 1896, Proc. Acad. Sci., Phila., 48:72, fig. 13, ♀ (excluding ♂); Cockerell, 1922, Amer. Mus. Novitates, 33:12.

The female of this species can be recognized by the yellow lateral marks of face intruding between the foveae and eyes, by the small yellow spot on middle of frons and by the entirely yellow scape of antennae. *Rectangulata* is rare in collections and the male, which has remained unknown up to the present time, is much like *gutierreziae*, but duller, with entirely yellow antennae and partly dark hind femora. The male, which Cockerell described in 1896, belongs with *P. affinis* Cresson.

Female.—Head and thorax dark green. Anterior end of cheeks, mandibles except red tips, labrum, clypeus, supraclypeal and lateral marks, dot or small spot on middle of frons (absent in one out of five examples), collar of pronotum, and band on hind border of disk from tubercle to tubercle, at the most very narrowly interrupted medially, yellow. Usual pair of dots on clypeus small and faint, the supraclypeal mark transversely quadrate, and the lateral marks broad below, abruptly truncate at lower end of foveae and intruding between foveae and eyes. Abdomen yellow, with a blackish spot on each side of the basal declivity of tergite 1 and a narrow even blackish band at junction of tergites 1-2 to 4-5; or in Idaho examples the basal half of tergite 1 more or less dark and the bands at junction of segments broader, with a fairly distinct subapical band on tergite 5. Legs yellow, the hind coxae, a blotch on underside of hind femora, the hind tibiae except basal third, and streak on outer edge of middle tibia brownish or fuscous, the hind tarsi tinged with brown; or in Idaho examples all the femora dark except at apex. Antennae yellow, the pedicel and flagellum dark brown above, and the flagellum slightly tinged with brown beneath. Tegulae yellow at base and subhyaline on outer margin. Wings hyaline, the nervures pale testaceous, the stigma pale yellow.

Head slightly broader than long and broader than thorax. Proboscis moderately long and slightly exceeding the fossa in repose. Mandibles strongly curved, acute at apex, and reaching far margin of proboscoidal fossa. Facial foveae separated from margin of eyes by a little more than their own width and not much longer than half the distance between antennal sockets and anterior ocellus. Pterostigma normal for group, and the part of marginal cell beyond the stigma generally a little longer than the part beneath. Pygidial plate almost as long as broad, with the rounded apex entire or only slightly notched. Head and thorax minutely and densely tessellate, the frons and vertex subopaque, the mesonotum slightly more shining, the punctura-

tion obsolete on frons and very fine and moderately close on mesonotum. Pubescence whitish, fine, erect, and moderately dense for a *Perdita*, the hair of mesonotum rather short. Length, about 4.5-4 mm.; anterior wing, 3.1-3.3 mm.

Male.—Thorax and crown of head dark green. Undersurface of head except occiput, cheeks broadly to posterior fourth of eyes, and face to, or almost to, level of anterior ocellus bright yellow, with green of vertex jutting on each side about halfway to level of foveae. Tip of mandibles reddish. Pronotum with a green crossband, which is sometimes reduced to a line on the flanks. Prosternum and T-mark on mesopectus yellow, the arms of the T moderately broad and sometimes ending rather distant from the tubercles. Abdomen yellow, the base of tergite 1 and band at junction of tergites 1-2 to 5-6 fuscous; part of the band at apex of tergite 5 sometimes nearly reduced to a transverse mark on each side, and similar marks sometimes present on tergite 6. Legs yellow, the hind tibiae except beneath and on basal fifth, hind tarsi and blotch on posterior and anterior sides of hind femora fuscous, the blotches mostly between the middle and apex, or sometimes extending nearly the whole length of femora; sometimes also a small blotch on posterior side of middle femora and tibiae. Antennae yellow, the flagellum a little more orange than the scape and rarely slightly ringed with brown above on basal joints. Tegulae and wings as in the female.

Head distinctly broader than long, the cheeks about as wide as the eyes. Disk of clypeus narrowed and rounded above, the lateral extensions broad, but reflexed and hardly visible in frontal view. Mandibles tapering, acute, and falling somewhat short of the far margin of proboscoidal fossa. Facial foveae small and punctiform. Apical lobe of tergite 7 rather narrow and rounded at apex. Sculpture and pubescence about as in the female. Subgenital plate more evenly triangular than in *gutierreziae*, the disk more hairy. Aedeagus similar to that of *gutierreziae*, with the most conspicuous difference residing in the oblique instead of subtruncate dorsal lobes of the caulis. Length, 3.5-4.5 mm.; anterior wing, 2.8-3 mm.

The type locality of *rectangulata* is Fort Collins, Colorado, where it was taken on *Solidago*, Aug. 15, 1895 by C. F. Baker. Additional material has been examined as follows.—COLORADO: 1 female, Fort Collins, Larimer Co., Aug. 15, 1895, No. 2101 (Baker); 1 female, Fort Collins on *Solidago*, Aug. 15, 1895, No. 1599 (Baker). NEW MEXICO: 1 female, near Tecalote, San Miguel Co., on *Gutierrezia sarothrae*, Sept. 5, 1930 (Timberlake). IDAHO: 1 female, Downey, Bannock Co., on *Solidago*, Aug. 14, 1947 (G. E. Bohart); 1 female, 1 male, 3 miles northwest of Malta, Cassia Co., Sept. 9, 1956 (W. F. Barr); 3 males, Conant, 4,400 feet, Cassia Co., on *Gutierrezia sarothrae*, Sept. 2, 1925 (R. W. Haegeler); 1 male, Albion, 4,300 feet, Cassia Co., on *Gutierrezia*, Sept. 1, 1925 (Haegeler), and 1 male labeled only "*G. sarothrae*, R. W. Haegeler."

Perdita snowii Cockerell

(Figs. 604, 605, 704)

Perdita snowii Cockerell, 1896, Proc. Acad. Sci., Phila., 48:73, ♀; Cockerell, 1910, Psyche, 17:244, ♂; Cockerell, 1922, Amer. Mus. Novitates, 33:6.

Cockerell described *snowii* from a single female collected at Estes Park, Colorado, by F. H. Snow in August, 1892. Later he found the species common at Eldora, Colorado, on *Grindelia* and described the male. Besides one male from Eldora, I have seen only three females which are a little doubtful and possibly belong to two different species.

Female.—Head and thorax dark green, the sides of thorax and propodeum more bluish, the mesonotum with a brassy tinge. Supralypeal area black. Mandibles except red tips, labrum, clypeus, and lateral marks pale yellow or whitish; lateral marks truncate at lower end of foveae and then intruding between foveae and eyes for a short distance. Collar of pronotum, mark at posterior corners of disk, and tubercles pale yellow. Abdomen pale yellow or whitish, with a broad fuscous band at junction of tergites 1-2 to 4-5, a narrow dark band at base of tergite 1 and an apical band on tergite 5. Legs fuscous, all of the knees, front and middle tibiae except

behind, and front tarsi pale yellow. Antennae fuscous, the scape pale yellow and the flagellum dull yellow beneath. Tegulae hyaline, with the tarsi pale yellow. Wings slightly dusky hyaline, the nervures testaceous yellow, with subcosta and margins of stigma slightly brownish.

Head somewhat broader than long, the disk of clypeus broader than high, with upper margin broadly rounded and subtruncate in middle. Proboscis moderately long and a little exceeding the fossa in repose. Mandibles stout, tapering, acute, and reaching far margin of the fossa. Facial foveae a little wider than the interval between them and eyes, and reaching from upper level of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Pterostigma rather narrow, not much more than half as wide as the first submarginal cell; marginal cell with the part beneath stigma distinctly shorter than the part beyond. Pygidial plate about as long as wide and distinctly notched at apex. Frons, vertex, and mesonotum strongly tessellate, dull, and obscurely but rather closely punctured, the face below antennae more shining, with sparse and more distinct punctures. Pubescence whitish, becoming slightly yellowish on vertex and mesonotum, rather abundant, erect and moderately coarse, and becoming rather short on frons, temples, and posterior middle of mesoseutum. Length, about 4.8 mm.; anterior wing, 3.2 mm.

The female from Artesia, Moffat Co., Colorado, has the markings whiter, with lateral marks not intruding between foveae and eyes, the light parts of legs pale yellow, with front tibiae entirely light, the middle tibiae pale brown behind, and basal third of hind tibiae and basal joint of hind tarsi light. Head not so broad, the disk of clypeus no broader than high, narrowed and rounded above with oblique sides, and the pygidial plate ogival at apex and only slightly retuse. Sculpture about the same, but the pubescence whiter and finer. Length, about 4 mm., anterior wing, about 3 mm.

Male.—Head and thorax dark green. Anterior end of gular region, posterior orbits to middle of eyes, mandibles except red tips, labrum, and face below level of antennae bright yellow, the yellow reaching the foveae at sides of face and sending a small nipple-shaped median projection onto frons. Collar of pronotum, mark on posterior corners of disk, and tubercles yellow. Abdomen brownish fuscous, with a yellow band on tergites 1 to 5, the bands nearly or quite as wide as the dark intervals, those on tergites 3 to 5 enclosed and that on tergite 1 narrowly interrupted at middle. Legs fuscous, with the hind knees and front and middle legs yellow except broadly behind on the femora and more narrowly on tibiae. Antennae yellow, the pedicel and flagellum fuscous above. Tegulae and wings as in female.

Head distinctly broader than long, the cheeks narrower than eyes. Mandibles rather slender, acute, and not quite reaching far margin of the proboscoidal fossa. Proboscis a little exceeding the fossa. Facial foveae oval, about twice as long as wide. Apical lobe of tergite 7 about as long as wide and rounded at apex. Sculpture nearly as in female, the frons opaque from a very fine tessellation, the mesonotum slightly shining. Pubescence whitish, a little whiter, finer, and sparser than in female. Subgenital plate triangular, the sides a little convexly arcuate, the apex narrowly rectangular, and the apical half of disk with fine setae. Aedeagus with dorsal lobes of caulis obliquely truncate; parameral lobes about as long as the dorsal lobes, broad at base and narrowed to apex as seen from side; fused body of sagittae distinctly angulate near middle and tapering thence to obtuse apex, and in lateral view moderately thickly fusiform, and hardly sinuate except for recurved basal rods. Length, 5 mm.; anterior wings, 3.1 mm.

Material of *snowii* examined.—COLORADO: 1 male, Eldora, 8,500 feet, Boulder Co., on *Grindelia*, Aug. 18, 1910 (Cockerell); 2 females, Ute Creek, 9,000 feet, Costilla Co., on *Aster*, Aug. 12 (R. W. Dawson); and 1 female, Artesia, Moffat Co., July 23, 1950 (C. D. Michener).

Perdita lasiogastra Timberlake

(Figs. 606, 607, 705)

Perdita lasiogastra Timberlake, 1929, Jour. New York Ent. Soc., 37:115, ♂.

The type of *lasiogastra* were collected in the sand hills at Katherine, Willacy County, Texas, and is now in the collection of the Illinois State Natural History

Survey, Urbana, Illinois. A good series of *lasiogastra* in the collection of the University of Kansas enables me to describe the female.

Female.—Head and thorax somewhat bluish green. Basal half of mandibles, clypeus, supra-clypeal and lateral marks white; apical half of mandibles rufotestaceous and red; labrum pale testaceous, sometimes fuscous on basal half; clypeus usually with two divergent blackish marks on upper part of disk; lateral marks of face broad opposite clypeus and narrow and obtuse above where they touch the lower end of foveae. Collar of pronotum and hind margin of disk from tubercle to tubercle white, but the band attenuated on inner side of tubercles and interrupted in middle. Abdomen fuscous or blackish, with a broad even white band on tergites 1 to 5, the bands on tergites 3 to 5 not quite reaching lateral margins and that on tergite 1 with a deep, narrow notch in front. Legs blackish, the apex of femora, front and middle tibiae except behind, front and middle tarsi, base of hind tibiae, and basal joint of hind tarsi yellowish white. Antennae fuscous, the scape yellowish white except on apical half above, the flagellum dull yellowish beneath. Tegulae white at base and hyaline on outer margin. Wings whitish hyaline, the nervures pale testaceous, the subcosta and margins of stigma pale brownish.

Head about as broad as long, the eyes somewhat wider than the cheeks. Disk of clypeus broader than high and more or less evenly rounded above. Proboscis in repose just filling the fossa, with the galeae not quite reaching base of stipites. Mandibles tapering, acute, and nearly reaching the far margin of the fossa. Facial foveae well impressed, broader than interval between them and eyes and reaching from level of middle of antennal sockets a little more than halfway to level of anterior ocellus. Pterostigma rather large, but not quite so wide as the first submarginal cell, the parts of the marginal cell beneath and beyond the stigma nearly equal. Pygidial plate as long as wide, the lateral margins a little convexly arcuate, the apex with a distinct notch which about equals the points on each side. Frons, vertex, and mesonotum strongly tessellate and dull, the punctures of mesonotum very fine and rather close, those of frons obscure, and those of face below antennae sparse and faint. Pubescence whitish, abundant, erect, moderately long, but short on frons and short and rather coarse on mesonotum. Length, about 5.5–6 mm.; anterior wing, 3.5–3.9 mm.

Male.—Head and thorax dark green, the propodeum bluish. Anterior half of gular region, posterior orbits broadly to middle of eyes, mandibles except red tips, labrum, and face to a little above level of antennae bright yellow; the yellow sometimes extending straight across above antennae, but the green usually descending on each side to the antennal sockets or even intruding for a short distance between lateral and subantennal marks, with the yellow in median line forming a broad spearhead-shaped mark on the frons. Pronotum yellow, with a broad green band from flank to flank. Abdomen yellow, the tergum with seven fuscous bands, the light and dark bands about equal, the light bands not quite reaching lateral margins except on tergite 1. Legs yellow, the posterior side of the femora, a small spot on posterior side of front tibiae, a blotch on middle tibiae and the hind tibiae except at base and beneath, fuscous. Antennae fuscous, the scape yellow except a small spot above and the flagellum dullish yellow beneath. Tegulae and wings as in female.

Head a little broader than long, the cheeks about as broad as the eyes. Mandibles tapering, acute, and nearly reaching far margin of proboscis fossa. Facial foveae about twice as long as wide. Venation as in female, except outer nervures of second discoidal cell are obsolete. Apical lobe of tergite 7 a little longer than wide and narrowed to the rounded apex. Sculpture and pubescence about as in female, the frons virtually impunctate. Subgenital plate triangular, as long as wide at base, the somewhat nipple-shaped apex acute, the disk with fine setae. Caulis of aedeagus nearly as broad as long, the dorsal lobes rounded at apex; parameral lobes rather long and slender and only moderately widened at base as seen from side; the fused sagittae very wide and strongly angled at the middle and acute at apex as seen from above, and moderately thickly fusiform as seen from side. Length, about 4–5 mm.; anterior wing, 2.8–3.4 mm.

Twenty-five females, 62 males, Port Isabel, Cameron Co., Texas, Nov. 1954 (N. L. H. Krauss); 1 male, near Tecalote, San Miguel Co., New Mexico, on *Pectis papposa*, Sept. 5, 1930 (Timberlake); and 2 males, Maybell, Moffat Co., Colorado, Aug. 18, 1940 (R. H. Beamer).

The males from New Mexico and Colorado agree closely in markings and genitalia with Texas material and seem to be correctly determined as *lasiogastra*. Possibly the female from Artesia, Colorado, discussed under *snowii* belongs with these males, in which case a new subspecies of *lasiogastra* might be in order, but more adequate material is needed.

***Perdita electa*, n. sp.**

P. electa is similar to *lasiogastra*, but the labrum, anterior margin of clypeus, two stripes on its disk, and supraclypeal area are black; the bands of abdomen are more yellowish, broad and complete although narrowed medially and notched behind, with that on tergite 5 poorly developed; the mesoscutum has thinner hair, and disk of tergites 4 and 5 are more nearly nude. It may prove to be a race of *lasiogastra* when better known.

Female.—Head and thorax dark blue-green, the labrum, clypeus in part, and supraclypeal area black. Mandibles except reddish tips, clypeus except anterior margin, and two more or less complete but narrow dark stripes on disk, and lateral marks yellowish white; the lateral marks broad below and narrowed about two-thirds above, where they touch the lower end of the foveae. Collar of pronotum, large marks on posterior corners of disk, narrowly confluent with large marks on tubercles white. Abdomen fuscous, with a broad, yellowish-white band on tergites 1 to 4, and an interrupted or broken band on tergite 5, the bands reaching lateral margins, narrowed medially, and notched behind, with that on tergite 1 very narrowly interrupted. Legs fuscous, the apex of femora, front and middle tibiae except posterior blotch, front tarsi, middle basitarsi and base of hind tibiae pale yellow. Antennae fuscous, the flagellum brownish yellow beneath, the scape and pedicel pale yellow beneath. Tegulae testaceous hyaline on outer margin and yellowish white at base. Wings whitish hyaline, the nervures pale testaceous, the subcosta and margins of stigma pale brown.

Head about as broad as long, the proboscis slightly exceeding the fossa in repose. Mandibles simple, acute, and not quite reaching far margin of the fossa. Facial foveae about twice as wide as the interval between them and eyes, and reaching from level of middle of antennal sockets somewhat more than halfway to level of anterior ocellus. Pterostigma normal for this group, the marginal cell with part beneath the stigma shorter than the part beyond. Pygidial plate broader at base than long, the sides arcuately convergent, the apex with subacute points on each side of the median notch. Frons, vertex, and mesonotum tessellate and rather dull, the frons impunctate, the mesonotum with rather sparse, minute, indistinct punctures; face below antennae more shining, with sparse, faint punctures. Pubescence whitish, erect, moderately abundant, that on the mesonotum sparser, longer and finer than in *lasiogastra*. Length, 6 mm.; anterior wing, 3.8–3.9 mm.

Two females (holotype and paratype), Granger, Sweetwater Co., Wyoming, on *Chrysothamnus nauseosus*, Aug. 25, 1954 (G. E. Bohart).

Type in collection of the Citrus Experiment Station, Riverside; paratype in the Bohart collection.

***Perdita retusa*, n. sp.**

(Figs. 608, 609, 706)

This species is similar to *lasiogastra* and *electa*, but the stout, almost dentate mandibles of the female, the black clypeus with a pale median mark and the nearly clear hyaline wings with dark nervures are distinctive characters.

Female.—Head and thorax dark bluish green, the labrum, clypeus, supraclypeal area, and sometimes the anterior corners of face black. Basal half, or more, of mandibles, median sub-

pyriform mark on clypeus, sometimes the lateral margins of disk of clypeus very narrowly and lateral marks white; apical half of mandibles rufotestaceous and red; lateral marks broad below and narrowed more than one-half above where they end obliquely at lower end of foveae. Collar of pronotum, interrupted band on hind margin of disk, and the tubercles pale yellow. Abdomen blackish, with a moderately wide white band on tergites 1 to 5, the bands narrower than the dark intervals, reaching lateral margins of segments and notched medially behind. Pygidial plate rufotestaceous. Legs blackish, the apex of femora, front and middle tibiae except behind, and base of hind tibiae pale yellow, the front and middle tarsi pale brownish. Antennae fuscous, the scape pale yellow except on apical half above, the flagellum brownish yellow beneath. Tegulae yellowish white at base and hyaline on outer margin. Wings nearly clear hyaline, the nervures brownish, the subcosta and margins of stigma pale fuscous.

Head as broad as long, with the cheeks nearly as broad as the eyes. Mandibles stout, abruptly narrowed on inner margin close to the rounded apex. Proboscis slightly exceeding the fossa in repose. Facial foveae usually wider, especially at anterior end, than the interval between them and the eyes, and reaching from the level of middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Pterostigma normal for the group, the marginal cell a little shorter beneath the stigma than beyond; second submarginal cell generally narrowed more than two-thirds to the radius. Pygidial plate about as long as broad at base, usually distinctly notched at apex, with the points on each side of the notch obtuse. Frons, vertex, and mesonotum strongly tessellate and dull, the frons almost impunctate, the mesoscutum with moderately close, minute, and indistinct punctures; clypeus with rather close shallow punctures. Pubescence white, moderately abundant, erect and fine, that on disk of mesonotum short. Length, about 5.5-6 mm.; anterior wing, 4.2-4.5 mm.

Male.—Head and thorax dark bluish green. Anterior end of gular region, posterior orbits narrowly to middle of eyes, mandibles except red tips, labrum, and face to level of foveae bright yellow, with the green of frons descending broadly on each side a little below that level. Collar of pronotum, mark on posterior corners of disk, and tubercles yellow, the posterior marks sometimes narrowly confluent on each side. Abdomen more or less dark fuscous above, with a moderately wide and even yellow band on tergites 1 to 5, and sometimes traces of a band on tergite 6, the band on tergite 1 either slightly interrupted or deeply notched in middle, with each half subpyriform and narrowed toward lateral margins. Apical lobe of tergite 7 testaceous, the venter yellow. Legs yellow, a blotch on posterior side of front and middle femora, sometimes a small spot on posterior side of middle tibiae, hind femora except at base and apex and on dorsal edge, hind tibiae except at base and beneath, and hind tarsi fuscous or blackish. Antennae yellow, the pedicel and flagellum fuscous above, becoming brownish toward apex. Tegulae and wings nearly as in female, the base of former yellow and the subcosta and margins of stigma darker fuscous.

Head hardly broader than long, the cheeks no broader than eyes. Mandibles rather stout, abruptly narrowed close to apex, and reaching far margin of the proboscis fossa. Facial foveae small, about twice as long as wide. Apical lobe of tergite 7 moderately wide and narrowed to the rounded or subtruncate apex. Sculpture and pubescence about as in the female. Venation similar, except outer nervures of second discoidal cell are weak. Subgenital plate triangular, slightly broader than long, the sides converging nearly straight, the apex rounded or truncated and the disk with rather close-set fine setae. Submedian lobes in dorsal aspect of caulis rounded at apex, the parameral lobes rather long and slender, with the base moderately wide as seen from side; fused body of the sagittae stout, fusiform, acute at apex, and not angulate at middle as seen from above, and moderately stoutly fusiform and somewhat sinuate in lateral view. Length, about 4-5 mm.; anterior wing, 3.8-4 mm.

Five females, 8 males (holotype female, allotype, and paratypes), 27 miles southeast of Yucca, Mohave Co., Arizona, Oct. 30, 1952 (E. G. Linsley and R. F. Smith). Paratypes as follows.—ARIZONA: 1 female, 11 miles south of Alamo, Yuma Co., on *Chrysothamnus*, Oct. 30, 1952 (Linsley and Smith). CALIFORNIA: 1 male, Whitewater, Riverside Co., Oct. 26, 1952 (Linsley and Smith); and 1 male, Red Rock Canyon, Kern Co., on *Chrysothamnus paniculatus*, Oct. 8, 1957 (J. C. Hall).

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

Perdita ensenadensis, n. sp.

(Figs. 610, 611, 707)

This species differs from those preceding in having the light bands of abdomen interrupted medially although the male is similar to *gutierreziae* and allied species. It is similar to *melanostoma* in having the lower part of face mainly black, but with the light markings generally larger.

Female.—Head and thorax dark, somewhat brassy green, the base of labrum, clypeus, and narrow orbital marks to level of antennae white; these marks sometimes evanescent or again moderately enlarged, the lateral marks sometimes with an anterior extension toward the clypeus and the disk of clypeus sometimes with a small spot on one or both sides opposite the median mark; the median mark itself usually oval or circular and closer to anterior margin than to the base. Mandibles testaceous, becoming red at apex and sometimes whitish at base. Pronotum dark except white mark on tubercles. Abdomen blackish, with a moderately wide white band on tergites 1 to 4, the bands interrupted medially, with those on tergites 3 and 4, or more rarely the others, not quite reaching the lateral margins. Legs blackish, the apex of front and middle femora, anterior side of front and middle tibiae, and extreme apex of hind femora yellowish white, the front and middle tarsi whitish tinged with pale brown. Antennae fuscous, the flagellum yellowish brown beneath. Tegulae testaceous hyaline, with the base brown or fuscous edged with whitish. Wings dusky hyaline, the nervures testaceous brown, with subcosta and margins of stigma a little darker.

Head about as broad as long, the proboscis hardly exceeding the fossa. Mandibles tapering, acute, and reaching far margin of the proboscis fossa. Facial foveae generally narrower than the interval between them and eyes, and extending from level of upper margin of antennal sockets hardly more than halfway to level of anterior ocellus. Pterostigma moderately broad and the parts of marginal cell beneath and beyond it about equal; second submarginal cell narrowed about one-half above. Pygidial plate about as long as wide, moderately narrow at apex, which is at most faintly notched. Head and thorax strongly and finely tessellate and dull, the mesonotum not much more shining than the frons; puncturation moderately close and shallow on face below antennae, and minute and rather obscure on frons and mesonotum. Pubescence whitish, erect, moderately sparse, and coarse, that on the mesonotum short and that on frons very short. Length, 4–5 mm.; anterior wing, 2.9–3.4 mm.

Male.—Head and thorax dark green. Anterior half, or more, of gular region, posterior orbits to middle of eyes, mandibles except red tips, labrum, and face to level of foveae, yellow; outer side of antennal sockets margined with green and often a dark spot on suture at anterior end of subantennal plates; green of frons with an angular projection on each side toward the antennal sockets. Collar of pronotum and a band on posterior margin including the tubercles and margin below them, but interrupted at middle of disk and sometimes on each side above the tubercles, yellow. Posterior half of prosternum and T-mark on mesopectus also, yellow, the anterior arms of the T broad but ending far from the tubercles. Abdomen brownish fuscous above and yellow beneath, with an even yellow band on tergites 1 to 5, the bands enclosed except sometimes on tergite 2, and that on tergite 1 deeply notched in front or interrupted medially. Legs yellow, the lower half of posterior side of front and middle femora except at apex, base of hind coxae, entire posterior side of hind femora, narrow streak on front tibiae behind and broader one on middle tibiae, hind tibiae except beneath, and hind tarsi fuscous. Antennae yellow, becoming more orange yellow on flagellum, the pedicel brownish fuscous and the flagellum pale brownish above except at apex. Tegulae subhyaline, with a yellow spot at base. Wings as in the female.

Head as broad as long, the cheeks not quite as wide as the eyes. Mandibles tapering and nearly reaching far margin of proboscis fossa. Facial foveae small and punctiform. Apical

lobe of tergite 7 somewhat longer than wide, with the sides converging to the rounded apex. Sculpture and pubescence much as in the female, but the puncturation and hair of mesonotum sparser. Subgenital plate triangular, about as long as wide at base, the apex slightly nipplelike, the disk with fine setae. Caulis of aedeagus oval, the dorsal lobes truncate at apex, the parameral lobes moderately long and appearing rather wide on apical part as seen from above, and broad at base and subacute at apex as seen in lateral view; fused body of sagittae moderately wide and angulate at middle, acute at apex as seen from above and rather thinly fusiform in lateral view. Length, about 3.75-4.25 mm.; anterior wing, 2.6-2.9 mm.

Nine females, 11 males (holotype female, allotype, and paratypes), 31 miles north of Ensenada, Baja California, Mexico, on *Aplopappus venetus*, Aug. 1, 1934 (Timberlake), in collection of the Citrus Experiment Station, Riverside.

Perdita microsticta, n. sp.

This new species is known only from one damaged specimen (left wings and one antenna lacking) but seems clearly distinct from other species of the group in the small white face marks and the deficient markings of the abdomen.

Female.—Head and thorax bluish green, the mesonotum more brassy, the labrum, clypeus, and supraclypeal area blackish. Base of mandibles and moderately small lateral face marks white, the latter rounded toward clypeus and somewhat widened on orbits of eyes, where they reach nearly to level of antennae. Small median mark on clypeus and small lateral spots on disk faintly white. Remainder of mandibles rufotestaceous, becoming redder at apex. Collar of pronotum, small spot on posterior corners of disk and tubercles pale yellow. Abdomen blackish on basal half, with a narrow, abbreviated, and interrupted pale-yellow band at base of tergites 2 and 3; apical depression of tergites 2 and 3, and following segments testaceous or rufotestaceous, becoming more brownish or reddish toward apex, and with a large blackish mark at basal corners of tergite 4 and a similar mark on each side subapically but farther from the lateral margins. Legs blackish, the apex of front and middle femora, anterior side of front and middle tibiae, their tarsi and hind knees pale yellow. Antennae fuscous, the scape narrowly pale yellow beneath, the flagellum more brownish yellow beneath. Tegulae testaceous, becoming brownish at base. Wings hyaline, the nervures testaceous yellow, the subcosta and margins of stigma pale brown.

Head somewhat longer than wide, the cheeks narrower than the eyes. Proboscis rather long, probably too long to be included within the fossa in repose. Mandibles tapering, acute, but not long enough to reach the far margin of proboscival fossa. Facial foveae fine but well impressed, about as wide as the interval between and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma moderately small, about two-thirds as wide as the first submarginal cell, and the part of marginal cell beneath it somewhat shorter than the part beyond. Pygidial plate as long as wide, rounded at apex and slightly notched. Frons, vertex, and mesonotum strongly tessellate, moderately and nearly uniformly dull, the minute punctures faint on the frons, distinct, but rather sparse and irregularly spaced on mesonotum; face below antennae more faintly tessellate, dullish, with fine, moderately close punctures on the clypeus, the white lateral marks polished. Pubescence whitish, abraded and much damaged in type, but apparently sparse, rather short, and erect on the mesonotum. Length, about 4.8 mm.; anterior wing, 3.1 mm.

One female (holotype), Scott Co., Kansas, June 28, 1925 (R. H. Beamer), in collection of the University of Kansas.

Perdita halli, n. sp.

(Figs. 612, 613, 708)

This species is anomalous in the black ground color of the head and thorax, but the subgenital plate and aedeagus of the male have the characteristic features

of the *octomaculata* group. Unfortunately nothing is known of the flower-visiting habits of this bee. The male type has been so badly cyanided that some details of the coloration are hard to discern or interpret correctly.

Female.—Head and thorax black, the clypeus pale brownish, becoming fuscous across dorsal margin of disk. Base of mandibles and a spot on anterior middle of disk of clypeus creamy white. Lateral marks livid, perhaps normally whitish (their inner anterior end next to clypeus more evidently whitish), broad below and narrow above on orbits, where they end at anterior end of foveae. Mandibles otherwise testaceous, becoming red at apex. Labrum testaceous. Collar of pronotum narrowly whitish, the tubercles white. Abdomen blackish, without markings, the pygidial plate rufotestaceous, the venter brownish. Legs fuscous, the anterior side of front and middle tibiae and their tarsi pale brownish, or brownish yellow. Antennae brownish fuscous, the scape pale yellow except a dark mark above at apex, the flagellum more orange yellow beneath. Tegulae pale brownish at base and testaceous hyaline on outer margin. Wings clear hyaline, the nervures testaceous, the margins of stigma and subcosta brownish.

Head as broad as long, the disk of clypeus much broader than high. Proboscis moderately exceeding the fossa in repose. Mandibles rather long, tapering, acute, and reaching far margin of the proboscival fossa. Facial foveae well impressed, moderately slender, about their own width from margin of eyes and extending from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma rather narrow, but more than half as wide as first submarginal cell; marginal cell with parts beneath and beyond the stigma about equal; second submarginal cell narrowed more than one-half to radius. Pygidial plate as long as wide, with the moderately narrow apex rounded and slightly retuse in middle. Frons, vertex, and mesonotum finely tessellate and moderately dullish, the tessellation of the face descending on each side to the subantennal plates but not invading area of the lateral face marks; punctures of frons and mesonotum minute and sparse, and those of face below antennae coarser but shallow. Pubescence white, rather sparse, erect, and moderately coarse, becoming rather short on disk of mesoscutum and on the frons. Length, 4.5 mm.; anterior wing, 3 mm.

Male.—Head and thorax black. Anterior gular region and cheeks broadly to middle of eyes, mandibles except red tips, labrum, and face to level of foveae yellow, with yellow in median line extending broadly almost to anterior ocellus. Sides of face opposite antennae suffused with fuscous (possibly a postmortem development). Pronotum yellow with a fuscous band from flank to flank, becoming broader on the disk. A small yellow spot on anterior border of mesoscutum just left of the median impressed line, probably adventitious. Abdomen yellowish, the basal tergite pale fuscous, the apical depression of tergites subhyaline. Legs yellow, the hind pair pale fuscous except the trochanters, knees, and under margin of tibiae; the middle femora also somewhat infuscated above and behind on apical half. Antennae yellow, the flagellum slightly infuscated above. Tegulae and wings as in female.

Head as broad as long, the cheeks nearly as broad as the eyes. Mandibles slender, acute, and nearly reaching far margin of proboscival fossa. Facial foveae punctiform. Venation as in female, except outer nervures of second discoidal cell are faint. Apical lobe of tergite 7 as long as wide, with sides converging to the rounded apex. Sculpture and pubescence about as in female. Subgenital plate a little broader than long, the sides somewhat convexly arcuate and convergent to a small nipplelike point at apex, the disk with fine setae. Apex of dorsal lobes of caulis rounded and a little more than their width apart; parameral lobes broad, but appearing narrow in dorsal view as they are held nearly vertical, and appearing broad at base and broadly rounded in lateral view; fused body of sagittae moderately wide and angulate at middle, acute at apex and rather slenderly fusiform as seen from side; basal interior of caulis with a rather high median septum. Length, about 3.8 mm.; anterior wing, 3.4 mm.

One female, 1 male (holotype female and allotype), about 6 miles north of Palm Springs, Riverside Co., California, May 4, 1954 (J. C. Hall), in collection of the Citrus Experiment Station, Riverside.

Perdita pectidis Cockerell

(Figs. 614, 615, 709)

Perdita pectidis Cockerell, 1896, Proc. Acad. Sci., Phila., 48:83, ♀, ♂.

This species may be recognized by its blue color, rather small white face marks and interrupted white bands of abdomen; the male is similar but has the face all white below level of antennae. This bee is found on *Pectis papposa* in New Mexico and Arizona.

Female.—Head and thorax dark blue, the disk of clypeus and supraclypeal area brown or black. Base of mandibles, a longitudinal median mark on clypeus, a small mark on each side of disk partly on the lateral extensions, and triangular lateral marks, ending bluntly at level of antennae, white. Mandibles otherwise testaceous, with apical fourth or third red. Labrum testaceous, or sometimes more or less broadly blackish at base. Collar of pronotum, small mark on posterior corners of disk, and tubercles white. Abdomen brown or blackish, with an interrupted white band on tergites 1 to 4, the parts of the bands widely separated except on tergite 1, oblique and widened at outer ends in New Mexico material, and less widely separated in Arizona specimens; the pygidial plate testaceous. Legs brown or blackish, the apex of femora, anterior side of front and middle tibiae and sometimes base of front tarsi pale yellow. Antennae blackish, the flagellum brownish yellow beneath. Tegulae whitish at base and testaceous hyaline on outer margin. Wings slightly dusky hyaline, the nervures testaceous brown, the subcosta and margins of stigma fuscous.

Head slightly broader than long. Proboscis rather short, the apex of galeae hardly reaching base of stipites when folded in repose. Mandibles tapering, acute, and nearly reaching far margin of proboscoidal fossa. Facial foveae rather short, somewhat broader than interval between them and eyes and reaching from upper level of antennal sockets hardly more than halfway to level of anterior ocellus. Pterostigma rather broad, but not quite equaling width of first submarginal cell; the part of marginal cell beyond the stigma somewhat longer than the part beneath, or the two parts about equal. Pygidial plate about as long as wide at base, rounded at apex and generally with a well-developed median notch. Head and thorax shining, the frons and vertex tessellate and somewhat dullish, the mesoscutum polished on disk and weakly tessellate on anterior border; punctures of frons and mesonotum moderately sparse and minute, and those of face below antennae coarser. Pubescence white, sparse, fine, and erect, that of mesonotum and frons very short. Length, about 4–4.5 mm.; anterior wing, about 2.8 mm.

Male.—Head and thorax dark blue. Mandibles except red tips, labrum, and face below level of antennae white, the lateral marks ending bluntly at level of foveae. Pronotum marked as in female. Abdomen fuscous or blackish, with a transverse white mark on each side of tergites 1 to 3; these marks sometimes reaching lateral margins, those on tergite 2 widened at outer ends and extended backward, and those on tergite 3 confluent with, or cut off from, a subapical white line extending inward from lateral margins, or the subapical lateral marks sometimes absent; sometimes tergite 4 with marks similar to those of tergite 3 but less developed. Legs blackish, the apex of femora, front and middle tibiae except behind, front tarsi, base of middle tarsi, and base of hind tibiae pale yellow, the hind tarsi brown and the small joints of middle tarsi pale brown. Antennae fuscous, the scape white except above, the flagellum dull yellow beneath except that the last one to three joints are entirely dark. Tegulae and wings as in female.

Head somewhat broader than long. Mandibles tapering, acute, and not quite reaching the far margin of proboscoidal fossa. Facial foveae punctiform, or a little longer than wide. Sculpture and pubescence as in female, but the frons rather dull. Apical lobe of tergite 7 somewhat longer than wide and narrowly rounded at apex. Subgenital plate triangular, about as long as wide at base, narrowly rounded at apex, the disk with fine setae. Dorsal lobes of caulis arcuately divergent and continuous with dorsal margin of parameral lobes; the latter moderately widened at base, especially as seen in lateral view; fused body of sagittae moderately

wide, angulate at middle, and tapering thence to acute apex, and moderately thickly fusiform as seen from side. Length, 3-3.3 mm.; anterior wing, 2.5-2.7 mm.

In addition to the type which has been examined at Philadelphia, the following material of *pectidis* has been examined.—NEW MEXICO: 3 females (one a cotype), Las Cruces, Dona Ana Co., on "*Tribulus maximus*" (= *Kallstroemia*), Sept. 20 (Cockerell); 1 female, Mesilla Park, on *Pectis papposa*, Sept. 7 (Cockerell); 3 males, 3 miles east of Mesilla Park, on *P. papposa*, Sept. 14, 1957 (Timberlake); 1 male, banks of the Rio Grande, 5 miles south of Mesilla, on *Sesuvium verrucosum*, Sept. 14, 1957 (R. C. Dickson). ARIZONA: 2 females, 2 males, 2.3 miles west of Salome, Yuma Co., on *P. papposa*, Sept. 14 and 24, 1953 (Timberlake).

Perdita phymatae Cockerell

Perdita phymatae Cockerell, 1895, Proc. Acad. Sci., Phila., 47:12, ♀; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:91.

The type of *phymatae* was rescued by Cockerell from the clutches of a *Phymata* on a yellow composite at Las Cruces, New Mexico, and later he found the bee common at Las Cruces in September at the flowers of *Bigelovia* (= *Aplopappus heterophyllus*) and *Gutierrezia*. For some unknown reason the male of this species has never been discovered.

Female.—Head and thorax dark green, somewhat brassy or sometimes bluish green, the propodeum more bluish. Supraclypeal area, clypeus, and labrum, and sometimes the anterior corners of face black, without light markings except occasionally a small yellow spot on middle of clypeus. Mandibles rufotestaceous becoming red at apex and whitish at base. Tubercles more or less pale brown, or white at apex. Abdomen blackish, generally without markings, but sometimes with a whitish streak on each side of the base of tergite 2, or more rarely these marks in the form of an enclosed and well-interrupted band, and two small spots present also on tergite 3. Pygidial plate rufotestaceous. Legs blackish, the anterior side of front and middle tibiae and front tarsi pale yellow, the middle tarsi pale brownish. Antennae fuscous, the scape narrowly pale yellow beneath, and the underside of flagellum brownish yellow. Tegulae testaceous hyaline and pale brownish at base. Wings hyaline, the nervures testaceous, the subcosta and margins of stigma brown.

Head barely wider than long, the proboscis of moderate length and not exceeding the fossa in repose. Mandibles tapering, subacute at apex, and not quite reaching the far margin of the fossa. Facial foveae somewhat wider than the interval between them and eyes and extending from level of middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Pterostigma moderately wide, with the parts of marginal cell beneath and beyond it about equal; second submarginal cell narrowed about one-half to the radius. Pygidial plate somewhat broader than long, with the sides more or less convexly arcuate and the apex generally only slightly retuse. Head and thorax tessellate, the frons dullish, the mesonotum more or less weakly tessellate, moderately shining and with minute moderately sparse punctures, which are more distinct than those of frons; clypeus and supraclypeal area shining and with sparse fine punctures. Pubescence whitish, rather fine, erect, and thin, that of frons and mesonotum short. Length, about 4-5 mm.; anterior wing, 2.9-3.1 mm.

The type at Philadelphia has been examined as well as other females collected by Cockerell at Las Cruces, New Mexico, and now in the collections at Philadelphia, Washington, and Riverside. Additional material as follows.—1 female, 36 miles east of Holbrook, Apache Co., Arizona, on *Gutierrezia sarothrae*, Sept. 3, 1930 (Timberlake); and 7 females, near southern entrance to Petrified Forest, Navajo Co., on *Gutierrezia*, Aug. 27, 1931 (Timberlake).

The specimen taken east of Holbrook is much duller than the others, with somewhat denser, longer, and coarser hair on the mesonotum. It would run as well or even better to *nuda* (couplet 96) in the table of species, and may possibly be

distinct, but as it agrees so closely with *phymatae* in other characters it must be considered a local variant, unless or until more material proves otherwise.

***Perdita cognata*, n. sp.**

(Figs. 616, 617, 710)

The male of *cognata* is rather small, with broad, entire, but notched yellow bands on the abdomen and face entirely yellow below level of antennae.

Male.—Head and thorax dark bluish green. A fine line on posterior orbits to middle of eyes, mandibles except red tips, labrum, and face below level of antennae sulphur yellow; lateral marks obliquely truncate and ending acutely at level of foveae. Broad mark on outer ends of flanks of pronotum, confluent with mark on tubercles, and that in turn with large mark on posterior corners of disk, together with the collar yellow. Abdomen fuscous above, with a broad yellow band on tergites 1 to 5, these bands reaching lateral margins except on tergite 5, notched medially behind on tergites 2 to 4, and very narrowly interrupted in tergites 1 and 5. Legs yellow, a blotch on posterior side of all the femora and on front and middle tibiae, the hind tibiae except beneath and at base and apex, and hind tarsi brown or fuscous. Antennae yellow, the flagellum brownish yellow beneath, a mark on apical half of scape above and upper side of pedicel and flagellum fuscous, becoming more brownish toward apex of flagellum. Tegulae hyaline, with the base pale yellow. Wings hyaline, the nervures testaceous, margins of stigma and subcosta brown.

Head rotund, as broad as long, the cheeks not quite equaling width of eyes. Proboscis rather long, extended in type, and in repose probably would somewhat exceed the fossa. Mandibles about normal, tapering, and acute. Facial foveae oval and less than thrice as long as wide. Pterostigma about two-thirds as wide as first submarginal cell, the part of marginal cell beyond it a little longer than the part beneath; second submarginal cell narrowed one-half to radius. Apical lobe of tergite 7 moderately wide and rounded at apex. Frons and vertex minutely granular tessellate, dull, and impunctate; mesonotum moderately dull and tessellate, with minute, rather sparse punctures; punctures of face below antennae rather close, but shallow and faint. Pubescence whitish, rather long, erect, and thin, except on cheeks. Subgenital plate triangular, about as long as wide, the apex a little rounded and disk with fine rather sparse setae. Caulis longer than wide, with dorsal lobes rounded at apex; parameral lobes moderately wide at base and less than half as wide on apical part in lateral view; fused body of sagittae moderately thickly fusiform, obtusely angulate at middle, and acute at apex as seen from above, and thinly fusiform and somewhat sinuate in lateral view. Length, 4.5 mm.; anterior wing, 3.4 mm.

One male (holotype), Granger, 6,400 feet, Sweetwater Co., Wyoming, Aug. 5, 1934 (H. A. Scullen).

Type in collection of the Citrus Experiment Station, Riverside, but it will go ultimately to the collection of the California Academy of Sciences.

***Perdita translineata*, n. sp.**

(Figs. 618, 619, 711)

P. translineata is distinguished by the four narrow, enclosed, pale-yellow bands of the abdomen of which the first and last are somewhat abbreviated and slightly interrupted.

Male.—Head and thorax bluish green. Mandibles except red tips, labrum, clypeus, large lateral marks, and supraclypeal mark sulphur yellow; a small irregular fuscous spot on each side of summit of clypeus; lateral marks evenly narrowed to an acute point on orbits halfway between level of antennae and foveae; supraclypeal mark quadrate and only slightly narrower above than below; subantennal plates green, but the anterior end and outer margin of left plate and a spot on outer margin of right plate yellow. Apex of tubercles yellow, the thorax

otherwise entirely dark. Abdomen blackish, with a narrow pale-yellow band on tergites 1 to 4, ending some distance from lateral margins, the bands on tergites 1 and 4 more abbreviated than the others and slightly interrupted in the middle. Venter pale yellowish, the first segment fuscous and apical margin of following segments pale brown. Legs fuscous, the underside of front coxae and trochanters, front femora and tibiae except behind, front tarsi, middle trochanters, and mark at base and apex of middle femora on anterior side, anterior side of middle tibiae, middle tarsi, hind trochanters, and small spot at apex of hind femora yellow. Antennae brownish fuscous, the scape clear yellow beneath and the flagellum slightly duller yellow beneath with apical half of terminal joint brown. Tegulae pale testaceous, becoming brownish at base. Wings slightly dusky hyaline, the nervures testaceous brown, the subcosta and margins of stigma dark brown.

Head as broad as long, the cheeks somewhat narrower than the eyes. Proboscis rather long and extended in type, and probably would exceed the fossa in repose. Mandibles tapering, acute, and reaching far margin of the fossa. Facial foveae small, faint, and barely longer than wide. Venation normal, the parts of marginal cell below and beyond stigma equal, the second submarginal cell narrowed one-half to radius, and the outer nervures of second discoidal cell weak and colorless. Apical lobe of tergite 7 as long as wide at base and narrowed evenly to the rounded apex. Frons and vertex granular tessellate, dull, and impunctate; the face below antennae moderately shining and almost impunctate; mesonotum tessellate, somewhat more shining than the frons and with minute, indistinct, moderately sparse punctures. Pubescence whitish, rather coarse, short and erect and moderately thin, the hair of frons and disk of mesonotum shorter than elsewhere. Subgenital plate triangular, about as long as broad at base, the apex slightly rounded, the disk with sparse minute setae. Caulis of aedeagus somewhat ovate, a little longer than wide, with dorsal lobes rounded at apex; parameral lobes nearly as long as the caulis, with the strap-shaped part unusually broad in dorsal view; sagittae shorter than usual, the fused body obtusely angulate beyond the middle and subacute at apex. Length, about 4.25 mm.; anterior wing, 2.6 mm.

One male (holotype), 3.7 miles southeast of Ben Wheeler, Van Zandt Co., Texas, on *Eriogonum multiflorum*, Oct. 12, 1952 (L. H. Shinnery), in collection of the Citrus Experiment Station, Riverside.

Perdita durangoënsis, n. sp.

(Figs. 620, 621, 712)

This species from Durango has the mesonotum weakly tessellate and shining, the face marks and narrowly interrupted bands of abdomen pale yellow.

Female.—Head and thorax dark blue-green, the labrum and supraclypeal area black. Mandibles except the red and rufotestaceous apical half, clypeus except two black stripes on disk, triangular lateral marks reaching level of antennae, and sometimes two dots on supraclypeal area pale yellow. Collar of pronotum, small mark on posterior corners of disk, and tubercles yellow. Abdomen fuscous, more or less tinged with brown, with a moderately interrupted, rather narrow yellow band on tergites 1 to 4, the bands on tergites 2 and 3 a little widened at outer ends, slightly oblique on each side of tergite 3, and that on tergite 4 not reaching lateral margins. Pygidial plate rufotestaceous. Legs brownish fuscous, the apex of femora, front and middle tibiae except behind, and base of hind tibiae yellow, the front and middle tarsi pale brownish, with the front basitarsi mostly yellow. Antennae blackish, the scape yellow beneath and the underside of flagellum narrowly dull yellow. Tegulae testaceous hyaline, and yellow at base. Wings dusky hyaline, the nervures brownish testaceous, the subcosta and margins of stigma brownish fuscous.

Head a little broader than long, the cheeks narrower than the eyes. Proboscis hardly exceeding the fossa. Mandibles tapering, acute, and reaching far margin of the fossa. Face foveae narrow, well impressed, about their own width from margins of eyes and reaching from level of middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Pterostigma about two-thirds as wide as first submarginal cell, the parts of marginal cell beneath

and beyond the stigma nearly equal, and the second submarginal cell narrowed somewhat more than half to radius. Pygidial plate as broad as long and distinctly notched at apex. Frons and vertex finely tessellate, dull, and impunctate, the face below antennae rather shining, with fine, sparse punctures; mesonotum rather weakly tessellate, shining, and with moderately close, minute punctures. Pubescence whitish, moderately abundant, rather fine and erect, and moderately short on the mesonotum. Length, about 5.3–5.5 mm.; anterior wing, 3.5 mm.

Male.—Head and thorax blue. Mandibles except red tips, labrum, and face below antennae except mark on inner margin of subantennal plates bright yellow; the lateral marks oblique from upper margin of antennal sockets to margin of eyes at foveae. Interrupted band on hind margin of disk of pronotum and the tubercles yellow, the collar entirely dark. Abdomen fuscous, with a broadly interrupted and narrow yellow band on tergites 1 to 3, the bands on tergites 2 and 3 ending before the lateral margins, but supplemented by a subapical cutoff yellow spot on lateral margin and reflexed part of the tergites. Legs blackish, the apex of femora, anterior side of front and middle tibiae, front and middle tarsi, and extreme base of hind tibiae, yellow. Antennae blackish, the scape yellow except above on apical half, the flagellum broadly dull yellowish beneath except the two apical joints entirely dark. Tegulae testaceous hyaline and brownish at base. Wings a little dusky, the nervures testaceous, the margins of stigma and subcosta brown.

Head about as broad as long, the mandibles tapering and acute. Facial foveae punctiform. Venation as in female, except the outer nervures of second discoidal cell are obsolescent and the marginal cell a little longer beyond the stigma than beneath. Pubescence similar, but hair of frons and mesonotum rather long and thin. Apical lobe of tergite 7 about as long as wide and not much narrowed to the rounded apex. Subgenital plate triangular, acute at apex, with fine close-set setae on the disk. Dorsal lobes of caulis obliquely subtruncate at apex, and continuous with dorsal margin of parameral lobes; the latter moderately elongate, just perceptibly knobbed at apex as seen from above, and broad at base and bluntly rounded at apex as seen from side; fused body of sagittae fusiform, acute at apex and not angulate at middle and in lateral view rather slender and somewhat sinuate. Length, 5 mm.; anterior wing, 3.3 mm.

Three females, 1 male (holotype female, allotype, and paratypes), San Juan del Rio, Durango, Mexico, on *Baccharis*, Aug. 7, 1951 (P. D. Hurd, Jr.).

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

Perdita cazieri, n. sp.

(Figs. 622, 623, 713)

This species is similar to *durangoënsis*, but the markings are creamy white instead of pale yellow, a supraclypeal mark usually developed, the abdominal bands more broadly interrupted, the mesonotum slightly more distinctly tessellate, and the pygidial plate entire or only slightly retuse.

Female.—Head and thorax dark blue-green, labrum, and sometimes supraclypeal area blackish. Base of mandibles, clypeus, usually a supraclypeal mark, and lateral marks truncate above at level of antennae creamy white, the disk of clypeus with two blackish stripes. Mandibles otherwise rufotestaceous, becoming red at apex. Collar of pronotum, cuneate mark on posterior corners of disk, and tubercles white. Abdomen including venter blackish, with four white bands, that on tergite 1 narrowly interrupted, those on tergites 2 to 4 more broadly interrupted, with each part broadened at outer ends and pointed within, or those on tergite 4 sometimes reduced to oval marks. Pygidial plate rufotestaceous. Legs blackish, the extreme apex of femora, anterior side of front tibiae, stripe on lower anterior margin of middle tibiae and front tarsi pale yellow. Antennae blackish, the flagellum dull yellowish beneath except on the first and last joints. Tegulae testaceous hyaline and white at base. Wings dusky hyaline, the nervures testaceous, the subcosta and margins of stigma pale brown.

Head somewhat broader than long, the cheeks about as broad as the eyes. Proboscis slightly

exceeding the fossa. Mandibles moderately stout, rather blunt at apex, and falling somewhat short of the far margin of the broad anterior part of the proboscival fossa. Facial foveae generally about twice as broad as the interval between them and eyes, and reaching from level of middle of antennal sockets about two-thirds of the distance to level of anterior ocellus. Pterostigma not much more than half as wide as the first submarginal cell, and the part of marginal cell beyond the stigma generally distinctly longer than the part beneath. Pygidial plate about as long as wide at base, with the apex rounded or subtruncate, entire or slightly retuse. Frons and vertex minutely tessellate, dull, and with numerous but obscure punctures; clypeus shining, with fairly distinct, shallow punctures; mesonotum tessellate, moderately shining, with posterior border of scutum finely lineolate and rather dull, the punctures fine and close on scutellum and moderately close on scutum. Pubescence whitish, moderately abundant, fine, erect, long on vertex and lower part of cheeks and moderately short on mesonotum. Length, about 5.5-7 mm.; anterior wing, 3.8-4.2 mm.

Male.—Head and thorax dark blue-green. Mandibles except red tips, labrum, and face below level of antennae bright yellow; lateral marks obliquely truncate from antennal sockets to orbits at foveae, or sometimes more or less transversely truncate, with the antennal sockets one-half to two-thirds encircled by the yellow. Pronotal marks yellow but otherwise as in female. Abdomen blackish, with a transverse pale-yellow mark on each side of the base of tergites 1 to 3, or these marks rarely evanescent; apical lobe of tergite 7 rufotestaceous. Legs blackish, the apex of femora, anterior side of front and middle tibiae and tarsi yellow. Antennae yellow, the flagellum duller yellow beneath, the scape above except at base, the pedicel and flagellum above blackish, the two apical joints entirely dark. Tegulae and wings as in female, except the base of tegulae generally more yellow than white.

Head somewhat broader than long, with the cheeks rather broad. Mandibles tapering, acute, and not quite reaching far margin of proboscival fossa. Facial foveae about thrice as long as wide. Venation as in female except for the faint outer nervures of second discoidal cell. Sculpture and pubescence about as in female, with hair of cheeks denser. Apical lobe of tergite 7 narrowed to the rounded apex. Subgenital plate triangular, much as in *durangoensis*, but more rounded at apex, the disk in both species more hairy than in most species of the *octomaculata* group. Genitalia nearly as in *durangoensis*, with the caulis short in relation to other parts and the sagittae longer and more slender. Length, 5-6 mm.; anterior wing, 3.5-4 mm.

Three females, 11 males (holotype female, allotype, and paratypes), Palos Colorados, 8,000 feet, Durango, Mexico, Aug. 5, 1947 (Mont A. Cazier). Additional paratypes as follows.—MEXICO, DURANGO: 4 females, 8 males, Otinapa, 8,200 feet, Aug. 11, 1947 (C. D. Michener). CHIHUAHUA: 18 females, 24 males, Santa Clara Canyon, 5 miles west of Parrita, Aug. 31 and Sept. 1, 1956 (J. W. MacSwain).

Types in collection of the American Museum of Natural History, New York City; paratypes in collections of the University of California at Riverside and Berkeley.

Perdita butleri, n. sp.

(Figs. 624, 625, 714)

This Arizona species may be recognized by the five broad and interrupted white bands of the abdomen and by the large white face marks, including sometimes a mark on the subantennal plates. In the male the yellow of face extends above antennae for a short distance in median line, but encloses a dark mark between the antennae, which is sometimes joined to the green of frons by an isthmus.

Female.—Head and thorax dark blue-green, the upper elevated part of supraclypeal area black. Base of mandibles, clypeus, lateral and supraclypeal marks, and sometimes oval subantennal marks, not covering more than half of subantennal plates, creamy white; lateral marks large, triangular, and intruding slightly between foveae and eyes; supraclypeal mark somewhat more than twice as broad as high and obtusely notched above. Labrum and narrow anterior margin of clypeus testaceous or brownish. Mandibles rufotestaceous except at base, becoming redder

at apex. Collar of pronotum, broad and interrupted band on hind margin of disk, and tubercles white. Abdomen fuscous, or more or less brownish, with a broad white band on tergites 1 to 5; all the bands except that on tergite 1 distinctly interrupted, that on tergite 5 sometimes reduced to two transverse marks, and each part on tergites 2 and 3 broadened at outer ends and somewhat pointed within. Legs fuscous, the apex of femora, anterior side of front and middle tibiae, base of hind tibiae and front tarsi yellowish white, the middle tarsi pale brown. Antennae fuscous, the scape pale yellow, except above, the flagellum brownish yellow beneath. Tegulae white at base and testaceous hyaline on outer margin. Wings slightly dusky hyaline, the nervures testaceous brown, the subcosta and margins of stigma brownish fuscous.

Head somewhat broader than long, the cheeks narrower than eyes and strongly receding. Proboscis a little exceeding the fossa. Mandibles rather slender, tapering, acute, and not quite reaching the far margin of proboscival fossa. Facial foveae broader than interval between them and eyes, and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma hardly more than half as wide as first submarginal cell, the part of marginal cell beneath the stigma shorter than the part beyond. Pygidial plate about as long as wide at base, the rather narrow apex with a distinct median notch. Frons and vertex tessellate, dull, and obscurely punctured, the mesonotum distinctly tessellate but more shining than the frons and with minute, moderately close punctures. Pubescence whitish, moderately abundant, fine, rather short and erect, with that on mesoscutum distinctly shorter than that elsewhere. Length, about 4.5–5.5 mm.; anterior wing, 3.2–3.3 mm.

Male.—Head and thorax dark blue-green. Narrow anterior end of cheeks and gular region, mandibles except red tips, labrum, and face to slightly above level of antennae bright yellow; the green of frons descending broadly on each side to the antennal sockets and the yellow ending quadrately or triangularly in median line a little above the sockets, but enclosing a small fuscous or greenish triangular mark, which is sometimes joined narrowly to the green above. Pronotum with marks as in female except that they are pale yellow. Abdomen blackish, with a pale-yellow band on tergites 1 to 5, the bands narrowly interrupted in middle, that on tergite 1 interrupted by a black line or merely notched in front. Legs pale yellow, the basal half of front and hind coxae, the middle coxae, all femora except rather broadly at apex, and a little more than apical half of hind tibiae except broadly beneath, fuscous or blackish, a blotch on posterior side of front and middle tibiae more brownish. Scape of antennae entirely and pedicel beneath yellow, the pedicel and flagellum blackish above, the underside of flagellum brownish yellow except apical joint which is partly brown. Tegulae and wings as in female except that the former are more yellowish than whitish at base.

Head as long as wide, the cheeks not as wide as the eyes. Mandibles tapering, acute, and reaching far margin of proboscival fossa. Facial foveae about twice as long as wide. Outer nervures of second discoidal cell faint as in the males of most species of *Perdita*. Sculpture and pubescence about as in the female, except that the puncturation and hair of mesoscutum slightly sparser. Apical lobe of tergite 7 longer than wide and ogival at apex. Subgenital plate about as long as wide at base, the sides convexly arcuate, the apex subacute, and the disk with very fine setae. Caulis of aedeagus about as broad as long, the basal orifice transverse, the dorsal lobes ending obliquely and continuous with dorsal margin of parameral lobes, which are rather broad toward apex and very broad across the base as seen from the side; fused body of sagittae angulate at middle and very acute at apex as seen from above, and moderately thick and sinuate in lateral view, with the apex slightly bulbous. Length, 3.5–4.5 mm.

Six females, 2 males (holotype female, allotype, and paratypes), 2.7 miles west of Salome, Yuma Co., Arizona, on *Pectis papposa*, Sept. 20, 1953 (Timberlake); 1 female, 1 male (paratypes), Gila Bend, Maricopa Co., on *P. papposa*, Sept. 12, 1954 (Bohart and Butler); and 1 female (paratype), 25 miles east of Gila Bend, on *Hymenothrix wislizeni*, Sept. 20, 1955 (G. D. Butler).

Types in collection of the Citrus Experiment Station, Riverside; and paratypes in collection of the University of Arizona.

***Perdita quinquebalteata*, n. sp.**

This species is similar to *butleri* in markings, but it is considerably larger, with the facial foveae much longer and narrower and the pygidial plate entire at apex.

Female. Head and thorax dark olive green, the propodeum somewhat bluish. Basal half of mandibles, clypeus, supraclypeal and lateral marks creamy white; supraclypeal mark nearly twice as broad as high and slightly retuse above; lateral marks triangular and barely intruding between foveae and eyes; labrum and anterior margin of clypeus fuscous. Apical half of mandibles rufotestaceous and red. Collar of pronotum, large cuneate marks on hind border of disk, and tubercles white. Abdomen brownish fuscous, with a white band on tergites 1 to 5, each band reaching lateral margins and narrowly interrupted, and both parts on tergites 2 and 3 widened at outer ends and acute within. Legs fuscous, the extreme apex of femora, anterior sides of front and middle tibiae, and front tarsi pale yellow. Antennae blackish, the scape entirely dark, the flagellum brown beneath. Tegulae testaceous hyaline, with the base white. Wings hyaline, with a slight whitish opacity, the nervures testaceous, the subcosta and margins of stigma brown.

Head only slightly broader than long, with the cheeks about as broad as the eyes. Proboscis moderately long and presumably a little exceeding the fossa. Mandibles tapering, acute, and reaching the far margin of fossa. Facial foveae about as wide as the interval between them and eyes and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Venation normal for group, the part of marginal cell beneath stigma shorter than the part beyond. Pygidial plate about as long as wide at base, with the apex moderately narrow and only slightly retuse at the most. Head and thorax tessellate, the frons dull, with obscure punctures, the mesonotum moderately shining and with fine, moderately close or well-separated punctures. Pubescence white, rather abundant, fine, and erect, that on the mesoscutum only moderately shortened. Length, about 7 mm.; anterior wing, 4.2 mm.

Two females (holotype and paratype), San Juan del Rio, Durango, Mexico, on *Baccharis*, Aug. 7, 1951 (P. D. Hurd, Jr.).

Type and paratype in collections of the University of California at Riverside and Berkeley.

***Perdita aplopappi*, n. sp.**

(Figs. 626, 627, 715)

The male genitalia of *aplopappi* are more distinctive than usual and ally it closely to *P. bruneri* Cockerell, but *aplopappi* is considerably smaller than *bruneri* and the light bands of abdomen in the female are reduced to small lateral marks.

Female.—Head and thorax dark olive green, the supraclypeal area black. Base of mandibles, clypeus, and lateral marks creamy white; the anterior margin of clypeus and two arcuate stripes on disk dark brown; lateral marks strongly emarginate on inner margin and ending bluntly at level of antennae. Mandibles otherwise rufotestaceous and the labrum brownish fuscous. Small spot on posterior corners of disk of pronotum and the tubercles pale yellow. Abdomen fuscous, the pygidial plate rufotestaceous; a small transverse white mark on each side of tergites 1 to 4, those on tergites 2 and 3 oblique and barely reaching the lateral margins and those on tergite 4 enclosed. Legs fuscous, the scape blackish, the underside of flagellum brownish yellow. Tegulae testaceous hyaline, with the base pale brownish. Wings slightly dusky hyaline, the nervures testaceous brown, the subcosta and margins of stigma fuscous.

Head as wide as long, the cheeks nearly as wide as the eyes. Proboscis barely exceeding the fossa in repose. Mandibles moderately stout, and reaching far margin of the fossa, slightly expanded on inner margin and subacute at apex. Facial foveae somewhat broader than the interval between them and the ocellus. Venation about normal, the part of the marginal cell beyond the stigma a little longer than the part beneath. Pygidial plate about as long as wide at base and ogival and entire at apex. Head and thorax strongly tessellate, the frons dull,

impunctate, the mesonotum nearly as dull as the frons and with sparse minute punctures, and the face below antennae moderately shiny and obscurely punctured. Pubescence dull whitish, rather long and erect, that of mesonotum thin and only slightly shorter than that elsewhere. Length, 5 mm.; anterior wing, 3.8 mm.

Male.—Head and thorax dark green. Gular region broadly and posterior orbits nearly to middle of eyes, mandibles except red tips, labrum, and face to level of foveae bright yellow, the green of frons sometimes descending on each side to the antennal sockets. Collar of pronotum, interrupted band on hind margin of disk, and the tubercles yellow. Abdomen brownish fuscous, with a yellow band on tergites 1 to 5, the bands rather narrow, entire or narrowly interrupted, or notched medially, with those on tergites 4 and 5 sometimes enclosed and that on tergite 5 sometimes evanescent. Legs yellow, the front and middle femora broadly behind except at apex, hind coxae and femora except at apex, small blotch on posterior side of front tibiae, larger blotch on middle tibiae, hind tibiae except beneath and broadly at base, and small joints of hind tarsi fuscous. Antennae yellow, the flagellum brownish yellow beneath, the pedicel and flagellum brownish above. Tegulae testaceous hyaline, becoming pale yellow at base. Wings as in female.

Head only slightly broader than long, the cheeks nearly as broad as the eyes. Mandibles tapering, acute, and reaching far margin of proboscoidal fossa. Facial foveae oval, about twice as long as wide. Apical lobe of tergite 7 about as long as wide, and truncate or rounded at apex. Sculpture and pubescence as in female, but face below antennae more uniformly shiny. Subgenital plate triangular, about as long as wide, the lateral margin a little arcuate and the apex acute. Dorsal lobes of caulis somewhat oblique and rounded at apex, and subcontinuous with dorsal margin of the wide part of parameral lobes; the latter with a broad but short basal part, beyond which they appear strap-shaped and slightly broadening toward apex in dorsal view, and somewhat ovaly expanded apically in lateral view because of a low, laminate, and vertical crest on the inner margin; fused body of sagittae strongly angulate at middle and tapering to the acute apex as seen from above, and rather thickly fusiform in lateral view. Length, 4.5–5 mm.; anterior wing, 3.2–3.5 mm.

Two females, 5 males (holotype female, allotype, and paratypes), Prescott, Yavapai Co., Arizona, on *Aplopappus gracilis*, Sept. 1, 1930 (Timberlake). Also the following paratypes.—1 male, Prescott, on *Eriogonum*, Aug. 31, 1930; 1 male, 7 miles southeast of Camp Verde, Yavapai Co., on *Gutierrezia microcephala*, Sept. 18, 1953; 2 males, 2.7 miles east of Portal, Cochise Co., on *Gutierrezia*, Sept. 29, 1955 (Timberlake); and 1 male, Milford, Beaver Co., Utah, Sept. 18, 1908 (J. C. Bradley).

Types in collection of the Citrus Experiment Station, Riverside; one paratype in collection of Cornell University.

Perdita apacheorum, n. sp.

Perdita apacheorum is known from only four females, one of which was taken with males of *aplopappi* near Portal, Arizona. Although the characters of the female appear to be distinctive enough, yet if the association with *aplopappi* is substantiated by further collecting, *apacheorum* may prove to be a race of that species. It differs in the female sex by the more shining mesonotum, the much more narrowly interrupted bands of the abdomen, by the yellow underside of the scape and notched apex of the pygidial plate.

Female.—Head and thorax dark bluish green, the supraclypeal area at least partly black. Mandibles except the rufotestaceous apical half, clypeus, lateral marks, and sometimes a transverse supraclypeal mark creamy white. Labrum, anterior margin of clypeus, and sometimes two arcuate stripes on disk testaceous brown. Lateral marks triangular, but little emarginate on inner margin and ending more or less acutely slightly above level of antennae. Collar of pronotum, interrupted band on hind margin of disk, and tubercles white. Abdomen fuscous or blackish, with a white band on tergites 1 to 4, the median interruption of the bands rather

slight, and usually very narrow on tergite 1 and the two marks on tergite 4 usually abbreviated and enclosed. (In paratype from near Pine, Arizona, the band on tergite 4 very narrowly interrupted and almost reaching lateral margins.) Venter of abdomen dark, the pygidial plate rufotestaceous. Legs blackish, the apex of femora narrowly, anterior side of front and middle tibiae and base of hind tibiae pale yellow. Antennae brownish fuscous, the scape broadly pale yellow beneath, the flagellum brownish yellow beneath. Tegulae testaceous hyaline, the basal margin brownish, the brown color more or less edged with white. Wings dusky hyaline, the nervures brown, the subcosta and margins of stigma fuscous.

Head somewhat broader than long, the cheeks narrower than eyes. Proboscis not exceeding the fossa in repose. Mandibles rather stout, slightly dilated on inner margin, and not quite reaching far margin of the fossa. Facial foveae a little wider than the interval between them and eyes and reaching from level of middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Pterostigma moderately narrow, the part of marginal cell beneath it somewhat shorter than the part beyond, and the second submarginal cell narrowed one-half to nearly two-thirds to radius. Pygidial plate about as long as wide, the sides converging almost evenly to the rather narrow apex, which is distinctly notched. Frons minutely tessellate, dull, and impunctate, the mesonotum strongly tessellate but more shining than the frons, and with fine, moderately close punctures; face below antennae shining and with sparse, rather distinct punctures. Pubescence whitish, rather fine and erect, that on mesonotum moderately long and thin. Length, about 5-5.5 mm.; anterior wing, 3.3-3.5 mm.

One female (holotype), 2.7 miles east of Portal, Cochise Co., Arizona, on *Gutierrezia sarothrae*, Sept. 24, 1955 (R. C. Dickson); 1 female (paratype), 5 miles east of Portal, on *Euphorbia*, Sept. 16, 1955 (G. E. Bohart); 1 female (paratype), 10 miles north of Portal, Sept. 15, 1955 (C. and M. Cazier); 1 female (paratype), 4.8 miles south of Pine, Gila Co., on *Gutierrezia*, Sept. 17, 1953 (Timberlake).

One female, 33 miles east of Deming, presumably in Dona Ana Co., New Mexico, 4,300 feet, Aug. 2, 1945 (H. A. Scullen) is doubtfully referred here. Although similar to *apacheorum* in some ways, the head is less broad, the scape not light beneath, the light bands of abdomen very narrowly interrupted and the wings whiter, with paler nervures. It agrees even less well with *P. affinis* Cresson.

Type of *apacheorum* and one paratype in collection of the Citrus Experiment Station, Riverside; the other paratypes in collections of the American Museum of Natural History and G. E. Bohart.

Perdita senecionis Cockerell

Perdita senecionis Cockerell, 1896, Proc. Acad. Sci., Phila., 48:94, ♀.

This species is known only from the type series collected at Las Cruces, New Mexico, at flowers of *Senecio*, October 9, 1895.

Female.—Head and thorax uniformly dark olive green, with a bluish tinge. Mandibles except tips, clypeus, lateral marks, and sometimes two small supraclypeal spots creamy white. Disk of clypeus with two broad slightly arcuate blackish stripes, more or less touching or confluent with the usual pair of dark dots, and not quite attaining the summit, and in the type confluent with a dark band across the anterior margin. Lateral marks broad at anterior end, but rapidly narrowing and ending subacutely at level of antennae. Labrum dark. Collar of pronotum, marks on posterior margin of disk, confluent on each side with large marks on tubercles, pale yellow. Abdomen brownish fuscous, with a creamy white band on tergites 1 to 4, the bands narrowed gradually to middle where they are narrowly interrupted, that on tergite 2 broad at outer ends, and those on tergites 3 and 4 not attaining the lateral margins. Legs brownish fuscous, the front and middle knees, anterior side of front tibiae, front tarsi, and line on anterior side of middle tibiae yellow, the middle tarsi pale brownish. Antennae fuscous, the flagellum more brownish, the scape broadly yellow beneath and at base above, and the flagellum more narrowly dullish yellow beneath. Tegulae yellow at base and hyaline on outer margin. Wings faintly

dusky, with a whitish opacity, the nervures testaceous, the margins of stigma and subcosta a little more brownish.

Head large, about as broad as long and as broad as thorax. Proboscis of medium length, and probably included within fossa when retracted. Mandibles tapering, acute, and reaching nearly to far margin of fossa. Facial foveae slender, as wide as the narrow interval between them and eyes, and reaching from level of middle of antennal sockets somewhat more than halfway to level of anterior ocellus. Head and thorax minutely tessellate, dull, with a satiny luster, the frons opaque in some aspects, impunctate, the mesonotum with extremely minute sparse punctures. Pubescence whitish, sparse and short, the face nearly nude, the vertex with thin erect hair, with that of cheeks shorter and much denser, and hair of mesonotum very short, fine, and sparse. Pygidium rather broad at base, and moderately narrow at apex, with a median notch. Pterostigma not quite equaling width of first submarginal cell; marginal cell with the part beneath stigma somewhat shorter than the part beyond. Length, about 6 mm.; anterior wing, 4 mm.

Two females (holotype and paratype), Las Cruces, Dona Ana Co., New Mexico, on *Senecio douglasii*, Oct 9, 1895 (E. O. Wooton), in U. S. National Museum.

Perdita bruneri Cockerell

(Figs. 628, 629, 716)

Perdita bruneri Cockerell, 1897, Ent. News, 8:23, ♂ (excluding ♀); Cockerell, 1901, Entomologist, 34:190 (in part); Swenk and Cockerell, 1907, Ent. News, 18:55 (in part); Crawford, 1916, Insec. Insc. Menstr., 3:108, ♂, ♀; Cockerell, 1916, Ann. Mag. Nat. Hist. (8)17:283; Stevens, 1919, Canad. Ent., 51:206; Cockerell, 1922, Amer. Mus. Novitates, 23:9; Timberlake, 1928, Proc. Hawaii. Ent. Soc., 7:151; Cockerell, 1927, Canad. Ent., 69:34.

Perdita cockerelli Crawford, 1906, Canad. Ent., 38:282, ♂, ♀; Swenk and Cockerell, 1907, Ent. News, 18:56; Crawford, 1912, Canad. Ent., 44:359.

P. bruneri is a rather large, robust bee for this group, that visits flowers of *Grindelia* and other genera of Compositae and ranges east of the Rocky Mountains from northern Texas to Manitoba and Alberta. The female is similar to *P. affinis* Cresson but larger, and the male resembles *aplopappi* but differs in having the yellow of face not going above the antennae in median line. Cockerell described both sexes of what he thought was one species, but Crawford later restricted *bruneri* to the male and referred the female to *P. swenki* Crawford.

Female.—Head and thorax dark green, the propodeum more bluish, the supraclypeal area blacker. Basal half of mandibles, clypeus, lateral marks, and sometimes a supraclypeal mark or two spots creamy white. Remainder of mandibles rufotestaceous, becoming redder at apex. Labrum brownish testaceous, but often pale testaceous or whitish at apex. Anterior margin of clypeus, especially of the lateral extensions and two arcuate stripes on disk, often more or less broken or obsolete, testaceous brown to fuscous. Lateral marks large and usually ending very broadly at level of antennae. Rarely a small white spot present on subantennal plates. Collar of pronotum, large mark on posterior corners of disk, narrowly confluent with large mark on tubercles, white. Abdomen brownish fuscous or blackish, with a broad and rather narrowly interrupted white band on tergites 1 to 4, and often two small transverse marks on tergite 5; the bands on tergites 1 to 3 more or less broadened at outer ends and that on tergite 4 usually ending close to lateral margins. Tergite 7 and apex of ventral segment 6 rufotestaceous, the venter otherwise dark. Legs blackish, all the knees, anterior side of front and middle tibiae and front basitarsi pale yellow, the small joints of front tarsi brownish. Antennae blackish, the base and underside of scape yellow, the underside of flagellum brownish yellow. Tegulae testaceous hyaline, with a white spot at base. Wings whitish hyaline, the nervures testaceous yellow, the subcosta and margins of stigma slightly brownish.

Head as broad as long, the cheeks somewhat narrower than eyes. Proboscis not exceeding the fossa in repose. Mandibles rather stout, subacute at apex, and almost reaching far margin of the proboscidial fossa. Facial foveae subequal in width to the interval between them and eyes and extending from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma moderately large and broad, the part of marginal cell beneath it generally distinctly shorter than the part beyond; second submarginal cell narrowed one-half, or somewhat more, to the radius. Pygidial plate about as broad at base as long, the sides arcuate and the apex strongly notched. Head and thorax minutely tessellate and dull, the frons a little duller than the mesonotum and impunctate, the mesonotum with minute, moderately sparse punctures; face below antennae moderately shiny, the clypeus with close shallow punctures. Pubescence whitish, rather fine, erect, and moderately abundant, the hair of frons and mesoseutum much shorter than that of vertex. Length, about 6-7.5 mm.; anterior wing, 4.4-4.9 mm.

Male.—Head and thorax dark green. Sometimes the narrow anterior margin of gular region, and posterior orbits very narrowly sometimes nearly to middle of eyes, mandibles except red tips, labrum, and face to level of antennae bright yellow. Lateral marks oblique above and reaching level of foveae. Outer margin of subantennal plates more or less dark, and generally there is a definite dark oblique mark across the lower end of the plates. Marks of pronotum yellow, otherwise about as in the female except the inferior margin of the flanks usually more or less broadly pale. Abdomen fuscous, or tinged with brown, with a yellow band, usually narrowly interrupted on tergites 1 to 4 or 5; the bands on first two segments sometimes broadened at outer ends, and generally those on following segments, or sometimes all, not quite reaching the lateral margins. Apex of tergite 7 rufotestaceous and venter more or less completely yellow. Legs yellow, the hind coxae at base, a blotch on posterior side of front and middle femora and tibiae, hind femora except at apex and broadly above, hind tibiae except beneath and at base and hind tarsi except underside of basal joint, fuscous. Antennae yellow, the flagellum brownish yellow beneath, a mark on scape above at apex, the pedicel and flagellum above fuscous, and the apical joint dark all around except at base. Tegulae and wings about as in female, but subcosta and margins of stigma more definitely darkened.

Head as broad as long. Mandibles tapering, acute, and nearly reaching far margin of proboscidial fossa. Facial foveae oval, about twice as long as wide. Apical lobe of tergite 7 short, broad, and rounded at apex. Sculpture and pubescence about as in the female. Subgenital plate as long as wide at base, the sides a little arcuate, the apex narrowly rounded, and the disk with fine short setae. Dorsal lobes of caulis rounded apically and not continuous with dorsal margin of the parameral lobes; the latter very broad across the base and abruptly much narrowed as in *aplopappi*, but without a laminate crest on the inner margin of the apical half, thus appearing about equally slender in dorsal and lateral views on the apical half; fused body of sagittae fusiform, rather broad but not angulate just beyond the middle and acute at apex, and about equally thickly fusiform as seen from the side. Length, about 5-6.5 mm.; anterior wing, 3.5-4.4 mm.

The type locality of *bruneri* is Westpoint, Nebraska, and the species has been recorded also from Colorado, Kansas, Wyoming, North Dakota, and Alberta. Stevens has reported that it is the commonest species of *Perdita* in North Dakota. Material of *bruneri* has been examined as follows.—NEBRASKA: 7 females, Westpoint, Cuming Co., Sept. 6-12 (J. C. Crawford); 6 females, Westpoint, Sept. 9 and 13 (Crawford); 2 females, Westpoint, on *Grindelia*, Sept. 6, 1900 (Crawford); 1 female, Westpoint, on *Solidago*, Sept. 12, 1900 (Crawford); 1 female, Halsey, Thomas Co., on *Cleone serrulata*, Aug. 27, 1911 (J. T. Zimmer); 3 females, Halsey, on *Solidago rigida*, Aug. 29-30, 1912 (Zimmer); 1 male, Genoa, Nance Co., Sept. 10, 1931 (H. I. Peters); 1 male, Kimball, 5,000 feet, Kimball Co., Aug. 6, 1934 (H. A. Scullen); 1 male, Sydney, 4,060 feet, Cheyenne Co., Sept. 2, 1953 (P. Stage). KANSAS: 1 female, Clay Co., Aug. 1901 (J. C. Bridwell); 1 female, Hutchinson, Reno Co., on *Aplopappus divaricatus*, Sept. 4, 1949 (Michener and Beamer); 1 female, 5 miles north of Hutchinson, on *Boltonia asteroides*, Sept. 3, 1951 (Michener and La Berge). TEXAS: 1 male, 7 miles northeast of Cleburne, Johnson Co., on *Solidago altissima*, Oct. 5, 1952 (L. H. Shinnars). COLORADO: 1 female, Denver, Denver Co.,

on *Solidago*, Aug. 24, 1908 (Mrs. C. Bennett); 1 female, White Rocks, Boulder Co., Aug. 13 (Cockerell); 1 male, Fort Garland, Costilla Co., Aug. 9 (L. Bruner); 1 male, sage flats, Ute Creek, Costilla Co., Aug. 9 (R. W. Dawson); 9 females, 22 males, Hoehne, Las Animas Co., on *Grindelia*, Sept. 6, 1930 (Timberlake). WYOMING: 2 males, Granger, 6,400 feet, Sweetwater Co., Aug. 5, 1934 (Scullen). MONTANA: 1 female, Three Forks, Gallatin Co., Aug. 13, 1931 (H. I. Peters). NORTH DAKOTA: 2 females, 3 males, Valley City, Barnes Co., on *Grindelia squarrosa*, Aug. 13, 1912 (O. A. Stevens); 1 male, Dickinson, Stark Co., on *G. squarrosa*, Aug. 11, 1912 (C. H. Waldron); 1 male, Mott, Hettinger Co., Sept. 3, 1928 (C. N. Ainslie); 2 males, Sheldon, Ransom Co., on *Solidago rigida*, Aug. 20, 1949 (Stevens).

CANADA, MANITOBA: 1 female, Brandon, Sept. 23, 1950 (Charles Bird).

Perdita swenki Crawford

(Figs. 630, 631, 717)

Perdita swenki Crawford, 1915, Insec. Insc. Menstr., 3:109, ♂, ♀; Stevens, 1919, Canad. Ent., 51:206; Timberlake, 1929, Jour. New York Ent. Soc., 37:115.

Perdita bruneri Cockerell, 1897, Ent. News, 8:23, ♀ (excluding the ♂); Cockerell, 1901, Entomologist, 34:190 (in part); Swenk and Cockerell, 1907, Ent. News, 18:55 (in part); Graenicher, 1911, Bull. Milwaukee Mus., 1:238; Graenicher, 1914, Canad. Ent., 46:54.

This species is remarkably like *bruneri* and was at one time confused with it. The male is easily distinguished by having the yellow face extending above antennae in the median line. The female is more difficult to distinguish but it has a smaller size, a larger supraclypeal mark, and a yellowish labrum. The type locality is Westpoint, Nebraska, and the species has been recorded (sometimes under the name of *bruneri*) also from North Dakota, Wisconsin, and Illinois.

Female.—Head and thorax dark green. Basal half, or more, of mandibles, clypeus, large lateral and supraclypeal marks pale yellow or creamy white. Clypeus with anterior margin, especially of the lateral extensions, narrowly testaceous and the disk with two dark stripes or broader marks on upper half. Lateral marks more or less emarginate on the inner margin and ending bluntly at level of antennae. Apical half of mandibles rufotestaceous, becoming redder at apex. Labrum testaceous yellow, but sometimes brownish at base. Collar of pronotum, large marks on posterior corners of disk, usually narrowly confluent with marks on tubercles, white. Abdomen fuscous or blackish, with a moderately narrow and slightly interrupted, white band on tergites 1 to 5, the band on tergite 5 and sometimes those on tergites 3 and 4, failing to reach the lateral margins. Legs fuscous, the apex of femora, front tibiae except a posterior blotch, anterior side of middle tibiae and front tarsi pale yellow. Antennae fuscous, the underside of scape yellow, and the flagellum brownish yellow beneath. Tegulae testaceous hyaline, the base whitish. Wings hyaline, the nervures testaceous yellow, the subcosta brownish.

Head about as broad as long, the cheeks nearly as wide as the eyes. Proboscis in repose only slightly exceeding the fossa. Mandibles moderately stout, subacute at apex, and not quite reaching far margin of the fossa. Facial foveae hardly wider than the interval between them and eyes and reaching from level of upper margin of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma about three-fourths as wide as first submarginal cell, with parts of marginal cell beneath and beyond it about equal. Pygidial plate as long as wide at base, the sides converging nearly straight and the apex moderately narrow and strongly notched. Head and thorax finely and strongly tessellate, the frons and vertex dull and impunctate, the mesonotum only slightly more shining, and with minute moderately sparse punctures; face below antennae moderately shiny, with sparse shallow punctures. Pubescence whitish, rather thin, fine and erect, that on frons and mesonotum moderately short. Length, 4.75–6 mm.; anterior wing, 3.4–3.7 mm.

Male.—Head and thorax dark green, or blue-green. Anterior half of gular region, broad posterior orbits to middle of eyes, mandibles except red tips, labrum, and face to level of foveae

bright yellow. Collar of pronotum, mark on posterior corners of disk, narrowly confluent with mark on tubercles, yellow. Abdomen fuscous, with a rather narrow yellow band on tergites 1 to 5; generally only the first and last band narrowly interrupted in middle and all failing to reach lateral margins, and that on tergite 5 sometimes evanescent. Legs yellow, the coxae except at apex and the underside of front pair, large blotch on posterior side of front and middle femora, hind femora except above and at apex, blotch or streak on posterior side of front and middle tibiae, hind tibiae except at base and beneath, and hind tarsi brownish or fuscous. Antennae yellow, the flagellum brownish yellow beneath, a spot at apex of scape and pedicel and flagellum above brown or fuscous. Tegulae and wings about as in the female, but margins of stigma more definitely brownish.

Head about as broad as long, the cheeks slightly broader than the eyes. Mandibles tapering and not quite reaching far margin of proboscival fossa. Facial foveae narrowly oval, about twice as long as wide. Apical lobe of tergite 7 a little longer than wide and rather narrowly rounded at apex. Sculpture and pubescence about as in female. Subgenital plate nearly equilaterally triangular, with the apex rounded and the disk with fine setae. Caulis about as broad as long, with the dorsal lobes truncate at apex and continuous with a flange which forms the dorsal margin of the broad basal part of parameral lobes; the latter lobes rather long and narrow as seen from above and moderately broad at base in lateral view; fused body of sagittae strongly angulate at middle, acute at apex in dorsal view, and moderately thickly fusiform in lateral view, with the basal rods more recurved than usual. Length, 4-5.5 mm.; anterior wing, 3.1-3.4 mm.

Females of *swenki* in the northern and northeastern part of its range having the markings much more distinctly yellow than in material from Nebraska. A female from Valley City, North Dakota, has the subantennal plates yellow, except a dark mark on the inner anterior side, and the lateral marks are broadly truncate slightly above level of antennae with a short extension between foveae and eyes.

Material of *swenki* examined as follows.—NEBRASKA: 176 females, Westpoint, Cuming Co., five of them labeled from *Grindelia*, Sept. 2, 6, 9, and 13, 1900 (J. C. Crawford); 1 female, Westpoint, on *Liatris*, Sept. 11, 1901 (Crawford); 4 females, Lincoln, Lancaster Co., one on *Grindelia*, three on *Solidago rigida*, Sept. 4, 1903 (M. H. Swenk); 3 males, Lincoln, on *S. rigida*, Aug. 30, 1903 (Swenk). NORTH DAKOTA: 3 females, 2 males, Valley City, Barnes Co., the females on *Chrysopsis* and *Grindelia*, the males on *Helianthus maximiliani*, Aug. 13, 1912 (O. A. Stevens); 2 females, Sheldon, Ransom Co., on *Solidago rigida*, Aug. 20, 1949 (Stevens). MINNESOTA: 2 females, 2 males, St. Cloud, Stearns Co., on *S. rigida*, Aug. 9, 1925 (Stevens); 1 female, Pelican Lake, Ottertail Co., on *Solidago*, Aug. 5, 1908 (R. H. Woleott). ILLINOIS: 1 male, Chicago (C. T. Brues). MICHIGAN: 1 male, 13 miles southwest of Cheboygan, Cheboygan Co., on *Solidago juncea*, July 29, 1952 (L. H. Shinnars).

Perdita prinonopsidis, n. sp.

(Figs. 632, 633, 718)

This species was determined at first as *swenki*, but the markings of the female are deep yellow instead of almost creamy white, and the hair of mesonotum is very short, and the wings somewhat dusky with comparatively dark nervures. The male differs from *swenki* in having the yellow of face extending above antennae only at the sides, and although the genital parts are very similar I believe that we are dealing with a distinct species. The male is also close to the eastern *consobrina*, but the female differs from that species in having the hair of mesonotum very sparse as well as short, and the bands of abdomen narrowly interrupted.

Female.—Head and thorax olive green, becoming a little bluish on underparts of thorax and on propodeum. Mandibles except red apical third, labrum, clypeus, lateral and supraclipeal

marks bright yellow, the labrum more or less brownish across the base and the disk of clypeus with two broad arcuate fuscous stripes. Lateral marks obtuse or truncate at level of antennae, and the supraclpeal mark large and quadrate. Collar of pronotum, cuneate mark on posterior corners of disk, more or less confluent with mark on tubercles, yellow. Abdomen blackish, the pygidial plate rufotestaceous; a rather narrow yellow band, more or less narrowly interrupted in middle on tergites 1 to 4; the bands on tergites 2 and 3 moderately widened at outer ends and extended backward, and that on tergite 4 failing to reach the lateral margins; sometimes two narrowly transverse marks present on tergite 5. Legs blackish, the apex of femora, front tibiae except behind, base and anterior streak on middle tibiae, front and middle tarsi, and extreme base of hind tibiae yellow. Upper side of scape or mark at apex, the pedicel and flagellum above fuscous, the scape otherwise bright yellow, and the flagellum brownish yellow beneath, except terminal joint which is more or less entirely dark. Tegulae testaceous hyaline, with basal yellow mark. Wings somewhat dusky hyaline, the nervures testaceous brown, the subcosta and margins of stigma brownish fuscous.

Head about as broad as long, the cheeks nearly as wide as the eyes. Proboscis slightly exceeding the fossa in repose. Mandibles rather slender, subacute, and nearly reaching far margin of the fossa. Facial foveae somewhat broader than the interval between them and the eyes and extending from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma moderately narrow, the part of marginal cell beneath it considerably shorter than the part beyond, and second submarginal cell narrowed nearly two-thirds to radius. Pygidial plate rather large, about as long as broad, somewhat ogival at apex and with a strong median notch. Head and thorax minutely tessellate, almost granular on the frons and vertex, the mesonotum nearly as dull as the frons and with sparse, minute, and faint punctures; face below antennae somewhat shiny and obscurely punctured. Pubescence whitish, short, fine and erect, that on the mesonotum so short and sparse that the surface appears nude in some aspects. Length, 4.75-6 mm.; anterior wing, 3.5-3.7 mm.

Male.—Head and thorax dark green. More or less narrow anterior margin of gular region, narrow posterior orbits for a short distance, mandibles except red tips, labrum, and face below level of antennae bright yellow; subantennal plates sometimes with a green mark at their lower end. Lateral marks usually extending broadly a little above level of antennae, where they are obliquely or more or less squarely truncate, or sometimes emarginate, and sometimes with a narrow extension over summit of antennal sockets (or with a minute cutoff dot), and more generally with an orbital extension to foveae or even sometimes with an intrusion between fovea and eye. Markings of pronotum and legs agreeing closely with those of female, except that the trochanters are yellow and the front femora are broadly yellow on anterior side. Abdomen blackish, with a more or less narrow yellow band on tergites 1 to 4, all the bands failing to reach the lateral margins and all narrowly interrupted medially except sometimes on tergite 3, and those on tergites 1 and 4 sometimes abbreviated or reduced to small marks, or sometimes absent on tergite 4. Venter dark, the apex of tergite 7 rufotestaceous. Tegulae as in female. Wings inclined to be slightly more dusky than in female, and with darker nervures.

Head as broad as long, the cheeks about as broad as the eyes. Mandibles tapering, acute, and reaching far margin of proboscival fossa. Facial foveae two or three times longer than wide, or sometimes approaching nearly half the length of those in female. Venation as in female, with outer nervures of second discoidal cell moderately enfeebled. Apical lobe of tergite 7 a little longer than wide and narrowed to the ogival apex. Sculpture and pubescence agreeing with condition in female. Subgenital plate triangular, about as long as wide and slightly rounded at apex, the setae of the disk a little longer and denser than usual. Dorsal lobes of caulis rather narrowly truncate at apex; parameral lobes moderately long, broad at base, and with an oblique crest from inner to outer margin on apical part, which makes the lobes appear emarginate on upper margin in lateral view; fused body of sagittae strongly angulate at middle and acute at apex in dorsal view, and moderately thickly fusiform and subsinuate in lateral view. Length, 4.5-5.5 mm.; anterior wing, 3-4 mm.

Eight females, 5 males (holotype female, allotype, and paratypes), 5 miles southeast of Hutchinson, Reno Co., Kansas, on *Aplopappus* (*Prionopsis*) *ciliatus*, *Helianthus petiolaris* and

Heterotheca subaxillaris, Sept. 2, 1951 (Michener and La Berge); 4 females, 2 males (paratypes), 2 miles south of Cherryvale, Montgomery Co., on *Boltonia asteroides*, Sept. 6, 1951 (Michener and La Berge). An additional male, with abdomen missing, was taken at the locality near Hutchinson on *Isopappus*.

Types in the collection of the University of Kansas; and paratypes in collections of the Citrus Experiment Station, and of R. R. Snelling and W. E. La Berge.

Perdita separata, n. sp.

P. separata can be distinguished from other species of the group by the small transverse lateral marks of face and by the large mark on each side of the abdominal segments.

Female.—Head and thorax dark green, the labrum, clypeus, and supraclypeal area blackish. Base of mandibles, small median mark on clypeus (and trace of a spot on left side of disk), and transverse lateral marks, not going above level of lower end of subantennal plates, pale yellow. Mandibles otherwise rufotestaceous, becoming red at apex. Narrow mark on posterior corners of disk of pronotum and the tubercles pale yellow. Abdomen blackish, with a broadly interrupted, pale-yellow band on tergites 1 to 5, the marks on tergites 1, 2, and 5 separated by more than their own transverse length, those on tergite 2 broadly subtriangular and those on 3 and 4 oval and separated by somewhat less than their transverse length, the width of interruption being gradated from tergites 1 to 4. Venter entirely dark, and the pygidial plate rufotestaceous. Legs blackish, the extreme apex of front femora, anterior side of front tibiae, and front tarsi and middle knees pale yellow. Antennae blackish, the flagellum dull yellowish beneath. Tegulae brownish at base and broadly testaceous hyaline on outer margin. Wings slightly dusky hyaline, the nervures testaceous, the margins of stigma and subcosta brown.

Head a little broader than long, the cheeks nearly as wide as the eyes. Proboscis rather short, the maxillary palpi equaling length of galeae, and the whole structure probably not exceeding the fossa in repose. Mandibles tapering and acute. Facial foveae rather faintly impressed, narrower than the interval between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma rather large, the parts of marginal cell beneath and beyond it about equal and the second submarginal cell narrowed nearly two-thirds to radius. Pygidial plate small, a little longer than wide, with the sides converging to the narrow and notched apex. Head and thorax tessellate, moderately dull, with dullness of frons and mesonotum about equal, the punctures of mesonotum minute, rather faint and moderately close, and those of face below antennae rather sparse and fine. Pubescence whitish, rather abundant, fine, long and erect, but short on frons and short and thin on face below antennae. Length, 4.5 mm.; anterior wing, 3.2 mm.

One female (holotype), San Ygnacio, Zapata Co., Texas, April 15, 1952 (Michener and Beamer), in collection of the University of Kansas.

Perdita fallax Cockerell

(Figs. 634, 635, 719)

Perdita fallax Cockerell, 1896, Proc. Acad. Sci., Phila., 48:83, 90, ♀; Swenk and Cockerell, 1907, Ent. News, 18:55.

Perdita erigeronis Cockerell, 1897, Ann. Mag. Nat. Hist. (6)19:398, ♂.

Perdita affinis Cockerell, 1922, Amer. Mus. Novitates, 33:8 (in part).

This bee is similar to *affinis*, but the characters given in the preceding key should distinguish the two species in most if not all cases. Specimen from Meeker, Colorado, placed under *affinis* by Cockerell (1922) undoubtedly belongs here. The form *fontis* described by Cockerell from Glenwood Springs (1922, p. 9) is unknown to me and the status is uncertain. It may be a distinct species that would fall near *separata* or *dalyi* in my table.

Female.—Head and thorax dark bluish green. Base of mandibles, clypeus, small lateral marks creamy white, the lateral marks emarginate on inner margin and reaching narrowly to level of antennae, and disk of clypeus with two dark stripes or two dark spots near the summit. Apical half, or more, of mandibles rufotestaceous, becoming redder at apex. Labrum testaceous, or more or less brownish. Supraclypeal area black, sometimes with one or two white dots, and rarely with a large but divided mark. Pronotum dark except white tubercles and a small mark on posterior corners of disk. Abdomen blackish, with an interrupted white band on tergites 1 to 4, the interruptions covering one-third or more of the width of the segments on tergites 2 and 3, although less than one-third with broader marks in most specimens from Nebraska; the marks on tergite 4 not reaching the lateral margins and sometimes evanescent or lacking. Legs fuscous, the extreme apex of femora, anterior side of front tibiae, and streak on middle tibiae pale yellow, the tarsi pale brownish. Antennae brown or fuscous above, the scape pale yellow and the flagellum brownish yellow beneath. Tegulae testaceous hyaline, becoming whitish at base. Wings clear or slightly whitish hyaline, the nervures testaceous, the subcosta and margins of stigma pale brown.

Head as broad as long, the cheeks nearly as broad as eyes. Proboscis slightly exceeding the fossa in repose. Mandibles tapering, acute, and not quite reaching the far margin of the fossa. Facial foveae generally not much wider than space between them and eyes and reaching from level of middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Venation normal, the part of marginal cell beyond the stigma usually longer than the part beneath. Pygidial plate about as broad as long, with the sides more or less arcuate and converging to the rounded apex which has a small but distinct notch. Frons and vertex almost granular tessellate, dull, and impunctate, the mesonotum strongly tessellate but somewhat more shining than the frons and with minute, moderately close punctures; face below antennae with moderately close, fine punctures. Pubescence whitish, rather abundant, erect and fine, with that on frons and mesonotum moderately short. Length, 4.5–5 mm.; anterior wing, 3–3.1 mm.

Male.—Head and thorax dark bluish green. Anterior half of gular region, posterior orbits rather broadly nearly to middle of eyes, mandibles except red tips, labrum, and face below level of antennae bright yellow; the yellow going above antennae for a short distance in median line and more broadly at sides, where it is more or less obliquely truncate from upper margin of antennal sockets to margin of eyes at lower end of foveae, or frequently more or less squarely truncate, with a slender orbital extension, and sometimes the antennal sockets are almost enclosed by yellow. Marks on pronotum and tubercles yellow. Abdomen brownish, or fuscous, with an interrupted yellow band on tergites 1 to 3; median interruption of bands generally covering about one-eighth to one-tenth of the width of the segments, with the marks on tergites 2 and 3 more or less oblique and enlarged at outer ends, those on tergite 3 sometimes abbreviated or with a cutoff lateral spot; sometimes traces of yellow, or a more or less developed band present also on tergite 4. Legs brown or fuscous, with front coxae and trochanters except behind, the front femora broadly in front and at apex, front tibiae except behind, middle and hind coxae at apex, with their trochanters in part and apex of femora, the anterior side of middle tibiae and base of hind tibiae yellow; the front and middle tarsi pale brownish. Antennae yellow, with spot at apex of scape above, and upper side of pedicel and flagellum brown. Tegulae and wings as in female, except base of tegulae more yellowish and nervures of wings more embrowned.

Head as broad as long, the cheeks as broad as the eyes. Mandibles tapering and reaching far margin of proboscis fossa. Facial foveae oval, about thrice as long as wide. Apical lobe of tergite 7 a little longer than wide, the apex narrow and rounded. Sculpture and pubescence much as in the female, the frons opaque. Subgenital plate as long as wide, the sides converging almost straight to a slightly rounded apex, the disk with fine short setae. Caulis of aedeagus oval, the dorsal lobes ending obliquely and continuous with dorsal margin of the base of parameral lobes; the latter lobes slightly clavate at apex as seen from above and moderately wide at base in lateral view; fused body of sagittae strongly angulate at middle and acuminate to apex in dorsal view and rather thickly fusiform as seen from side. Length, about 3.5–4.5 mm.; anterior wing, 2.7–3.2 mm.

Material of *fallax* examined as follows.—NEW MEXICO: 1 female (cotype), Las Cruces, Dona Ana Co., on *Verbesina encelioides*, Sept. 20 (Cockerell); 1 male, Santa Fe, Santa Fe Co., June 9, 1931 (F. C. Lutz); 1 female, 1 male, 38 miles west of Magdalena, 7,100 feet, Socorro Co., Aug. 5, 1946 (H. A. Scullen). TEXAS: 4 females, Dalhart, Dallam Co., June 8, 1950 (R. H. Beamer and P. P. Cook). ARIZONA: 4 females, 12 males, near Seligman, Yavapai Co., on *Gutierrezia*, Aug. 29, 1931 (Timberlake). UTAH: 1 male, Ogden, Weber Co.; 1 male, Poverty Flat, San Juan Co., June 7, 1948 (G. F. Knowlton and S. L. Wood). WYOMING: 1 male, Bondurant, Lincoln Co., Aug. 4, 1949 (L. D. Beamer); 1 female, Wheatland, Platte Co., July 14, 1937 (C. L. Johnston); 2 females, Riverton, Fremont Co., on *Helianthus*, Aug. 3, 1955 (G. E. Bohart). MONTANA: 1 male, Three Forks, Gallatin Co., Aug. 1, 1918 (A. L. Melander). COLORADO: 1 female, 1 male, Meeker, 6,200 feet, Rio Blanco Co., July 20–21 (Lutz); 1 female, Boulder Co., June 16, 1925 (C. H. Hicks); 2 males, Boulder Co., Aug. 1, 1925 (C. P. Custer); 5 females, 1 male, Fort Collins, Larimer Co., June 15, 1896, No. 2076 (C. F. Baker); 3 males, Fort Collins, Aug. 15, 1896, No. 2096 (Baker); 1 male, Fort Collins, Aug. 11, 1896 (N. E. Baker), Baker No. 2098; 1 female, 2 males, Fort Collins, Aug. 15, 1896, No. 2120 (Baker); 1 female, Fort Collins, on *Eriogonum*, Aug. 12, 1896, No. 2121 (Baker); 2 females, 1 male, foothills west of Fort Collins, June 20, 1896, No. 2185 (Baker). NEBRASKA: 1 female, Warbonnet Canyon, Sioux Co., on *Aster*, Sept. 9, 1901 (M. Cary); 4 females, 3 males, Warbonnet Canyon, on *Helianthus*, Sept. 12, 1901 (Cary); 1 male, Glen, 4,000 feet, Sioux Co., on *Cleome*, Aug. 20, 1906 (H. S. Smith); 2 females, Harrison, Sioux Co., on *Helianthus*, Aug. 4, 1908 (C. H. Gable); 1 female, Harrison, on *Grindelia*, Aug. 9, 1908 (Gable); 1 male, Harrison, on *Helianthus petiolaris*, Aug. 12, 1912 (R. W. Dawson); 2 females, 2 males, Monroe Canyon, Sioux Co., on *H. petiolaris*, June 25 and July 1, 1911 (Dawson); 1 male, Bridgeport, Morrill Co., on *H. petiolaris*, July 10, 1912 (L. M. Gates); 1 female, Mitchell, Scotts Bluff Co., on *H. petiolaris*, July 11, 1912 (M. H. Swenk); 1 female, Mitchell, Aug. 15, 1948 (R. E. Hill).

Perdita affinis Cresson

(Figs. 636, 637, 720)

Perdita affinis Cresson, 1878, Trans. Amer. Ent. Soc., 7:69, ♀, ♂; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:70; Cockerell, 1897, Ann. Mag. Nat. Hist. (6)20:511; Cockerell, 1904, Entomologist, 37:6; Cockerell, 1920, Jour. New York Ent. Soc., 27:299; Cockerell, 1922, Amer. Mus. Novitates, 33:8 (in part); Timberlake, 1928, Amer. Mus. Novitates, 321:5.
Perdita rectangularata Cockerell, 1896, Proc. Acad. Sci., Phila., 48:72, ♂ (excluding ♀).

The type locality of *affinis* is Colorado, and it has been recorded previously only from that state and New Mexico.

Female.—Head and thorax dark blue-green, the labrum, two more or less developed stripes on disk of clypeus, and the supraclypeal area black. Base of mandibles, clypeus, and lateral marks creamy white; mandibles otherwise rufotestaceous becoming red at apex; labrum somewhat rufotestaceous apically; lateral marks often more or less emarginate on inner margin and ending bluntly at level of antennae. A supraclypeal mark sometimes represented by a line or two dots adjacent to summit of clypeus. Collar of pronotum, mark on posterior corners of disk, and tubercles white. Abdomen blackish, the venter entirely dark, the pygidial plate rufotestaceous. An interrupted white band on tergites 1 to 4 with the width of the interruption amounting to about one-fourth, or more or less than one-fourth, of the width of the segment, but the interruption on tergite 1 usually amounting to one-half of that on tergite 2; the marks moderately widened at outer ends and somewhat oblique on tergites 2 to 4, and often more or less acute within, with those on tergite 4 usually not quite reaching the lateral margins. Legs blackish, the extreme apex of front and middle femora, anterior side of front and middle tibiae pale yellow, the front tarsi brownish. Antennae fuscous or blackish, the scape entirely dark, the flagellum brown beneath. Tegulae testaceous hyaline, with the base fuscous, margined with white. Wings dusky hyaline, the nervures brownish testaceous, the subcosta and margins of stigma brownish fuscous.

Head about as broad as long, the cheeks as wide as the eyes. Proboscis slightly exceeding the fossa in repose. Mandibles rather stout, tapering, subacute at apex, and not quite reaching the far margin of the fossa. Facial foveae nearly twice as wide as the interval between them and eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Venation normal for group, the part of marginal cell beneath stigma generally distinctly shorter than the part beyond. Pygidial plate about as long as wide, with apex moderately narrowly truncate or rounded and only slightly notched. Head and thorax strongly tessellate, with mesonotum somewhat less dull than the frons and moderately sparsely and minutely punctured; face below antennae shining and moderately closely punctured. Pubescence whitish, rather fine, and erect, that of mesonotum moderately long and abundant. Length, 5-7 mm.; anterior wing, 3.6-4 mm.

Male.—Head and thorax dark blue or blue-green. Anterior margin of gular region, anterior third of inferior orbits very narrowly, mandibles except red tips, labrum, and face below level of antennae bright yellow; the lateral marks more or less evenly and obliquely truncate from antennal sockets to margin of eyes at lower end of foveae. Small mark on each side of hind margin of disk of pronotum and tubercles yellow. Abdomen fuscous or blackish, with a narrowly interrupted yellow band on tergites 1 to 4, the band on tergite 4 more or less abbreviated or rarely absent. Apical lobe of tergite 7 rufotestaceous, and the venter dark with a yellow band on segments 2 to 4. Legs fuscous, the anterior side more or less of front and middle femora and their apices, and front and middle tibiae yellow, the front and middle tarsi yellow tinged with brown. Antennae brown or fuscous above, the scape bright yellow except a mark at apex above, and the underside of flagellum brownish yellow. Tegulae and wings as in female, except base of tegulae is yellow.

Head slightly broader than long, the cheeks a little broader than eyes. Mandibles slender, tapering, and reaching far margin of proboscis fossa. Facial foveae about twice as long as wide. Apical lobe of tergite 7 as long as wide and narrowed about one-half to the rounded apex. Outer nervures of second discoidal cell faint, the venation otherwise, sculpture and pubescence about as in the female. Subgenital plate equilaterally triangular, the disk with rather numerous fine setae. Caulis of genitalia oval, with dorsal lobes obliquely rounded at apex and subcontinuous with dorsal margin of base of parameral lobes; the latter lobes moderately long and tapering almost evenly from the broad base to the narrowly rounded apex as seen from side; fused body of sagittae moderately angulate at middle, acute at apex, and in lateral view quite thickly fusiform. Length, about 4.75-5.5 mm.; anterior wing, 3.3-3.9 mm.

Material of *affinis* examined as follows.—COLORADO: 1 male, Fort Collins, Larimer Co., on *Solidago*, Aug. 15, 1895, No. 1599 (Baker), labeled *P. rectangulata*, ♂, and apparently the allotype of *rectangulata*; 2 males, Fort Collins, on *Solidago*, Aug. 8, 1895, No. 1595 (Baker); 1 female, Fort Collins, Aug. 30, 1895, No. 1630 (Baker); 2 females, 1 male, Fort Collins, Aug. 15, 1895, No. 2096 (Baker); 4 females, 2 males, Fort Collins, Aug. 15, 1896, No. 2101 (Baker); 1 male, Fort Collins, on *Helianthus*, Aug. 12, 1896, No. 2120 (Baker); 2 males, Fort Collins, July 10, 1896 (N. E. Baker), Baker No. 2044; 1 female, Fort Collins, Aug. 22, 1900; 1 female, 1 male, Jim Creek, about 7,000 feet, near Boulder, Boulder Co., Aug. 3, 1922 (Lutz); 16 females, 3 males, near Morley, Las Animas Co., on *Grindelia squarrosa*, Aug. 24, 1931 (Timberlake); 1 female, Glen Haven, Larimer Co., July 29, 1946 (P. B. Lawson); 1 male, Artesia, Moffat Co., on *Helianthus petiolaris*, July 22, 1950 (Michener). NEW MEXICO: 1 female, Pecos, San Miguel Co., on *Grindelia inornata*, Aug. 23 (Cockerell). ARIZONA: 1 male, Prescott, Yavapai Co., on *Erigeron*, Aug. 31, 1930 (Timberlake); 1 male, north of the Rio Verde, Yavapai Co., Sept. 18, 1929 (J. A. Kusche); 2 females, Southwestern Research Station, 5 miles west of Portal, 5,400 feet, Cochise Co., Sept. 8, 1955 (Gertsch and Ordway), and 12 females, 9 males, same locality on *Aplopappus gracilis*, Sept. 8, 1958 (Timberlake).

Perdita consobrina consobrina Timberlake
(Figs. 638, 639, 721)

Perdita consobrina Timberlake, 1928, Amer. Mus. Novitates, 321:3, ♀.

Perdita consobrina consobrina Timberlake, 1952, Proc. Ent. Soc. Wash., 54:202, ♀, ♂.

This species may be recognized by the unequally interrupted yellow bands of the abdomen and by the dull, dark olive-green head and thorax, with an unusually dense pale ochreous pubescence.

Female.—Head and thorax dark olive green, the propodeum a little bluish, the supraclypeal area black. Mandibles, except the rufotestaceous and reddish apical half, apical part of labrum, clypeus, and large lateral marks yellow. Base of labrum more or less testaceous or brown. Two broad blackish stripes on marks on upper part of disk of clypeus, usually involving the usual pair of dots. Lateral marks more or less emarginate on inner margin and ending bluntly at level of antennae. A supraclypeal mark not infrequently represented by two small yellow spots. Collar of pronotum, mark on posterior corners of disk and tubercles yellow. Abdomen blackish with an interrupted yellow band on tergites 1 to 4 or 5, the interruptions generally narrow on tergites 1, 4, and 5, and broad on tergites 2 and 3, with the band on tergite 2 usually reduced to triangular lateral marks and that on tergite 5 sometimes abbreviated or lacking. Legs fuscous, the apex of front and middle femora, anterior side of front tibiae, a streak on middle tibiae, and knees of hind legs yellow. Antennae fuscous, the scape yellow beneath, the underside of flagellum yellowish brown. Tegulae testaceous hyaline, with a yellow spot at base. Wings dusky hyaline, the nervures testaceous brown, the subcosta and margins of stigma darker brown.

Head slightly longer than wide, the cheeks receding but nearly as wide as the eyes. Proboscis somewhat exceeding fossa in repose. Mandibles rather slender, acute, and nearly reaching far margin of the fossa. Facial foveae linear, narrower than interval between them and eyes, and reaching from level of middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Venation normal for group, the marginal cell with parts beneath and beyond the stigma about equal. Pygidial plate about as long as wide, the apex narrowly rounded or subtruncate with hardly a trace of a notch. Frons, vertex, and mesonotum very minutely and densely granular tessellate and opaque, the mesonotum with unusually close but indistinct punctures; face below antennae rather shiny, the clypeus with moderately close fine punctures. Pubescence whitish, moderately long, and erect, that of vertex and mesonotum pale brownish ochreous, and unusually dense, very fine and subdepressed on mesonotum with numerous coarser, moderately short and erect hairs intermixed. Length, about 5.5–6 mm.; anterior wing, 3.2–3.5 mm.

Male.—Head and thorax dark green. Slender postorbital line to middle of eyes, mandibles except red tips, labrum, and face below antennae bright yellow, the yellow nearly evenly terminated at lower level of antennal sockets, with usually a thin orbital extension to foveae; rarely the subantennal plates are green with an enclosed yellow spot. Collar of pronotum, small marks on posterior margin of disk, and tubercles yellow. Abdomen blackish, with an interrupted, enclosed, narrow yellow band on tergites 1 to 3 or 4, with the marks on tergite 2 sometimes broadened at outer ends. Legs blackish, the apex of coxae, trochanters, apex and anterior margin of front and middle femora, anterior side of front and middle tibiae, front and middle tarsi, knees of hind legs, and under margin of hind tibiae yellow. Tegulae testaceous, becoming brownish at base. Wings as in female.

Head as broad as long, the cheeks about as broad as the eyes. Mandibles tapering and reaching far margin of proboscoidal fossa. Facial foveae about twice as long as wide. Venation as in female except for the faint outer nervures of second discoidal cell. Apical lobe of tergite 7 narrowed to a rounded apex. Sculpture and pubescence much as in the female, the hair of vertex and mesonotum more whitish. Subgenital plate and aedeagus resembling the same part of *affinis*, with the fine setae of the plate restricted more to apical half of disk, the sagittae less acute at apex, and the parameral lobes narrower over a greater part of their length. Length, 4.5–5.5 mm.; anterior wing, 3–3.4 mm.

The type locality of *consobrina* is Sumter, Sumter Co., South Carolina. It has been recorded also from Southern Pines and Lakeview, Moore Co., and from Harnett Co., North Carolina, mostly from flowers of *Chrysopsis*. The following material has been examined.—SOUTH CAROLINA: 1 female, 4 males, Aiken, Aiken Co., on *Chrysopsis*, Sept. 6, 1951 (T. B. Mitchell). NORTH CAROLINA: 5 females, 7 males, Southern Pines, Moore Co., on *Chrysopsis*, Sept. 15, 1949,

Sept. 10 and 23, 1950, and Sept. 8, 1951 (Mitchell); 3 females, 1 male, Holly Shelter, Pender Co., on *Chrysoopsis*, Oct. 5, 1951 and Sept. 15, 1953 (Mitchell).

Perdita consobrina lepida Timberlake

Perdita consobrina lepida Timberlake, 1952, Proc. Ent. Soc. Wash., 54:203, ♀, ♂.

There is nothing more to add to the account of *lepida*. The type locality is Dunedin, Pinellas County, Florida, and it has been recorded also from Lake Worth, Palm Beach County.

Perdita atriventris, n. sp.

(Figs. 640, 641, 722)

This is a small dull green species (male) with the subantennal plates dark and the abdomen blackish with small pale-yellow marks on the first two segments. It falls in the table near *octomaculata*, but the genitalia are more similar to those of *nitidella*, *gutierreziae* and other species, which are much more strongly marked with yellow.

Male.—Head and thorax dark bluish green. Mandibles except red tips, labrum, and face below level of antennae, except subantennal plates, rather pale yellow. Thorax entirely dark. Abdomen black, with a brownish tinge, and with two small pale-yellow submedian marks at base of tergite 1 and a smaller spot on basal middle of tergite 2. Legs brownish fuscous, the apex of front coxae, front trochanters, base of front femora, and broad oblique mark across anterior side of apex, front tibiae except behind, front and middle knees and anterior side of middle tibiae yellow. Antennae brown, the flagellum pale yellowish brown beneath, and underside of scape clear pale yellow. Tegulae testaceous hyaline, with basal margin brown. Wings hyaline, with a slight whitish opacity, nervures testaceous, the subcosta and margins of stigma brown.

Head rotund, as long as wide, the cheeks somewhat narrower than the eyes. Proboscis moderately short and not exceeding the fossa. Mandibles tapering, acute, and reaching far margin of the fossa. Facial foveae almost punctiform, only slightly longer than wide. Venation normal, the part of the marginal cell beneath the stigma barely shorter than the part beyond, and outer nervures of second discoidal weak and colorless. Apical lobe of tergite 7 about as long as wide and rounded at apex. Frons, vertex, and mesonotum minutely tessellate and obscurely punctured, the mesonotum somewhat more shining than the dull frons, the face below antennae rather shiny and with faint punctures. Pubescence whitish, rather long, and erect, but that of the frons and mesonotum short, apparently sparse (or worn) on scutum and rather abundant on the frons. Subgenital plate in the form of an equilateral triangle, with very fine setae on the disk. Caulis not much longer than broad, the dorsal lobes truncate at apex; parameral lobes unusually broad in apical part as seen from above, and tapering to apex as seen from the side; sagittae unusually short, the fused body strongly angulate at middle and acute at apex, and thinly fusiform in lateral view. Length, about 4 mm.; anterior wing, 2.9 mm.

One male (holotype), Calvert, Robertson Co., Texas, on *Heterothesa subaxillaris*, Oct. 19 (F. C. Bishopp), in U. S. National Museum.

Perdita octomaculata octomaculata (Say)

(Figs. 642, 643, 723)

Panurgus 8-maculatus Say, 1828, Long's Second Expedition, 2:350, ♂, ♀; Leconte Edit., 1:237.

Perdita 8-maculata Cresson, 1887, Syn. Hym. Amer. :296; Provancher, 1888, addit. faune Canad. Hym. :321.

Perdita octomaculata Cockerell, 1896, Proc. Acad. Sci., Phila., 48:60; Lovell and Cockerell, 1916, Psyche, 13:113; Crawford, 1913, Canad. Ent., 45:271; Bequaert, 1920, Psyche, 27:12; Cockerell, 1922, Ann. Mag. Nat. Hist. (9)9:663; Timberlake, 1928, Amer. Mus. Novitates, 321:2.

Say cited a no more definite locality for *octomaculata* than the United States, but it seems certain that his material was collected east of the Mississippi and perhaps in Indiana, for he described the markings as yellow. The typical eastern race has been recorded from Quebec, New Brunswick, Maine, New Hampshire, Massachusetts, Connecticut, New York, New Jersey, Virginia, and South Carolina.

Female.—Head and thorax dark bluish green, the labrum, clypeus in part, and supraclipeal area black. Basal half, or a little more, of mandibles, three marks on clypeus, and lateral marks yellow; the submedian dark mark of clypeus sometimes reduced to narrow stripes, with the disk becoming mainly yellow; lateral marks more or less emarginate on inner margin and ending more or less acutely at level of antennae; apex of mandibles red, gradating into yellow at base. Small cuneate mark on posterior corner of disk of pronotum and apex of tubercles yellow. Abdomen brown or fuscous, with a moderately large yellow mark on each side of tergites 1 to 4; these marks more or less enlarged at outer ends and pointed within, with those on tergites 2 to 4 more or less oblique. Sometimes the marks are less abbreviated and form moderately widely interrupted bands, with traces of a band on tergite 5. Legs brown or fuscous, the extreme apex of femora, anterior side of front tibiae and sometimes a streak on basal half of anterior side of middle tibiae yellow, the front tarsi pale brownish. Antennae blackish, the pedicel and flagellum yellowish brown beneath. Tegulae testaceous hyaline, with the base yellow. Wings dusky hyaline with a brownish tinge, the nervures testaceous brown, the subcosta and margins of stigma brownish fuscous.

Head usually slightly wider than long, the cheeks nearly as wide as the eyes. Proboscis not exceeding the fossa, the apex of galeae falling short of base of stipites in repose. Mandibles subacute at apex and not quite reaching far margin of fossa. Facial foveae well impressed, twice as wide as the interval between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma nearly equaling width of first submarginal cell; marginal cell with parts beneath and beyond the stigma about equal; second submarginal cell narrowed more than one-half to radius. Pygidial plate rather small, as long as wide, the narrow apex usually weakly notched. Frons and vertex granular tessellate and dull, the mesonotum minutely tessellate and somewhat more shining than the frons; face below antennae moderately shiny, with shallow obscure punctures. Pubescence whitish, abundant only on the cheeks and underside of thorax, the hair of mesonotum very short, sparse, and erect. Length, about 6–7 mm.; anterior wing, 4.3–4.6 mm.

Male.—Similar to female, with mandibles except red tips, labrum, clypeus, and lateral marks bright yellow. The marks on each side of first four tergites also generally smaller than in female. Apex of coxae more or less, the trochanters, anterior side of front femora, front tibiae except behind, base, apex, and dorsal margin of middle femora, anterior side of middle tibiae, apex of hind femora, underside of hind tibiae, and front and middle tarsi, except apical joints of middle pair, yellow. Scape of antennae yellow beneath. Tegulae and wings as in female.

Head somewhat wider than long, the cheeks about as wide as the eyes. Mandibles acute at apex and reaching far margin of proboscis fossa. Facial foveae rather large, oval, about twice as long as wide. Apical lobe of tergite 7 rather wide and truncate at apex. Sculpture and pubescence much as in female. Subgenital plate roughly triangular, broader than long, the sides arcuate or almost angulate, the apex rounded, the discal setae mostly confined to the apex. Caulis of aedeagus broadly oval, the dorsal lobes somewhat oblique and rounded at apex, with a notch where it connects with the dorsal margin of the parameral lobes; the latter lobes broad at base and tapering to rather acute apex as seen from side; sagittae thickly fusiform, not at all angulate at middle, the apex acute. Length, 5–6.5 mm.; anterior wing, 3.7–4 mm.

Material of *octomaculata* has been examined as follows.—MAINE: 1 male, Saco, York Co., Aug. 10, 1927 (T. B. Mitchell); 2 females, Indiantown Island (R. H. Walcott). NEW HAMPSHIRE: 2 females, Pelham, Hillsboro Co., Aug. 18 and Sept. 14, 1905 (J. C. Bridwell); 1 female, Mast Yard, Merrimack Co., on goldenrod, Aug. 6, 1896 (W. F. Fiske), Baker, No. 2135; 2 females, Webster, Merrimack Co., on goldenrod, July 22, 1896 (W. F. Fiske), Baker No. 2136.

NEW YORK: 2 males, Lake George, Warren Co., Aug. 3, 1903 (J. L. Zabriskie); 1 female, Keene Valley, Essex Co., Aug. 12, 1907 (H. Notman); 1 female, Union Springs, Cayuga Co., Sept. 20, 1916 (E. G. Anderson); 1 male, Long Island (Casey). NEW JERSEY: 4 males, Brigantine, Atlantic Co., Sept. 9, 1927 (C. H. Ballou); 1 male, Hadden Heights, Camden Co., Sept. 18, 1933 (L. J. Bottimer); 11 females, 13 males, Englewood, Bergen Co., on *Solidago*, Sept. 7, 1942 (C. D. Michener); 4 males, Montvale, Bergen Co., Aug. 12, 1949 (B. L. and J. G. Rozen). MARYLAND: 1 female, Chesapeake Beach, Calvert Co., Sept. 16, 1921 (Barber and Schwarz). VIRGINIA: 1 male, Virginia Beach, Princess Anne Co., Oct. 6 (F. Knab); 1 female, 1 male, Rosslyn, Alexandria Co., Sept. 16, 1923 (J. M. Aldrich). NORTH CAROLINA: 1 female, Valley of Black Mts., Aug. 27, 1906 (W. Beutenmuller); 2 females, 1 male, Bryson City, Swain Co., on *Solidago*, Sept. 7, 1923 (J. C. Crawford); 2 females, 3 males, Bryson City, on *Aster ericoides*, Sept. 22 and 25, 1923 (Crawford); 1 female, 1 male, Bryson City, on *Aster puniceus*, Sept. 26, 1923 (Crawford); 1 female, Raleigh, Wake Co., on *Solidago*, Sept. 21 (Mitchell); 1 female, Cherrypoint, Craven Co., 1945 (A. J. Walz). GEORGIA: 2 females, Thompsons Mills, Jackson Co., Sept. 1909 (H. A. Allard). INDIANA: 1 female, Elkhart, Elkhart Co., on *Solidago*, Sept. 13, 1896 (R. J. Weith), Baker No. 2085; 1 male, Elkhart, Aug. 22, 1896 (R. J. Weith), Baker No. 2089; 1 female, Lafayette, Tippecanoe Co., Sept. 9, 1930 (Geo. G. Ainslie). CANADA, ONTARIO: 3 males, Toronto, Aug. 1, 1896 (D. G. Cox), Baker No. 2021; 6 females, 6 males, Toronto, Aug. 10, 1896 (D. G. Cox), Baker No. 2066; 1 female, Toronto (R. J. Crew), Baker No. 2393.

Visits of this bee have been recorded previously to *Aster*, *Solidago*, *Boltonia*, *Coreopsis*, *Eupatorium*, *Cichorium*, and *Lycopus*, and it is known to collect pollen from at least the first four genera of these plants.

Perdita octomaculata terminata Cockerell

Perdita affinis Cockerell, 1901, Entomologist, 34:190; Swenk and Cockerell, 1907, Ent. News, 18:55 (not Cresson).

Perdita octomaculata Robertson, 1914, Ent. News, 25:69, 70, Robertson, 1922, Psyche, 29:161, 169; Michener, 1947, Amer. Midland Nat., 38:447.

Perdita octomaculata terminata Cockerell, 1922, Amer. Mus. Novitates, 33:8, ♀, ♂.

Cockerell's *terminata* is a rather poorly defined western race of *octomaculata*, and there is no doubt that material from Illinois and Mississippi is closer to *terminata* than to typical eastern form.

Female.—Like typical *octomaculata* except that the markings of face, thorax, and abdomen are creamy white instead of yellow.

Male.—Markings bright yellow as in typical form, but a supraclypeal mark is often present.

The type locality of *terminata* is Westpoint, Nebraska, and it has been recorded by Swenk and Cockerell (as *P. affinis*) also from Cedar Bluffs and Nebraska City. Material has been examined as follows.—NORTH DAKOTA: 3 males, Mott, Hellinger Co., July, 1918 (C. N. Ainslie). NEBRASKA: 2 females, 1 male, Westpoint, Cuming Co., Sept. 6 and 13 (J. C. Crawford); 3 females, 1 male (one female a cotype), Westpoint, on *Solidago rigida*, Sept. 12, 1900 (Crawford); 1 female, Cedar Bluffs, Saunders Co., on *Aster* (L. Bruner); 1 female, mouth of Gordon Creek, on *Aster salicifolius*, Sept. 30, 1910 (M. H. Swenk); 2 females, 1 male, Omaha, Douglas Co., on *Solidago*, Sept. 3, 1913 (L. T. Williams); 6 females, 2 males, Omaha, on *Solidago canadensis* and *Aster multiflorus*, Aug. 20, 26, and 29, 1914 (Williams). KANSAS: 3 females, 1 male, Lawrence, Douglas Co., Sept., 1948 (C. D. Michener); 2 females, 10 males, Lakeview, Douglas Co., on *Solidago*, Sept. 3, 1950 (Michener); 28 females, 14 males, Douglas Co., on *Aster azureus*, Oct. 1, 1951 (Michener and Beamer); 25 females, 4 males, Douglas Co., on *A. azureus*, Oct. 2, 1951 (R. H. and L. D. Beamer). TEXAS: 1 female, Paris, Lamar Co., on cotton, Sept. 3, 1904 (C. R. Jones). IOWA: 4 females, 3 males, Brown's Lake, Woodbury Co., Sept. 6, 1954 (Jean L. Laffoon). ARKANSAS: 1 female, Hot Springs, Garland Co., Sept. 28, 1939 (Van Dyke). ILLINOIS: 1 female,

1 male, Carlinville, Macoupin Co. (Robertson); 1 male, Champaign Co., on *Solidago*, Aug. 17, 1957 (T. B. Mitchell). MISSISSIPPI: 2 females, 4 males, Hattiesburg, Forrest Co., Oct. 1 and 22, 1944 (Michener).

Perdita jonesi Cockerell

(Figs. 644, 645, 724)

Perdita jonesi Cockerell, 1906, Entomologist, 39:177, 179, ♀, ♂.

Perdita birkmanni Cockerell, 1916, Ann. Mag. Nat. Hist. (8)17:282, ♂ (not ♀; new synonymy).

This species is similar to *octomaculata* but differs in the smaller markings of face and abdomen, the subfuliginous wings with a dark stigma, and in the more opaque and hairy mesonotum, which appears almost black in some aspects. The true male of *jonesi* is the var. *a* of Cockerell's description and what he thought was the typical male³ is possibly distinct but I have not seen it.

Female.—Head and thorax dark bluish green, the labrum, clypeus, and supraclypeal area black. Base of mandibles, median mark or stripe on clypeus, often a mark on lateral margins of disk, and rather small lateral marks pale yellow; lateral marks usually broad below and reaching level of antennae; median mark of clypeus with lateral arms at summit of disk, which are usually confluent with marks on lateral margins, the disk then having a dark anterior margin and two broad stripes which do reach the summit. In one specimen the face marks are reduced to a small clypeal mark and a small spot at anterior corners of face. Mandibles rufotestaceous except base and red at apex. Pronotum dark, or apex of tubercles yellow. Abdomen blackish, with a yellow mark on lateral margins of tergites 1 to 4, the marks usually gradually increasing in size from tergites 1 to 3, more or less oblique, oval and not quite touching lateral margins on tergites 3 and 4, widened at outer ends on tergite 2, and small and transverse on tergite 1. Venter dark, the pygidial plate ferruginous. Legs blackish, the front and middle knees and streak on anterior side of front tibiae pale yellow. Antennae blackish, the flagellum usually somewhat brownish beneath. Tegulae testaceous, with the base brownish. Wings subfuliginous, the nervures and the stigma dark brown, the subcosta fuscous.

Head as long as wide, the cheeks rather narrower than the eyes. Proboscis moderately long and barely exceeding the fossa in repose. Mandibles rather slender, acute, and nearly reaching far margin of the fossa. Facial foveae narrow, about as wide as the interval between them and the eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma of medium size and narrower than the first submarginal cell; marginal cell usually distinctly longer beyond the stigma than beneath. Pygidial plate as long as wide, with apex moderately wide and notched. Frons, vertex, and mesonotum minutely tessellate and subopaque, with rather close, minute and obscure punctures on the scutum; face below antennae rather shiny, the clypeus with moderately sparse punctures. Pubescence whitish, moderately abundant, that of mesonotum rather short, coarse, and erect. Length, about 5.1–6.1 mm.; anterior wing, 3.8–4 mm.

Male.—Similar to the female. Mandibles except red tips, labrum, clypeus, rather large lateral marks, supraclypeal mark, and sometimes a dot on subantennal plates, yellow. Apex of tubercles yellow, and sometimes a spot on posterior corners of the disk. Abdomen blackish or dark brown, with a yellow mark on each side of tergites 1 to 5, the marks larger than those of female and on tergites 3 and 4 generally separated by not much more than their transverse length. Legs fuscous, or somewhat brownish, the apex of femora, anterior side of tibiae and tarsi of front and middle legs, and knees of hind legs yellow. Antennae fuscous or blackish, the flagellum dull yellow beneath. Tegulae and wings as in female.

Head rotund, as long as wide, the cheeks nearly as wide as eyes. Mandibles tapering and nearly reaching far margin of proboscis fossa. Facial foveae narrowly oval and about three

³ The male which Cockerell considered the typical male of *jonesi* apparently runs in my table to *jonesi*, from which it differs in the dark marks or stripes on the clypeus, the lack of a supraclypeal mark, the marks of abdomen restricted to tergites 2 and 3, and legs nearly all dark.

times longer than wide. Venation as in female, except outer nervures of second discoidal cell are weak. Apical lobe of tergite 7 with the apex moderately narrow, truncate, or rounded. Sculpture and pubescence nearly as in female. Subgenital plate as long as wide, with the apex broadly rounded or subtruncate. Dorsal lobes of caulis separated by a deep, V-shaped emargination, truncate at apex, and continuous with dorsal margin of the base of parameral lobes; the latter lobes moderately wide at base and tapering to the narrowly rounded apex as seen from side; fused body of sagittae ovally fusiform and rounded at apex as seen from above, and thinly fusiform as seen from side; the reversible sac of sagittae instead of being broad and amorphous as in most species of *Perdita* here takes the form of a slender cylindrical tube; volsellae long, subequal, and prominently exerted from caulis. Length, about 4.5–5 mm.; anterior wing, 3.1–3.8 mm.

The type locality of *jonesi* is Rosser, Texas, and that of *birkmanni* is Fedor. Material of *jonesi* has been examined as follows.—TEXAS: 1 female (cotype), Rosser, Kaufman Co., on *Petalostemum multiflorum*, June 7, 1905 (C. R. Jones); 12 females, 1 male, Handley, Tarrant Co., on *Monarda punctata*, June 19, 1906 (J. C. Crawford); 6 males, Jacksonville, Cherokee Co., on *M. citriodora*, June 28, 1906 (F. C. Bishopp); 2 females, 5 males (includes male type of *birkmanni*), Fedor, Lee Co., May 30 and June 1 (year not given), May 26, June 6 and 11, 1899 (G. Birkmann); 1 female, 2 males, Giddings, Lee Co., on *Dalea aurea*, May 12, 1953 (L. D. Beamer). KANSAS: 12 females, 1 male, 9 miles north of Caldwell, Summer Co., June 11, 1952 (Wille and Michener).

Perdita discreta Timberlake

(Figs. 646, 647, 725)

Perdita discreta Timberlake, 1954, Ent. News, 65:14, ♀.

This species is similar to *jonesi*, but the female has the markings of face and abdomen smaller and much whiter, the wings less fuliginous, and the stigma with a central paler streak; the male has the markings of abdomen in the form of a well-interrupted and abbreviated yellow band on tergite 1 and at base of tergites 2 to 5. The male is described here for the first time.

Male.—Head and thorax dark olive green. Mandibles except red tips, labrum, clypeus, and lateral marks bright lemon yellow; a fuscous spot more or less developed on each side of summit of clypeus; lateral marks evenly triangular and reaching level of antennae; a small irregular supraclypeal mark, or traces, usually present. Thorax entirely dark. Abdomen blackish, with a narrow, abbreviated, and interrupted yellow band on tergites 1 to 5, in the form of transverse marks ending far from lateral margins, rather close together on tergite 1 and more widely separated and close to the base on following segments. Apical lobe of tergite 7 testaceous, the venter pale and yellowish, becoming more or less brown on last two segments. Legs blackish, the front coxae, apex of middle and apical half of hind coxae, the trochanters, anterior side and apex of front and middle femora, front and middle tibiae except a posterior blotch, front and middle tarsi and hind knees yellow. Antennae fuscous above, the scape clear yellow beneath, the underside of flagellum brownish yellow with first joint dark except apical spot and the apical joint brownish except at base. Tegulae testaceous, with the base fuscous. Wings rather pale fuliginous, the nervures brown, the subcosta and margins of stigma fuscous.

Head as broad as long, the cheeks somewhat narrower than the eyes. Proboscis moderately exceeding the fossa. Mandibles slender, acute, and nearly reaching far margin of the fossa. Facial foveae narrowly oval and about three times longer than wide. Pterostigma about two-thirds as wide as the first submarginal cell, the marginal cell with the parts beneath and beyond stigma subequal, and the second submarginal cell narrowed one-half or more to the radius. Frons, vertex, and mesonotum strongly and minutely tessellate and nearly equally dull, the face below antennae also tessellate and dullish; clypeus with a few faint shallow punctures, the frons and mesonotum virtually impunctate. Pubescence whitish, rather long on lower part of

cheeks and underside of thorax, and short, rather thin and erect on frons and mesonotum. Apical lobe of tergite 7 about as long as wide and rounded at apex. Subgenital plate triangular, as long as wide, the apex rounded and the apical half of disk with fine setae. Dorsal lobes of caulis obtusely rounded at apex and continuous with dorsal margin of the dilated part of parameral lobes; the latter broad across the basal half and slender at apex in lateral view; fused body of sagittae broad and angulate at middle and subacute at apex in dorsal view, and moderately thickly fusiform as seen from side; volsellae moderately exerted from caulis in dorsal view. Length, about 4.5 mm.; anterior wing, 3-3.1 mm.

One female (paratype), Holly Shelter, Pender Co., North Carolina, Oct. 5, 1951 (T. B. Mitchell); 7 females, 1 male, Holly Shelter, on *Aplopappus*, Oct. 3, 1953; 15 females, 5 males, Holly Shelter, Oct. 9, 1954; 3 females, 6 males, Southern Pines, Moore Co., on *Aplopappus*, Sept. 29, 1955 (Mitchell).

Perdita dolichocephala Swenk and Cockerell
(Figs. 648, 649, 726)

Perdita dolichocephala Swenk and Cockerell, 1907, Ent. News, 18:54, ♀ (excluding one paratype).

Perdita nebrascensis Swenk and Cockerell, 1957, Ent. News, 8:53, ♂ (excluding type ♀); Cockerell, 1922, Amer. Mus. Novitates, 33:8; Timberlake, 1928, Proc. Hawaii. Ent. Soc., 7:151 (new synonymy).

The type of *dolichocephala* is a female from Warbonnet Canyon, Sioux County, Nebraska, but one of the two paratypes from Niobrara, Knox County, belongs to the species which Stevens described later as *tridentata*. The females of these two species are similar but *dolichocephala* has well-developed face marks and the marks of abdomen evanescent or lacking, whereas *tridentata* has these conditions reversed. The male of *dolichocephala* has the face yellow straight across for a short distance above antennae and *tridentata* has the yellow ending at level of antennae, with the subantennal plates green.

Female.—Head and thorax slightly bluish green, the frons and mesonotum somewhat bronzy, the labrum, clypeus, and supraclipeal area blackish. Spot on base of mandibles, median mark or stripe on clypeus, and small lateral marks yellowish white; the median mark of clypeus more or less widened anteriorly and sometimes supplemented by a small spot on the lateral extensions, or by a streak on lateral margins of the disk; lateral marks extending narrowly on orbits to level of antennae and widened below to margin of clypeus. Thorax entirely dark. Abdomen entirely blackish, or sometimes with a much abbreviated and yellowish-white band on tergites 1 to 3; the pygidial plate rufotestaceous. Legs fuscous, the extreme apex of front femora and anterior side of front tibiae pale yellow. Antennae blackish, the flagellum yellowish brown beneath. Tegulae pale testaceous, the base brownish or fuscous. Wings hyaline, the nervures testaceous, the subcosta and margins of stigma brown.

Head distinctly longer than wide, the cheeks receding but about as wide as the eyes. Proboscis rather long and somewhat exceeding the fossa in repose. Mandibles tapering, subacute, and almost reaching far margin of the fossa. Facial foveae deeply impressed, about as wide as the interval between them and eyes and reaching not quite two-thirds of distance from level of middle of antennal sockets to level of anterior ocellus. Pterostigma rather large and equaling width of first submarginal cell; marginal cell with part beyond stigma only slightly longer than the part beneath; second submarginal cell generally narrowed not much more than one-half to radius. Pygidial plate as long as wide, more or less strongly arcuate on the sides, and rounded and notched at apex. Frons, vertex, and mesonotum minutely granular tessellate, dull, and at most indistinctly punctured; face below antennae considerably more shining and with close shallow punctures on the clypeus. Pubescence whitish, moderately long and abundant on cheeks and underparts of thorax, and very fine, short, dense and appressed on mesonotum, with

numerous short, coarse erect hairs interspersed. Length, about 6-6.5 mm.; anterior wing, about 4 mm.

Male.—Head and thorax dark bluish green. Broad anterior part of gular region and posterior orbits to middle of eyes, mandibles except red tips, labrum, and face to level of lower end of foveae bright yellow. Pronotum yellow except a broad green band from flank to flank. Abdomen blackish, with a rather broad yellow band on tergites 1 to 5, the bands on tergites 3 to 5 not reaching lateral margins and notched medially or slightly interrupted on the two distal segments, the band on tergite 2 barely reaching the lateral margins and that on tergite 1 more or less widened at the middle. Legs yellow, a blotch or streak on posterior side of front and middle femora and tibiae, the posterior and underside of hind femora, the hind tibiae except beneath and the hind tarsi fuscous. Antennae yellow, the flagellum more brownish yellow, but otherwise not much darkened above except slightly on the basal segments, the pedicel, however, fuscous above. Tegulae and wings about as in female, except the base of tegulae yellow.

Head moderately longer than wide, the cheeks wider than the eyes. Mandibles tapering, acute, and almost reaching far margin of proboscival fossa. Facial foveae oval, about twice as long as wide. Outer nervures of second discoidal cell weak, the venation otherwise as in the female; the pubescence and sculpture also similar. Apical lobe of tergite 7 about as long as wide and rather narrow and rounded at apex. Subgenital plate triangular, about as long as wide at base, but the apex rather broadly truncated. Caulis of genitalia broadly oval, the dorsal lobes rather widely separated and rounded at apex and discontinuous with dorsal margin of parameral lobes; the latter lobes inserted rather low on sides of caulis, curved and strap-shaped apically, and moderately wide and tapering in lateral view; fused body of sagittae moderately thickly fusiform, wide but not angulate across the middle and subacute at apex in dorsal view, and with about the same thickness as seen from side. Length, about 4.5-5.5 mm.; anterior wing, 3.1-4 mm.

P. dolichocephala has been reported from Nebraska, and the male as *nebrascensis* also from Kansas and Colorado. Material has been examined as follows.—NEBRASKA: 1 female (paratype), Niobrara, Knox Co., on *Helianthus*, May 13, 1902 (W. D. Pierce); 1 female, 1 male (the male a paratype of *nebrascensis*), Neligh, Antelope Co., on *Helianthus*, Aug. 7, 1901 (M. Cary); 1 female, Halsey, Thomas Co., on *Helianthus subrhomboides*, Aug. 25, 1911 (J. T. Zimmer); 3 females, 3 males, Halsey, on *H. petiolaris*, Aug. 5 and 7, 1912 (Zimmer); 2 females, Valentine, Cherry Co., Sept. 10, 1951 (E. Gilbert); 3 males, 7 miles north of Grant, Perkins Co., on *H. petiolaris*, Aug. 25, 1954 (E. W. Hamilton). KANSAS: 2 males, Clay Co., Aug., 1901 (J. C. Bridwell); 8 females, Great Bend, Barton Co., on *Heterotheca subaxillaris*, Sept. 4, 1949 (Michener and Beamer); 37 females, 56 males, Hutchinson, Reno Co., on *Helianthus petiolaris*, Sept. 4, 1949 (Michener and Beamer); 7 females, 3 males, Garden City, Finney Co., on *H. petiolaris*, Sept. 6, 1949 (Michener and Beamer); 1 male, Garden City, Sept. 10, 1936 (M. E. Griffith); 2 females, 1 male, 5 miles southeast of Hutchinson, Reno Co., on *Euphorbia*, Sept. 2, 1951 (Michener and La Berge); 1 female, 31 males, 5 miles southeast of Hutchinson, on *Helianthus petiolaris*, Sept. 2, 1951 (Michener and La Berge); 2 males, 5 miles north of Hutchinson, on *Boltonia asteroides*, Sept. 2, 1951 (Michener and La Berge); 1 male, Hutchinson, on *H. petiolaris*, Sept. 2, 1951 (Michener and La Berge); 3 females, 5 males, 2 miles east of St. John, Stafford Co., on *H. petiolaris*, Sept. 2, 1951 (Michener and La Berge); 4 females, 13 males, Marysville, Marshall Co., on *Amorpha canescens*, July 5, 1951 (Michener); 2 males, 2 miles south of Garden City, Finney Co., on *H. petiolaris*, Sept. 3, 1951 (Michener and La Berge); 1 female, 1 male, 9.5 miles south of Garden City, on *Helianthus*, Aug. 26, 1956 (A. F. Shinn); 6 females, 4 males, 4 miles south of Garden City, on *Helianthus*, Aug. 27, 1956 (Shinn). COLORADO: 1 female, 11 males, Roggen, Weld Co., on *Helianthus*, Aug. 26, 1935 (Michener).

Perdita tridentata Stevens

(Figs. 650, 651, 727)

Perdita tridentata Stevens, 1919, Canad. Ent., 51:206, ♂; Stevens, 1921, Canad. Ent. 53:66, ♀; Timberlake, 1928, Proc. Hawaii. Ent. Soc., 7:151.

Perdita dolichocephala Swenk and Cockerell, 1907, Ent. News, 18:54, ♀ (in part).

The female of *tridentata* is similar to *dolichocephala*, and the two were confused by Swenk and Cockerell, but *tridentata* differs in having the face entirely dark and abdomen with transverse marks on the first three segments. The male has the subantennal plates green and sometimes two broad fuscous stripes on disk of clypeus. The type locality is Pleasant Lake, North Dakota.

Female.—Head and thorax dark green, the frons and mesonotum bronzy, the labrum, clypeus, and supraclypeal area brownish fuscous. Mandibles testaceous or rufotestaceous, becoming red at apex and sometimes blackish at base. Face and thorax without light markings. Abdomen dark brown, with two transverse yellowish-white marks on tergites 1 to 3, or 4, the marks on tergite 1 often small or sometimes lacking, those on other segments forming a narrow, abbreviated, and well-interrupted basal band. Legs brownish fuscous, the extreme apex of front femora and a streak more or less developed on anterior side of front tibiae pale yellow. Antennae brown or fuscous, the flagellum brownish yellow beneath. Tegulae pale testaceous, the base brownish. Wings hyaline, the nervures testaceous brown, the subcosta and margins of stigma darker brown.

Structural characters, including sculpture, pubescence, and venation, closely approximating conditions in *dolichocephala*, but facial foveae less impressed and pubescence of mesonotum sparser, with the short erect hairs finer and less numerous, and the sides of the pygidial plate straight, the apex narrower, with the points on each side of the median notch more acute. Length, about 5.5–6.5 mm.; anterior wing, 3.6–4 mm.

Male.—Head and thorax dark green, somewhat bronzy on frons and mesonotum. Mandibles except reddish apical half, clypeus in part, narrowly triangular lateral marks ending acutely somewhat above level of antennae and a supraclypeal mark yellow. Labrum brown, or sometimes yellow apically. Anterior margin of clypeus, usually broadened on each side of disk, and sometimes two broad stripes on disk brown or fuscous, the yellow then reduced to a narrow line on lateral margins of disk, and broad median stripe, or to the latter only. Small mark on posterior corners of disk of pronotum and the tubercles yellow. Abdomen dark brown or fuscous, with a moderately wide yellow band, not reaching the lateral margins, on tergites 1 to 5, the bands on tergites 1, 4, and 5 usually interrupted medially. Legs fuscous, the femora at apex, part of anterior side of front pair and sometimes of middle pair more or less fully, anterior side of front and middle tibiae and underside of hind tibiae yellow, the front tarsi yellowish, the middle tarsi pale brown. Antennae yellow, a spot at apex of scape, the pedicel and flagellum above brown. Tegulae and wings as in female.

Head usually a little longer than wide, the cheeks as wide as eyes. Mandibles tapering, acute, and nearly reaching far margin of proboscival fossa. Facial foveae small, about thrice as long as wide. Sculpture and pubescence about as in the female, but the erect hair on anterior border of mesoscutum rather long. Apical lobe of tergite 7 about as long as wide and more or less narrowly rounded at apex. Subgenital plate somewhat broader than long, triangular but much rounded at apex, the disk with minute setae on apical part. Caulis of aedeagus broadly oval, the dorsal lobes rounded at apex and discontinuous with dorsal margin of parameral lobes; the latter lobes appearing strap-shaped as seen from above but broad and but little narrowed to apex in lateral view; fused part of sagittae moderately wide and obtusely angulate at middle, and acuminate to the rather sharp apex in dorsal view and rather thickly fusiform as seen from the side. Length, 3.5–5 mm.; anterior wing, 2.9–3.5 mm.

Material of *tridentata* examined as follows.—NORTH DAKOTA: 1 male (paratype) Pleasant Lake, Benson Co., on *Helianthus petiolaris*, Aug. 9, 1913 (O. A. Stevens); 1 male, Sheldon,

Ransom Co., and 3 females, Aug. 28, 1920, on same flower (Stevens). IOWA: 5 males, Sargents Bluff, Woodbury Co., Aug. 22, 1930, 3 males, Aug. 20, 1931, and 2 males, sand dunes, Aug. 25, 1933 (C. N. Ainslie). NEBRASKA: 1 female (paratype of *dolichocephala*), 2 males, Niobrara, Knox Co., on *Helianthus*, Aug. 13, 1902 (W. D. Pierce); 1 female, Neligh, Antelope Co., on *Helianthus*, Aug. 7, 1901 (M. Cary); 1 female, Valentine, Cherry Co., Sept. 10, 1951 (E. Gilbert); 1 male, 7 miles north of Grant, Perkins Co., on *H. petiolaris*, Aug. 25, 1954 (E. W. Hamilton). KANSAS: 2 females, 5 males, Clay Co., Aug. 1901 (J. C. Bridwell); 30 females, 28 males, Hutchinson, Reno Co., on *H. petiolaris*, Sept. 4, 1949 (Michener and Beamer); 5 females, 67 males, 5 miles southeast of Hutchinson, on same flower, Sept. 2, 1951 (Michener and La Berge); 1 male, 8 miles north of Elkhart, Morton Co., on same flower, Sept. 4, 1951 (Michener and La Berge); 1 male, 4 miles southeast of Hugoton, Stevens Co., on same flower, Sept. 4, 1951 (Michener and La Berge); and 1 male, Kinsley, Edwards Co., on *Aplopappus* (*Prionopsis*), Sept. 2, 1951 (Michener and La Berge).

Perdita nuda Cockerell

Perdita nuda Cockerell, 1896, Proc. Acad. Sci., Phila., 48:93, ♀.

P. nuda is similar to *phymatae* but much larger and duller, with very sparse, short erect hair on the mesonotum. It lacks light markings on face, thorax, and abdomen, or it may have a small yellow spot on the clypeus.

Female.—Head and thorax brassy green, the base of labrum, clypeus, anterior corners of face, and supraclypeal area black. Mandibles rufotestaceous, becoming redder at apex and yellowish white at base. Apex of labrum testaceous or brown. Sometimes a minute whitish dot on lateral plates of face adjacent to sides of clypeus, and sometimes (the type of *nuda*) a yellow spot on middle of clypeus. Thorax and abdomen entirely dark, the latter blackish, or more or less tinged with brown, the pygidial plate rufotestaceous. Legs blackish, the apex of front and middle femora, anterior side of front tibiae and streak on middle tibiae yellow, the front tarsi pale brown becoming slightly yellowish on underside of basal joint. Antennae blackish, the scape yellow beneath and at base, the flagellum brownish yellow beneath. Tegulae testaceous, the base brown. Wings with a whitish opacity, the nervures testaceous brown, the subcosta and margins of stigma pale fuscous.

Head about as broad as long, the cheeks narrower than the eyes. Proboscis not exceeding the fossa, the apex of galeae falling a little short of base of stipites when folded in repose. Mandibles rather stout, subacute, and nearly reaching far margin of the fossa. Facial foveae well impressed, somewhat wider than the interval between them and eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma moderately large but not equaling width of first submarginal cell; marginal cell with part beyond stigma slightly longer than the part beneath; second submarginal cell narrowed about one-half to radius. Pygidial plate about as long as wide, with the sides nearly straight and the apex moderately narrow and distinctly notched. Frons, vertex, and mesonotum strongly tessellate, the parts about equally dull, the mesoscutum with remote and minute punctures; face below antennae more shining, with clypeus, supraclypeal area, and anterior corners of face almost polished, the clypeus with fine shallow punctures. Pubescence whitish, sparse except on front coxae and mesopectus, the hair of mesoscutum short, very sparse and erect. Length, about 6 mm.; anterior wing, 4.2–4.4 mm.

The type from New Mexico, without a more definite locality, has been examined. The following specimens seem to be too similar to be separated from *nuda* without more evidence.—3 females, 15 miles west of Holbrook, Navajo Co., Arizona, on *Erigeron*, Sept. 3, 1930 (Timberlake).

Perdita dalyi, n. sp.

This species is similar to *nuda* in size and paucity of markings, but it differs in the olive-green color of head and thorax, the milky-white wings and in the rather

dense but very short pubescence of the mesonotum. In the pubescence it is like *consobrina*, but that species has dusky wings and comparatively extensive yellow markings. In Cockerell's key (1896) it runs best to *verbesinae*, or if size is disregarded it goes on to *asteris*, but both of these species are only distantly related to *dalyi*.

Female.—Head and thorax olive green, the underparts of thorax and propodeum more bluish, the labrum, clypeus, and supraclypeal area blackish. Basal half of mandibles, a narrowly pyriform mark on middle of clypeus, and a small mark between anterior end of eyes and clypeus, together with a short streak on adjacent margin of clypeus, yellowish white. Mandibles becoming red at apex. Thorax without markings, the tubercles pale brown. Abdomen dark brown, with two rather faint, slender, transverse whitish marks on tergites 1 and 2, the marks on tergite 2 about equally distant from each other and the lateral margins. Pygidial plate bright rufotestaceous. Legs brownish fuscous, the apex of front femora and anterior side of front tibiae, yellow, the front tarsi yellow tinged with brown above. Antennae brownish fuscous, the flagellum brownish yellow beneath. Tegulae brown at base, and broadly testaceous hyaline on outer margin. Wings milky hyaline, the stigma pale yellow, the margins of stigma and subcosta brown, the other nervures nearly colorless.

Head as broad as long, the cheeks receding and narrower than eyes. Proboscis moderately elongate, probably somewhat exceeding the fossa in repose, the galeae somewhat longer than the stipites. Mandibles acute and almost reaching far margin of the fossa. Facial foveae very narrow, but well impressed, hardly more than half as wide as the interval between them and eyes and reaching from level of middle of antennal sockets hardly two-thirds of distance to level of anterior ocellus. Pterostigma about two-thirds as wide as first submarginal cell, the parts of marginal cell beneath and beyond the stigma about equal, and the second submarginal cell narrowed about one-half to radius. Pygidial plate somewhat broader than long, the sides moderately arcuate, and the apex ogival with a distinct median notch. Frons, vertex, and mesonotum dull from a very fine and dense tessellation, the frons indistinctly punctured; the face below antennae except subantennal and lateral plates, shining, with fine, rather close punctures on the clypeus. Pubescence whitish, moderately long and erect, abundant on cheeks, vertex, and sides of thorax, and rather dense, very fine, short, depressed and pale ochraceous on mesonotum, with short, erect, coarse mosslike hairs interspersed. Length, about 6.5 mm. (or nearly 7 mm., with head stretched forward); anterior wing, 4 mm.

One female (holotype), El Paso Co., Texas, on *Aplopappus heterophyllus*, Sept. 13, 1950 (H. V. Daly), in collection of the University of Kansas.

Perdita occidua, n. sp.

P. occidua is similar to *affinis* in many ways, but I believe that it is not likely to prove to be a form of that species when better known. It differs from *affinis* in having the abdominal marks very small and close to the lateral margins on tergites 1 to 3, with those on tergites 2 and 3 strongly oblique and narrow, and in having the facial foveae very narrow.

Female.—Head and thorax dark blue-green, the labrum, anterior margin of clypeus, two arcuate stripes on the disk, and supraclypeal area fuscous or blackish. Mandibles except at base and the apex of labrum rufotestaceous. Base of mandibles, disk of clypeus except at sides, and lateral marks pale yellow; lateral marks broad at anterior ends, emarginate on inner margins, and ending bluntly at level of antennae. Apex of tubercles pale yellow, the thorax otherwise dark. Abdomen black, the pygidial plate rufotestaceous; a small mark on lateral margins of tergites 1 to 3 creamy white, with those on tergites 2 and 3 narrow, oblique and not quite touching the lateral margins. Legs blackish, the extreme apex of front and middle femora, anterior side of front tibiae, front tarsi beneath and line on anterior side of middle tibiae yellow. Antennae fuscous, the scape and pedicel blackish, the flagellum yellowish brown be-

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

Other characters in agreement with *affinis*, except facial foveae narrow and no wider than the interval between them and eyes, the part of marginal cell beneath and beyond the stigma nearly equal and the hair of mesonotum sparse and short. Length, about 5.5 mm.; anterior wings, 3.9 mm.

One female (holotype), Todd's Lodge, Oak Creek Canyon, Coconino Co., Arizona, Sept. 29, 1948 (Grace H. and John L. Sperry), in collection of the University of Kansas.

Besides the foregoing species of the *octomaculata* group, there are certain other species described by Cockerell which more or less certainly belong here, but which I have been unable to recognize, and the location of the types is unknown to me. These species are *P. maculipes*, *P. pellucida*, and *P. biparticeps*. They were each described from a single male, collected at Las Cruces, New Mexico, in September, 1895.

Perdita maculipes Cockerell

Perdita maculipes Cockerell, 1896, Proc. Acad. Sci., Phila., 48:87, ♂.

This species is similar to *nitidella*, *gutierreziae*, and *bigeloviae*, and would go somewhere near these species in my key but cannot be placed exactly. It has the lower cheeks broadly yellow, and yellow of face extending onto the frons, with its upper margin more trifid than in *gutierreziae*. Abdomen is yellow with the dark bands united on lateral margins, so that the yellow bands must be enclosed. The front and middle legs are yellow, with a black patch on the tibiae. The type was collected at flowers of *Aplopappus heterophyllus*, Sept. 5, 1895 (A. M. Holt).

Perdita biparticeps Cockerell

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

Although this species was more fully described than *maculipes*, it can be placed in my key with hardly any greater accuracy, but unless certain color characters were overlooked by Cockerell it runs with *snowii* and *lasiogastra* in couplet 169. It is distinguished from these two species by its dark blue color, by the shining and nearly nude mesonotum and by its small size. The type was collected from *Pectis papposa*, Sept. 17, 1895 (Cockerell).

Perdita pellucida Cockerell

Perdita pellucida Cockerell, 1896, Proc. Acad. Sci., Phila., 48:88, ♂.

P. pellucida apparently can go only to *gerhardi*, *monardae*, or *dallasiana* in couplet 121 of my key, but it differs in having the white of face not going above the antennae in median line, the thorax dark except marks on pronotum and a small white spot on the mesopleura, and the abdomen with dull white and dark brown bands. This species is obviously very distinct from any of those treated here and possibly does not belong to the *octomaculata* group. It was described from one male collected at flowers of *Aplopappus heterophyllus*, Sept. 12, 1895 (Cockerell, No. 5,100).

SUPPLEMENT TO PARTS I TO III

The material reported here came to hand too late to be included in previous parts of this revision. In addition I had the opportunity in June, 1958, to examine types at Philadelphia and Washington and the results of that study are also presented.

Subg. *Cockerellula* Strand

A new table to separate the males of this group is presented to help distinguish *P. knulli*, n. sp. and *P. seminigra* Timberlake, which have not been keyed out previously.

- | | |
|--|--------------------------------|
| 1. Basal segment of venter without a medio-apical fold or process..... | 2 |
| Basal segment of venter with a conduplicate process at middle of apex..... | 4 |
| 2. Tergite 7 very broad across the apex and armed with a large process on each side..... | 3 |
| Tergite 7 narrowed about one-half to apex and armed on each side with a small blunt process, these processes no longer than wide and a little above and before the true apex which is rather narrowly rounded in middle | <i>bidenticauda</i> Timberlake |
| 3. Tergite 7 almost as broad at apex as at base, with the apical truncation much broader than length of the lateral processes, which taper only moderately from their bases | |
| | <i>opuntiae</i> Cockerell |
| Tergite 7 less broad across the apex, with the apical truncation about equal to the length of the lateral processes, which have a rather broad arcuate flange on their inner margin | |
| | <i>seminigra</i> Timberlake |
| 4. Tergite 7 with two apical processes placed more or less above and before the apical margin.. | 5 |
| Tergite 7 very broad across the apex, either with a small median notch, or more broadly notched and furrowed to form two broad lobes..... | 6 |
| 5. Medio-apical processes of tergite 7 quadrate, moderately large, as long as wide, truncate at apex, and placed well before and above the true apex, which is emarginate between two blunt teeth | <i>asteca</i> Timberlake |
| Tergite 7 narrowed somewhat more than one-half to apex, with the medio-apical processes small, blunt, and about as long as wide as seen from above, the true apical margin truncate between the processes, but forming a carinate edge before their bases as seen from beneath; head dark ferruginous, with a broad blackish band before the ocelli and a whitish face | |
| | <i>knulli</i> , n. sp. |
| 6. Tergite 7 about as broad across the apex as at base and with a small median notch; head dark blue-green, the face below antennae yellowish white..... | <i>laticauda</i> Timberlake |
| Tergite 7 broadly furrowed medially and strongly emarginate to form two broad, somewhat oblique lobes at apex; head ferruginous, the face below antennae yellowish white | |
| | <i>lobata</i> Timberlake |

Perdita lobata Timberlake

Perdita lobata Timberlake, 1953, Univ. Kans. Sci. Bull., 35:967, ♂.

The female of this species is now at hand and would run to *bidenticauda* and *laticauda* in the table (Univ. Calif. Publ. Entom., 9:354-355) except that the facial foveae are about as long as the distance between the posterior ocelli plus (instead of minus) the diameter of both ocelli. Otherwise it agrees very closely with both species.

Additional material.—3 males, 3 females, Starr Co., Texas, March 28, 1950 (D. J. and J. N. Knull).

Perdita knulli, n. sp.

(Figs. 652, 653, 728)

Male.—Thorax slightly bluish green, washed with brown on posterior face and flanks of propodeum, on metapleura and across upper part of mesepisternum. Pronotum and head dark ferruginous brown, becoming paler ferruginous on undersurface of head, a broad band on face in front of ocelli blackish or slightly greenish. Anterior half of gular region, mandibles except pieceous tips, labrum, and anterior part of face to the level of the dark band on frons probably pale yellow or whitish (discolored or reddened in types). Abdomen ferruginous. Legs brownish fuscous, the front tibiae and tarsi pale ferruginous. Antennae ferruginous, the pedicel and flagellum slightly infuscated above. Tegulae pale testaceous, the base brownish. Wings dusky hyaline, the nervures and stigma brown, the subcosta more infuscated.

Head very large, broader than long and broader than thorax, the rounded cheeks and the temples about twice as broad as the eyes. Inner orbits somewhat diverging anteriorly. Posterior ocelli about three times their distance apart from the occipital margin. Face below level of antennae short and transverse, the subantennal plates very small. Disk of clypeus about twice as broad as long, the visible part of lateral extensions in frontal aspect narrowly triangular, the reflexed part very broad and not reaching base of mandibles. Proboscis moderately short, the tip of galeae when folded in repose not reaching base of stipites. Mandibles very thick at base, tapering moderately to the blunt tips, and falling short of the far margin of the proboscis fossa. Facial foveae well impressed and about five times longer than wide. Pterostigma narrowly lanceolate. Marginal cell broadly and obliquely truncate at apex, the part beneath stigma shorter than the part beyond. Abdomen broadly ovate, depressed. Tergite 7 narrowed about two-thirds to apex, which is armed on each side with a small, blunt process about as broad as long as seen from above, the margin between the processes truncate and furnished on undersurface with a carinate edge. First segment of venter furnished at middle of apex with a strong fold, which looks like a large conical process, rounded at apex, as seen from the side. Middle of second ventral segment with two very fine diverging ridges, which end in a minute tubercle on apical margin, the margin between the tubercles slightly and roundly emarginate. Frons strongly tessellate, the dark band dull, the tessellation gradually fading out toward occipital margin, the cheeks nearly polished; face below antennae moderately shiny, with tessellation on the lateral plates; frons minutely and closely punctured on the dark area, the punctures becoming much sparser on the vertex. Thorax tessellate, with the mesonotum about as minutely sculptured and as closely punctured as the dark part of frons. Pubescence white, sparse, and short, the vertex nude, the hair of mesonotum very fine and depressed, with sparse, short erect hairs interspersed. Hind tibiae and apex of abdomen with very coarse hair. Subgenital plate straplike, slightly tapering to the rounded apex, the disk with sparse setae a little longer than width of plate. Caulis of genitalia quadrate, as broad as long, the dorsal lobes obliquely truncate at apex and separated by a deep V-shaped emargination; parameral lobes small, narrowly fusiform and inserted laterally on the underside of caulis at some distance before the apex of dorsal lobes; fused body of sagittae fusiform, abruptly swollen subapically just before separating into two slender rods as seen from above, and thickly fusiform and obtuse at apex in lateral view. Length, about 3.5–4 mm.; anterior wing, 2.5–2.9 mm.

Female.—Head and thorax dark bluish green, the abdomen ferruginous. Very similar to females of *bidenticauda* and *laticauda* and apparently differing only in that the mesonotum is somewhat duller and more minutely and more closely punctured. Length, about 4.5 mm.; anterior wing, 2.1 mm.

Two males, 1 female (holotype male, allotype, and paratype), Davis Mts., Jeff Davis Co., Texas, June 21, 1949 (D. J. and J. N. Knull). The female bears dark brown pollen, with spherical and moderately fine grains.

Types in collection of the Ohio State University, the paratype retained at Riverside.

Subg. *Macroteropsis* Ashmead*Perdita haplura* Cockerell

Perdita haplura Cockerell, 1922, Proc. U. S. Nat. Mus., 60, Art. 18:19, ♀.

The type female has been examined. It runs to *portalis* in my key and has a similar shaped head, with narrow cheeks, diverging inner orbits, and with similar sculpture and pubescence. Its male has been seen but was received too late to be included in this part.

Female.—Mesonotum, including scutellum uniformly tessellate, moderately dullish, and with fine close punctures, which become considerably sparser on the scutellum. Mesonotum not conspicuously hairy, yet invested with a very short, close-set, white pubescence. Hair on other parts of thorax and on head rather abundant, moderately short and erect, but the upper part of frons and the vertex much more nearly nude.

One female (holotype), Sanderson, Terrell Co., Texas, May 9, 1912 (J. S. Mitchell), in U. S. National Museum.

Perdita magniceps, n. sp.

(Figs. 654, 655, 729)

The type male of this species, from near Deming, New Mexico, was at first thought to be the male of *haplura*, but a male from Sanderson, Texas, now indicates that the association with *haplura* is incorrect. The male of *magniceps* is similar to the male of *portalis* in some characters but differs in having the head orange ferruginous and yellow, the thorax partly ferruginous, the mandibles simple and blunt at apex and the genitalia very distinctive. It is similar to the female of *haplura* in sculpture of mesonotum but has the hair of that part of the body considerably denser, although the pubescence is short and sparse on some other parts of head and thorax, with the entire face and vertex nude.

Male.—Head orange ferruginous shading into pale yellow at sides of face below foveae and in the middle below antennae and more gradually and rather broadly on anterior end of underside of head. Mandibles whitish at base, shading into rufotestaceous and then into dark red at apex. Proboscis brown. Facial foveae black, and there are slight and irregular blackish spots in the ocellar area. Mesonotum dark green, with lateral margins of the scutum, disk of scutellum, pronotum, a nubilous mark on basal middle of propodeum, the apex and flanks of propodeum, the metapleura, and upper part of the mesopleural region orange ferruginous, the propodeum otherwise and mesoplectus black. Abdomen ferruginous, with a large fuscous patch on each side of basal half of tergite 1, the lateral margins of following segments black, with an infuscation spreading across tergites 3 to 7, but apical middle of tergites 5 to 7 remaining light; apical depression of tergites, especially of tergites 3 to 6, whitish subhyaline. Legs black, the front coxae beneath, except at base, apical half, or a little more of front and middle femora, the front and middle tibiae and tarsi and hind knees ferruginous, the hind tarsi ferruginous tinged with brown. Antennae orange ferruginous, the basal joints of flagellum slightly ringed above with fuscous and the apical joint brownish on upper side. Tegulae pale testaceous subhyaline, and pale yellowish at base. Wings milky hyaline, the nervures nearly colorless, the subcosta slightly yellowish.

Head very large, much broader than long and much broader than the thorax, the orbits of eyes slightly diverging above. Cheeks extremely broad and rectangulate opposite middle of eyes. Eyes broadly oval, less than twice as long as wide, with about two-thirds of the anterior end above or in front of the upper margin of mandible. Subantennal plates extremely small. Lateral plates of face very broad and with a broad extension in front of the eye to base of mandible.

Proboscis rather short, included within the fossa in repose, the apex of galeae reaching base of the stipites. Mandibles thick at base, tapering to blunt apex, and nearly reaching the far margin of the fossa. Facial foveae subtriangular and about twice as long as wide. Venation normal for group, the stigma narrowly lanceolate, the marginal cell obliquely truncate at apex, with the part beneath the stigma shorter than the part beyond. Abdomen ovate, depressed, the apical tergite ending in a broad even truncation. Head shining, with the face rather faintly tessellate, the frons duller than other parts and almost densely and minutely punctured, the punctures becoming sparse on vertex. Face below antennae moderately shiny, with fine, close punctures. Mesonotum minutely tessellate, somewhat dull and closely and rather indistinctly punctured. Pubescence white, sparse, and short, the face virtually nude, but mesonotum nearly covered with depressed, short mosslike hair; occiput fringed with coarse erect hairs, and white hair conspicuous on metanotum and sides of posterior face of propodeum. Subgenital plate much longer than wide, much narrowed just before the middle, then expanding into an oval apical part, with rather long, erect hair on the disk. Dorsal lobes of caulis separated by a V-shaped emargination, tapering and blunt at apex; parameral lobes lacking; fused body of sagittae thickly cylindrical, moderately expanded apically, and armed with short stiff setae on lateral margins, the apex truncate between two small blunt projections, and with two converging processes arising from lower part of interior wall of the tube, the structure in lateral view uniform in thickness and slightly curved upward at apex. Length, 5 mm.; anterior wing, 3 mm.

One male (holotype), 17 miles east of Deming, Luna Co., New Mexico, on *Sphaeralcea*, Sept. 13, 1957 (Timberlake), in collection of the Citrus Experiment Station, Riverside.

Perdita portalis Timberlake

Perdita portalis Timberlake, 1954, Univ. Calif. Publ. Entom., 9:357, ♀, ♂; Timberlake, 1956, Univ. Calif. Publ. Entom., 11:323.

Together with the preceding male of *magniceps*, and several females of *P. latior* Cockerell, a series of six males and twenty-five females of *portalis* was taken east of Deming, at flowers of *Sphaeralcea*, Sept. 13, 1937 (Timberlake and Dickson).

Perdita echinocacti Timberlake

Perdita echinocacti Timberlake, 1954, Univ. Calif. Publ. Entom., 9:360, ♂, ♀.

The following material was collected by the author in Mexico, in September, 1957.—SONORA: 1 male, 26 females, 40 miles north of Guaymas, on *Kallstroemia grandiflora*, Sept. 17; 3 females, 37 miles north of Guaymas, on *Antigonon leptopus*, Sept. 17; 11 males, Alamos, on *Kallstroemia*, Sept. 17; 1 male, Aduana, on a mallow with small cream-colored flowers, Sept. 18; 8 males, 6 females, Figueroa Ranch, near Alamos, on *Kallstroemia*, Sept. 19; 1 male, Aduana, on *Kallstroemia*, Sept. 20; 4 males, 2 females, 25 miles south of Navajoa, on *Kallstroemia*, Sept. 21; and 6 females, San Carlos Bay, on *Kallstroemia*, Sept. 23. SINALOA: 20 males, 7 females, near Las Mochis, on *Jacquemontia* sp., Sept. 22.

This species collects pollen from at least three very different flowers, namely, *Ferocactus* (Cactaceae), *Kallstroemia* (Zygophyllaceae) and *Jacquemontia* (Convolvulaceae).

Subg. *Macroterella* Timberlake

Perdita mellea Timberlake

Perdita mellea Timberlake, 1954, Univ. Calif. Publ. Entom., 9:364, ♂, ♀.

One female of this species was collected from flowers of *Euphorbia polycarpa*, 25 miles south of Navajoa, Sonora, September 21, 1957 (Timberlake).

Perdita mortuaria Timberlake

Perdita mortuaria Timberlake, 1954, Univ. Calif. Publ. Entom., 9:362, ♂, ♀; Timberlake, 1956, Univ. Calif. Publ. Entom., 11:324.

One male of *mortuaria* was collected in Alverson Pass, Coyote Mts., Imperial County, California, on *Larrea divaricata*, April 8, 1956 (R. R. Snelling).

This specimen is somewhat larger and more robust than the types from Box Canyon and the Death Valley region. The abdomen has a clearer and brighter ferruginous color, and the apical part of tergite 7 is more compressed, becoming sharply carinate medially, with a V-shaped opening beneath, the carina projecting to form a small acute tooth in dorsal view. Possibly a southern race is indicated, or the divergence in structure may be merely tied in with the greater robustness of the specimen.

Subg. *Heteroperdita* Timberlake

It is surprising to be able to report the discovery of still another species of *Heteroperdita* on *Coldenia* in the Colorado Desert of California. The three species with a yellowish or whitish abdomen marked with black spots (normally five spots on each of the internediate segments) may be separated by the following key, which works equally well for both sexes:

1. Thorax with yellow markings, in addition to the usual marks on pronotum and tubercles; legs entirely yellow 2
 Thorax dark green, the disk of mesoscutum blackish; tubercles and small posterior marks on disk of pronotum yellow; legs yellow, the femora and hind tibiae marked with black; abdomen whitish, with spots of lateral and intermediate rows circular and those in the middle triangular or more or less longer than wide, and those of intermediate rows largest
maculosa Timberlake
 2. Mark at base of propodeum, on sides of propodeum and on metapleura yellow; clypeus, transverse lateral marks, and supraclypeal mark creamy white; spots of the median row of abdomen more or less large, transverse, or forming a part of a basal band
arenaria Timberlake
- Mesonotum and metanotum dark green, with a purplish luster, the remainder of thorax yellow except a large dark blotch on sides of the mesepisternum; face entirely pale yellow below level of antennae; spots of median row of abdomen generally small, more or less longitudinal in female or quadrate in male..... *wasbaueri*, n. sp.

Perdita wasbaueri, n. sp.

(Figs. 656, 657, 730)

Female.—Head, mesoscutum, except extreme lateral margins, axillae, metanotum, and large blotch on sides of mesepisternum dark bronzy green, the exposed part of the frons and the mesoscutum with a purplish luster. Anterior part of gular region, posterior orbits to above middle of eyes, proboscis, mandibles except red tips, labrum, and face below level of antennae pale yellow. Pronotum, scutellum, sides and sternum of thorax and propodeum yellow, except the dark blotch on each side of the mesepisternum. Abdomen pale yellow or creamy white, the lateral foveae of tergite 2 black, and with small black spots on tergites 1 to 5, arranged in lateral, submedian, and median rows (with 4, 5, 5, 5, 5 spots on each segment). The spots of submedian rows (including one on each side of tergite 1) largest and circular, those of median row, except on tergite 3, more or less longer than wide and reaching from base approximately to middle of segment. Pygidial plate pale testaceous. Legs pale yellow. Antennae pale brown, with scape,

pedicel, and one or two joints of flagellum pale yellow. Tegulae yellowish at base and testaceous hyaline on outer margin. Wings whitish hyaline, the nervures pale testaceous yellow.

Head as broad as long, the eyes very large with orbits slightly diverging above. Cheeks narrow and restricted to area behind upper two-thirds of eye. Face below antennae protuberantly convex. Proboscis moderately long and somewhat exceeding the fossa and distinctly longer than in *arenaria*. Mandibles slender, acute, and reaching far margin of the fossa. Facial foveae concealed by pubescence. Pterostigma about one-half as wide as first submarginal cell, and the part of marginal cell beneath the stigma somewhat longer than the part beyond. Pygidial plate triangular, about as long as wide and acute at apex. Head and thorax very minutely tessellate, dullish, and impunctate. Pubescence white, short, dense, appressed, and concealing the surface of the frons, vertex, cheeks, mesoscutum, metanotum, and mesopleura, except that the frons has a large transverse area and the mesoscutum a longitudinally oval area on each side which are bare; clypeus and scutellum also nude, the latter with a few short erect setae. Gular region or postgenae with long stiff hairs directed obliquely inward toward the proboscis fossa. Length, about 3 mm.; anterior wing, 1.8 mm.

Male.—Similar to female in color and markings, sculpture, and pubescence. Spots of the median row of abdomen generally quadrate, with two of the angles on the median line, the spot on tergite 1 sometimes very small. Tergites 5 and 6 with three spots, or sometimes only the two submarginal spots left on tergite 6. Frons without the nude area of the female, and hair of postgenae short, more or less erect, similar to that on preoccipital ridge. Tergite 7 narrowed gradually into a large apical lobe, with an ogival or subacute apex. Subgenital plate quadrate, somewhat broader than long and a little broader at apex than at base, with a broad shallow emargination at apex and very fine setae on the moderately convex disk. Caulis of genitalia suboval, with basal orifice entirely on ventral side, the dorsal lobes separated by a deep U-shaped notch and obliquely truncate at apex; parameral lobes short and slender; inferior pair of volsellae slightly longer than the parameral lobes and armed with two minute tubercles, the superior volsellae mainly concealed and with only one tubercle at apex; fused body of sagittae broadly saclike, constricted above at middle, with the projecting process on each side at apex bent sharply outward. Length, about 2.5 mm.; anterior wing, 1.8 mm.

Eight females, 15 males (holotype female, allotype, and paratypes), Mecca, Riverside Co., California, on *Coldenia plicata*, Aug. 20 and 25, 1956 (M. Wasbauer).

Types in collection of the Citrus Experiment Station, Riverside; paratypes in collection of the University of California, Berkeley.

Subg. *Hesperoperdita* Timberlake

Perdita trisignata trisignata Cockerell

Perdita trisignata Cockerell, 1896, Proc. Acad. Sci., Phila., 48:76, fig. 14, ♀.

Perdita ruficauda Cockerell, 1916, Jour. Ent. Zool., Pomona, 8:44, ♀; Cockerell, 1923, Proc. U. S. Nat. Mus., 60(18):17, ♂ (new synonymy).

Perdita ruficauda ruficauda Timberlake, 1954, Univ. Calif. Publ. Entom., 9:376, figs. 53, 54, 143.

A reëxamination of the type of *trisignata* and comparison with specimens of *ruficauda* convinced me that the darker color of the abdomen of *trisignata* is a discoloration.

Subg. *Glossoperdita* Cockerell

Perdita hurdi Timberlake

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

Three males of *hurdi* were taken by R. C. Dickson at flowers of *Proboscidia* sp., at Oroz, Sonora, September 17, 1957. At Aduana, Sonora, two males and one female were collected at the same or a similar annual species of *Proboscidia*, September 18, 1957, by Timberlake and Dickson. The specimens from the latter

locality have the proboscis distinctly longer than usual. In the female the glossa extends nearly 4 mm. beyond the tip of the galeae, nearly equals the length of the wings, and apparently reaches the apex of the abdomen. Otherwise these specimens agree with typical *hurdi*, except that the supraclypeal area is dark in one of the males.

Perdita navarretiae navarretiae Timberlake

Perdita navarretiae Timberlake, 1958, Univ. Calif. Publ. Entom., 14:379, figs. 460, 461, 515, ♂.

Perdita navarretiae angusticeps, n. subsp.

This is similar to typical *navarretiae*, but the male is darker, with only the abdomen tinged with ferruginous, the supraclypeal area sometimes dark, or at least not so much whitened as remainder of the lower part of face, the mesoscutum more shining, with posterior part of disk more sparsely punctured, and the legs and antennae darker.

Male.—Head and thorax blue-green, the mesoscutum except margins and the scutellum black. Mandibles, except the testaceous and red apical half, labrum, and nearly all of face below level of antennae white; the lower margin of supraclypeal area and two stripes on disk of clypeus sometimes faintly pale brown, or the stripes on clypeus and supraclypeal area more definitely fuscous. Lateral marks obliquely truncate at level of antennal sockets and extending on orbits a little above that level. Usual pair of dark dots on clypeus lacking. Tubercles and interrupted band on hind margin of disk of pronotum white. Abdomen fuscous above, more or less tinged with reddish brown, the apical part of tergite 6, tergite 7, and the venter ferruginous. Tergites 1 to 2, or 3, or 4, with a narrow white subapical band, broadly interrupted on each side, the bands on tergites 3 and 4, if present, tending to be represented only by lateral spots. Legs blackish, the coxae and trochanters ferruginous, the extreme apex of front and middle femora, anterior side of front tibiae and spot at base of middle tibiae pale yellow, the remainder of outer side of middle tibiae and the tarsi ferruginous, and hind tibiae ferruginous, tinged with fuscous. Antennae blackish, the flagellum except three basal joints broadly yellowish brown beneath. Tegulae testaceous hyaline, the base with a white spot. Wings dusky hyaline, the nervures dilute fuscous, with subcosta and margins of stigma darker fuscous.

In structural characters, sculpture, and pubescence agreeing closely with *navarretiae*, the mesoscutum slightly more shining and a little more sparsely punctured on the posterior middle of disk. Abdomen less depressed and narrower than in *navarretiae*. Proboscis in repose probably reaching the front coxae. Length, about 3.6–4.5 mm.; anterior wing, 2.5–2.9 mm.

Female.—Head and thorax dark blue-green, the labrum, clypeus, supraclypeal area, subantennal plates, and mesonotum black. Lateral marks of face, and sometimes a spot on base of mandibles white, the lateral marks strongly oblique on inner margin and reaching level of antennae and the anterior end of foveae. Pronotum with interrupted band on hind margin of disk and the tubercles white. Abdomen fuscous, somewhat tinged with brown, with a white subapical band on tergites 1 to 4, the bands interrupted on each side and usually in the middle, the submedian spots small and the lateral marks large and oblique. Pygidial plate rufous, the venter dark. Legs blackish, the front and middle knees slightly whitish. Antennae blackish, becoming more brownish toward apex, the flagellum yellowish brown beneath except at base. Tegulae and wings as in the male.

Head about one and one-half times longer than wide, the inner orbits moderately diverging anteriorly. Mandibles simple, tapering, and nearly reaching far margin of proboscidial fossa. Proboscis moderately elongate and well exceeding the fossa. Facial foveae long and slender, close to margin of eyes and reaching from level of middle of antennal sockets nearly three-fourths of distance to level of anterior ocellus. A triangular elevation extending from supraclypeal area well onto frons, and above this a strongly impressed median line to anterior ocellus. Lower face

convex and prominent, the cheeks broad posteriorly but tapering almost to a point beneath anterior end of eyes. Wings and venation very nearly as in *pelargoides*. Pygidial plate narrowly triangular and acute at apex. Head and thorax minutely and nearly uniformly tessellate and moderately dullish. Frons and vertex with minute moderately close punctures, those of mesonotum slightly coarser and sparse and those of clypeus distinctly closer. Pubescence whitish, moderately long and rather thin, but hair of frons, vertex, and mesonotum extremely short and sparse. Length, about 4.5 mm.; anterior wing, 2.9 mm.

Eleven males, 3 females (holotype male, allotype, and paratypes), 5 miles west of Pinecrest, Tuolumne Co., California, June 30, 1957 (R. R. Snelling and M. D. Stage).

Types in collection of the Citrus Experiment Station, Riverside, and paratypes in the Snelling collection.

Subg. *Epimacrotera* Timberlake

It is now becoming evident that *Glossoperdita* and *Epimacrotera* may intergrade more or less completely. In typical *Glossoperdita* the tongue is very long, in the forms *navarretiae* and *angusticeps* moderately long, and in two species of *Epimacrotera*, namely, *nigrocaerulea* and *nigriventris*, which have the head longer than wide, the proboscis is still shorter and hardly exceeds the fossa in repose. In other species of *Epimacrotera* with a broad head the proboscis is even more abbreviated. *Epimacrotera*, therefore, may still be used for those species in which the proboscis does not or only slightly exceeds the proboscidial fossa in repose.

Perdita nanula, n. sp.

Because of the small and rather narrow pterostigma, *nanula* is provisionally placed in *Epimacrotera* although more material is needed to confirm its position. In the key to the species of *Epimacrotera* (Univ. Calif. Publ. Entom., 9:378) it runs to couplet 6 for the mesonotum is distinctly tessellate and the abdomen without markings. It is more similar to *binotata* than to *diversa* and is distinguished by the tessellate but rather shining frons and mesonotum, by the entirely dark color except the white tubercles, and by the brassy green mesonotum.

Female.—Head and thorax bluish green, the mesonotum with a brassy luster, the labrum, clypeus, and anterior part of lateral plates of face to level of summit of clypeus black. Tubercles white, but no other light markings. Abdomen blackish, the pygidial plate ferruginous. Legs blackish, the apical joint of tarsi pale brown, and front and middle knees with a small white spot. Mandibles blackish at base and rufotestaceous and red on apical half. Antennae fuscous, the flagellum yellowish brown beneath except at extreme base. Tegulae testaceous hyaline, the base brownish. Wings moderately dusky hyaline, the subcosta and margins of stigma fuscous, the other nervures more dilutely colored.

Head considerably broader than long, the inner orbits of eyes slightly diverging above. Proboscis short, the galeae not reaching more than halfway to base of stipites when folded in repose. Mandibles rather stout, with a small inner tooth, and not reaching far margin of the proboscidial fossa. Facial foveae slender, somewhat more than their own width from margin of eyes and reaching from level of middle of antennal sockets about halfway to level of anterior ocellus. Pterostigma shorter than the first submarginal cell and no more than half as wide; marginal cell with the part beyond the stigma distinctly longer than the part beneath; second submarginal cell narrowed somewhat more than one-half to radius. Pygidial plate moderately broad and narrowed to the rounded apex. Frons, vertex, and mesonotum distinctly tessellate, but only moderately dullish, the frons with close, fine punctures and the vertex and mesonotum with much sparser punctures. Black part of face smooth and shining, with close punctures, which are a little coarser than those of frons. Pubescence whitish, rather short, fine, thin and erect, the

hair of mesonotum becoming considerably shorter on the posterior part of disk. Length, about 3.5 mm.; anterior wing, 2.5 mm.

One female (holotype), 11 miles east of Douglas, Cochise Co., Arizona, on *Euphorbia albomarginata*, Sept. 24, 1955 (Timberlake), in collection of the Citrus Experiment Station, Riverside.

The type was taken with a series of a small, similarly colored but highly polished species of *Perdita* (s. str.), which is still undescribed.

Perdita euphorbiae Timberlake

Perdita euphorbiae Timberlake, 1954, Univ. Calif. Publ. Entom., 9:380, ♀, ♂.

Two males and four females of *euphorbiae* were collected at flowers of *Kallstroemia* and *Euphorbia*, five miles south of Navajoa, Sonora, Mexico, September 21, 1947 (Timberlake and Dickson).

Subg. *Cockerellia* Ashmead

Perdita beata beata Cockerell

Perdita beata Cockerell, 1895, Psyche 7, Suppl., 1:10; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:99, ♀.

Perdita perpulchra Cockerell, 1897, Ann. Mag. Nat. Hist. (6)19:398, ♂ (not Cockerell, 1896).

In Part II of this revision (Univ. Calif. Publ. Entom., 11:327) I showed that *P. baileyae* Cockerell is the true male of *perpulchra*, and suggested that the male described in 1897 as *perpulchra* was probably the male of *beata*. A male collected in the foothills, three miles east of Mesilla Park, September 14, 1957, at flowers of *Verbesina encelioides*, agrees with Cockerell's description of the male which he assigned to *perpulchra* and which was collected on the college campus, Mesilla Park, on *Verbesina*, September 16, 1895. My specimen is undoubtedly the male of *beata* and is also unquestionably conspecific with the male of *P. signata* Timberlake. Therefore, *beata* and *signata* may be considered races of one species, and it is possible that a good series of *beata* from New Mexico would show some intergradation with *signata*.

One female of *beata* has been taken in the Davis Mountains, Jeff Davis County, Texas, June 21, 1949 (D. J. and J. N. Knull).

Perdita albipennis Cresson

Perdita albipennis Cresson, 1868, Trans. Amer. Ent. Soc., 1:368, ♀.

Perdita hyalina Cresson, 1878, Trans. Amer. Ent. Soc., 7:68, ♂ (new synonymy).

Examination of the types of *albipennis* and *hyalina* at Philadelphia revealed that both have the opaque, impunctate frons that has been associated by me with *P. lacteipennis*, *canadensis*, and *palidipennis*. On the other hand the species with comparatively shining and punctate frons which I have called *P. albipennis* must now be known as *P. lingualis* Cockerell. The older records under the name *albipennis* are probably mixed, some based on true *albipennis* and some on *lingualis*. Both species occur in New Mexico, but the true *albipennis* is probably much more abundant there than *lingualis*. The var. *helianthi* Cockerell (type female examined at Washington) agrees closely with the type of *albipennis*. The following names, therefore, have been applied to forms of *albipennis*: *hyalina* Cresson, male, *helianthi* Cockerell, female (the male not examined), *parsonis* Cockerell, male;

lacteipennis Swenk and Cockerell, *pallidipennis* Graenicher, and *canadensis* Crawford. Of these, only in *pasonis* was the frons specifically described as dull. The form that Cockerell distinguished as *P. heliophila* apparently flies with *albipennis* in New Mexico, and the two apparently fully intergrade. The recognition of subspecies is complicated by the variability of *albipennis* in New Mexico, but possibly we should recognize four subspecies, namely, *P. albipennis albipennis* in the southwest, *P. albipennis lacteipennis* on the western plains, *P. albipennis pallidipennis* in eastern Kansas and Nebraska eastward, and *P. albipennis canadensis* in northern localities.

Perdita lingualis Cockerell

Perdita albipennis var. *lingualis* Cockerell, 1896, Proc. Acad. Sci., Phila., 48:105, ♀.

Perdita albipennis Timberlake, 1954, Univ. Calif. Publ. Entom., 9:400, ♀, ♂.

All the references under *albipennis* by Timberlake belong to this species, but some of the others, except the original description, include both species. Specimens of *lingualis* in my collection determined by Cockerell as *albipennis* are from Grand Junction and La Junta, Colorado, Las Cruces, New Mexico, and Lincoln, Nebraska, but some of the records of *albipennis* from eastern Nebraska may be based on specimens of *pallidipennis*. I have seen *lingualis* from Utah, Colorado, Nebraska, Kansas, Texas, New Mexico, and Timaupilas, Mexico.

Allomacrotera, n. subg.

Type.—*Perdita stephanomeriae* Timberlake.

With the discovery of the male of *stephanomeriae* we find that it differs too much in important characters from *P. albonotata* to remain in *Procockerellia*, and we must conclude that it has had a different origin. There is good reason to believe that *Procockerellia* was derived from a *Cockerellia*-like ancestral stock, and that *stephanomeriae* has much more in common with *Hexaperdita*, *Xeromacrotera*, and *Callomacrotera*.

Male.—Having general characters and appearance of *Procockerellia*, but claws of hind tarsi bifid and the flanks of pronotum normal, not deeply furrowed as in *Procockerellia* and *Cockerellia*. Proboscis moderately elongate, the maxillary palpi three-jointed. Seventh tergite tapering to a narrow apex, which has an obscure angle on each side and a small acute angle in middle. Aedeagus more similar to the genitalia of *Hexaperdita* than to those of any other group.

Perdita stephanomeriae Timberlake

(Figs. 658, 659, 731)

Perdita stephanomeriae Timberlake, 1954, Univ. Calif. Publ. Entom., 9:404, ♀.

Male.—Head and thorax shining bluish green, the disk of mesoscutum and scutellum presumably black (but concealed by a coarse pin). Anterior third of cheeks, mandibles except testaceous and reddish apex, labrum, clypeus, lateral marks, and large mark on subantennal plates white. Two short longitudinal marks on upper margin of disk of clypeus, sutures of subantennal plates, especially a small spot at anterior end of plates and the broad margin surrounding a green mark on supraclypeal area blackish. Lateral marks transverse below, emarginate on inner margin, and ending acutely on orbits at level of antennae. Collar of pronotum, two spots on posterior margin of disk, and tubercles white. Abdomen brown, the venter and tergite 7 testaceous, the middle of ventral segments 2 to 4 suffused with brown. Legs brown, a spot on outer side of front

trochanters, knees of all legs, anterior side of front tibiae, incomplete stripe on middle tibiae, and all tarsi yellowish white. Antennae fuscous, the scape broadly white beneath and the underside of flagellum pale yellowish. Tegulae whitish at base and pale testaceous hyaline on outer margin. Wings milky hyaline, the nervures pallid, the subcosta and stigma testaceous yellow, the margins of stigma pale brown.

Head rounded in outline except for an anterior truncation, slightly broader than long and somewhat broader than thorax. Cheeks moderately broad and rounded. Mandibles long, strongly curved, very acute, with apical fourth abruptly narrowed on inner margin. Proboscis moderately elongate, distinctly exceeding the fossa, the glossa probably reaching the front coxae. Flanks of pronotum no more than normally impressed, the posterior corners of the disk not prominent. Tergite 7 considerably narrowed to the slightly tridentate apex. Claws of all tarsi bifid. First joint of flagellum longer than pedicel or following joint as in *albonotata*. Head and thorax polished and shining, the frons with minute punctures which become close in area between antennal sockets and margin of eye on each side of face. Punctures of mesonotum apparently rather close and minute. Pubescence whitish, fine, moderately abundant, long and erect, but becoming moderately short on face and mesonotum. Subgenital plate, much longer than wide and tapering, but apical half narrow and nearly parallel-sided, carinately ridged in the middle beneath and with fine dense hair; basal arms short and horizontal. Caulis of aedeagus broadest at base, with great depth dorsoventrally, and deeply semicircularly emarginate above, the dorsal lobes at first narrowly separated by a fissure and diverging in the apical third of their length; caulis also with a curious thickening of the side walls, apparently to support the base of parameral lobes and showing as an oval swelling on each side in dorsal view and as a semicircular thickening in lateral view; parameral lobes broad at base, tapering, incurved, and finely hairy on outer surface, but the hair hardly visible except in lateral view; two pairs of vibrissae, with the usual tubercles extremely fine; fused body of sagittae broad in dorsal view with two short prongs at the rounded apex, and moderately slender as seen from the side. Length, 5.5 mm.; anterior wing, 4 mm.

One male, 5 miles west of Essex, San Bernardino Co., California, on *Dalea spinosa*, June 30, 1952 (R. H. and L. D. Beamer, C. Liang, and W. La Berge).

Subg. *Pentaperdita* Cockerell and Porter

Perdita amoena Timberlake

Perdita amoena Timberlake, 1956, Univ. Calif. Publ. Entom., 11:330, ♂; Timberlake, 1958, Univ. Calif. Publ. Entom., 14:386, ♀.

An additional male was collected three miles southwest of Agua Prieta, Sonora, August 26, 1957 (J. C. Schaffner). The species is new to Mexico.

Perdita chrysophila Cockerell

(Figs. 660, 661, 732)

Perdita chrysophila Cockerell, 1896, Jour. New York Ent. Soc., 4:206, ♂.

The specimen from Hollywood, New Mexico, recorded in Part II of this revision (p. 331), has been compared with the type in the U. S. National Museum and found to be the true *chrysophila*. Fortunately, the type male has the genitalia protruded far enough to afford an examination of these critical parts.

Male.—Head and thorax dark blue-green, the clypeus, disk of mesoscutum, scutellum, and metanotum black. Abdomen blackish, the apical depression of tergites subhyaline. No light markings. Antennae and legs brownish fuscous, the flagellum dark brown beneath. Tegulae pale brown, broadly subhyaline on outer margin. Wings hyaline, appearing whitish in some lights, the nervures pale testaceous, the subcosta and margins of stigma brown.

Head distinctly broader than long, somewhat narrowed and rounded posteriorly, the cheeks broad and simple and broadest opposite summit of eyes and narrowed gradually anteriorly. Flanks of pronotum well impressed, the impression forming an obtuse emargination in lateral margins of the disk as seen from above. Abdomen ovate, depressed. Vertex of head finely tessellate and dull, the tessellation gradually weakening anteriorly, the face including most of frons shining and becoming polished anteriorly. Frons and sides of face opposite antennae with fine, distinct, and rather sparse punctures. Thorax polished, minutely punctured, the punctures becoming very remote on disk of scutum and scutellum. Pubescence sparse, moderately long, erect, and whitish. Aedeagus more similar to *annexa* than to *nigroviridis*, but distinctive; parameral lobes of caulis narrow and more acuminate as seen in lateral view than in *annexa*, and projecting fold in dorsal wall of caulis is truncate as seen from side instead of rounded; fused body of sagittae as seen from above much more massive, with the apical half narrowed only slightly toward the base, and in lateral view thickest at the middle and curved upward at tip. The subgenital plate is broader than in *annexa* and not narrowed toward base. Length, about 5 mm.; anterior wing, 3.9 mm.

One male, Hollywood, New Mexico, Sept. 17 (R. H. Crandall); and 1 male (holotype), Organ, 5,100 feet, Dona Ana Co., New Mexico, on *Verbesina encelioides*, Sept. 28 (Cockerell).

Perdita annexa, n. sp.

Perdita chrysophila Cockerell, 1904, Entomologist, 37:6; Timberlake, 1954, Univ. Calif. Publ. Entom., 9:406, figs. 93, 94, 162, ♂ (not Cockerell, 1896).

The male specimen from Pecos, New Mexico, determined by Cockerell as a variety of *chrysophila* is now known to be distinct. Cockerell claimed that it is bluer than the type of *chrysophila*, but I do not believe that anyone could distinguish the two species satisfactorily on the basis of color; however, *annexa* has the mesonotum slightly duller, the cheeks considerably broader, and flanks of the pronotum more deeply impressed and forming an acute emargination in lateral margins of the disk in dorsal view.

Male.—Head and thorax dark bluish green, the anterior border of face, including clypeus, posterior middle of mesoscutum, and scutellum brownish fuscous. Abdomen, legs, and antennae brownish fuscous, with the apical depression of tergites whitish subhyaline. Mandibles dark testaceous, the margins of base somewhat infuscated, the apex reddened. Tegulae testaceous, darker at base, and subhyaline on outer margins. Wings whitish hyaline, the nervures pale testaceous, the margins of stigma and subcosta pale ferruginous.

Head distinctly broader than long and subquadrate, the cheeks broader than the eyes, and narrowed strongly on anterior third. Disk of clypeus nearly twice broader than high, the lateral extensions strongly inflexed and hardly visible in frontal view. Mandibles large, tapering from somewhat dilated base, acute at apex, and each reaching nearly to base of the other. Facial foveae about three to four times longer than wide. Proboscis of moderate length, the maxillary palpi about one-third as long as the galeae, which about equal the stipites in length. Flank of the pronotum deeply impressed, the anterior wall of the groove strongly elevated and carinate, the disk not abbreviated, but the lateral margins acutely notched by the impression, the transverse suture deeply impressed and strongly sinuate, and the posterior corners rounded but only moderately prominent. Pterostigma hardly more than half as wide as the first submarginal cell; marginal cell with part beyond the stigma distinctly longer than the part beneath. Head and thorax sculptured very nearly as in *chrysophila*, but the vertex less strongly tessellate, and the mesoscutum faintly tessellate around the margin and on at least the anterior third. Pubescence not materially different from *chrysophila*. Subgenital plate about five times longer than wide, a little narrowed toward base and subacute at apex. Caulis of genitalia with strong submedian folds, which are acute at apex as seen from above and rounded at apex in lateral view and project over the sagittae; parameral lobes moderately wide and tapering to acute apex

as seen both from above and from the side; fused body of sagittae moderately thickly fusiform and a little swollen subapically, and more slender and tapering in lateral view. Length, about 4.8 mm.; anterior wing, 3.5 mm.

One male (holotype), Pecos, San Miguel Co., New Mexico, on *Hymenoxys richardsoni*, Aug. 21, 1903 (W. P. Cockerell), in collection of Citrus Experiment Station, Riverside.

Subg. *Alloperdita* Viereck

Perdita obscurata Cresson

Perdita obscurata Cresson, 1878, Trans. Amer. Ent. Soc., 7:70, ♀ (excluding ♂).

Perdita carolina Timberlake, 1952, Proc. Ent. Soc. Wash., 54:199, ♀, ♂; Timberlake, 1956, Univ. Calif. Publ. Entom., 11:274, figs. 213, 214, 307 (new synonymy).

Doctor T. B. Mitchell has informed me that after examination of the type of *P. obscurata* he concluded that it was the same as *P. carolina* Timberlake. I also have examined the type and can confirm this synonymy. The species that has been called *obscurata* for many years has a short broad glossa, and the palpi also short, with the terminal joints only a few times longer than thick. The proboscis in the type of *obscurata* is retracted and mainly concealed by posture of head, but I was able to expose the tips of the palpi by removing adhering dirt with a fine brush and water. The terminal joints of the palpi were found to be long and slender, so that there is no doubt of the synonymy of *carolina*.

Perdita bradleyi Viereck

Perdita obscurata Cresson, 1878, Trans. Amer. Ent. Soc., 7:70 ♂; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:59, ♀; Timberlake, 1928, Amer. Mus. Novitates, 321:7; Timberlake, 1956, Univ. Calif. Publ. Entom., 11:274, figs. 211, 212, 306 (not Cresson, 1878, ♀).
Perdita bradleyi Viereck, 1907, Ent. News, 18:393, ♂.

Although Cresson stated that he was describing *obscurata* from two specimens, I found one male and three female additional specimens in the Cresson collection labeled "Ga." like the types. All these specimens as well as the allotype male of *obscurata* belong with *P. bradleyi* Viereck. Cockerell, in redescribing *obscurata* in 1896, thought he had the type female before him, but he must have had one of these additional females, for he found that it disagreed with Cresson's description in some details.

Subg. *Perditella* Cockerell

Perdita larreae Cockerell

Perdita larreae Cockerell, 1896, Proc. Acad. Sci., Phila., 48:62, ♂; Timberlake, 1956, Univ. Calif. Publ. Entom., 11:268, figs. 203, 204, 304.
Perdita larrearum Cockerell, 1896, Proc. Acad. Sci., Phila., 48:63, ♀.

A series of this species was collected where Highway 70 crosses Goodwin Wash, near Geronimo, Graham County, Arizona, at flowers of *Aplopappus heterophyllus* and *Baccharis glutinosa*, September 15, 1957 (Timberlake and Dickson). About one-fourth of the females are brown or nearly so and the remainder entirely dark, except for a few intermediate specimens.

Perdita marcialis Cockerell

Perdita marcialis Cockerell, 1896, Proc. Acad. Sci., Phila., 48:62, ♂; Timberlake, 1956, Univ. Calif. Publ. Entom., 11:269, figs. 205, 206, ♂, ♀.
Perdita phaceliae Cockerell, 1898, Ann. Mag. Nat. Hist. (7)2:450, ♀; Cockerell, 1902, Amer. Nat., 36:811; Cockerell, 1907, Ann. Mag. Nat. Hist. (7)20:130 (new synonymy).

P. phaceliae was described from specimens collected at La Cueva, Organ Mountains, at about 5,000 feet elevation, Dona Ana County, New Mexico, at flowers of *Phacelia*, September 2, 1898 (C. H. T. Townsend). I have not seen the type, but specimens from Alamogordo, Otero County, New Mexico, determined by Cockerell, agree exactly with the description and with the female of *marcialis*.

Subg. *Perdita* F. Smith

HALICTOIDES GROUP

Perdita halictoides F. Smith

Perdita halictoides F. Smith, 1853, Cat. Hym. Brit. Mus., 1:128, ♀; Timberlake, 1958, Univ. Calif. Publ. Entom., 14:371.

Perdita sexmaculata var. *punctata* Cockerell, 1896, Proc. Acad. Sci., Phil., 48:91, ♀; Cockerell, 1897, Ent. News, 8:24 (new synonymy).

Perdita punctata Cockerell and Porter, 1899, Ann. Mag. Nat. His. (7)4:416; Swenk and Cockerell, 1907, Ent. News, 18:56.

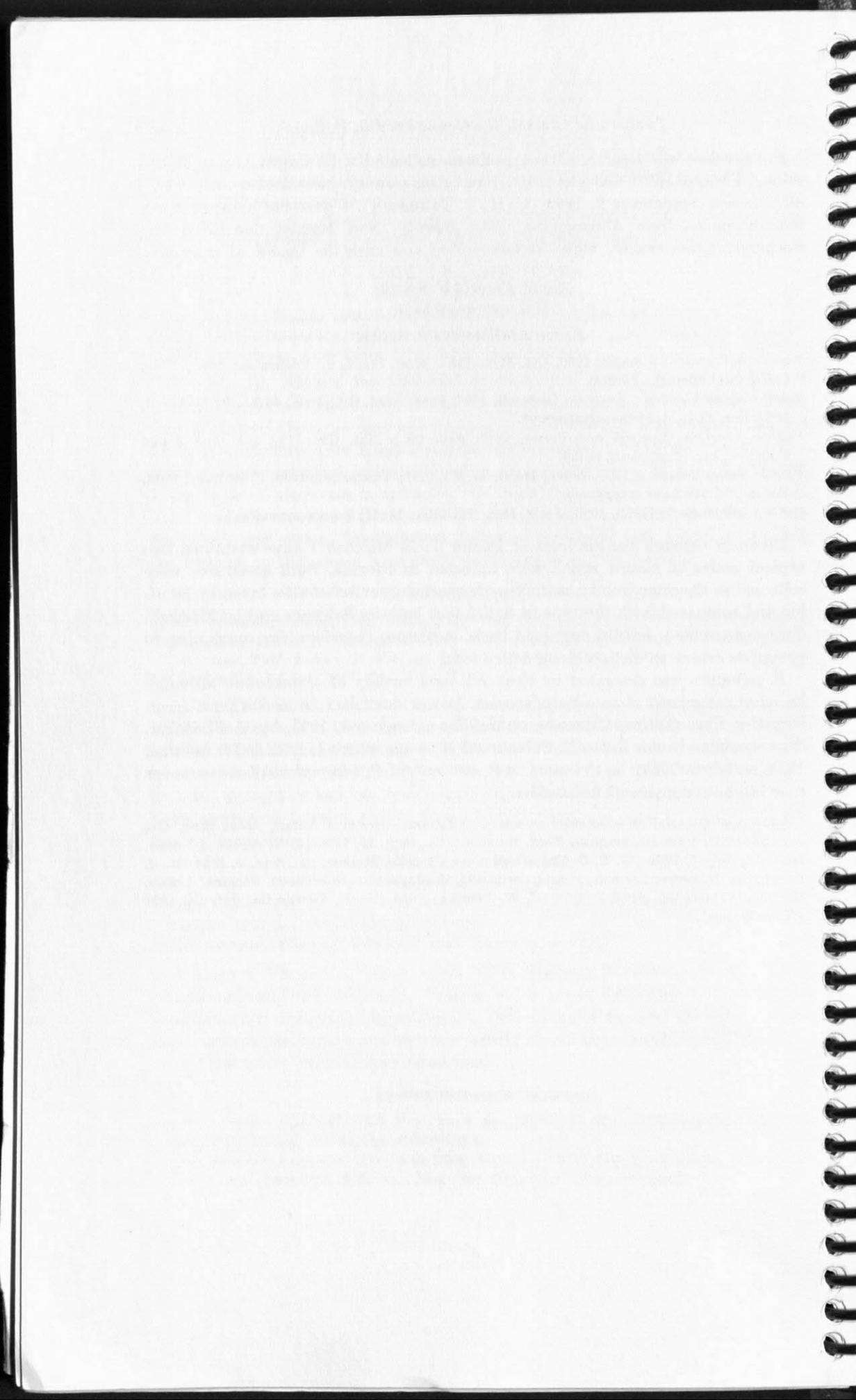
Perdita maura Cockerell, 1901, Entomologist, 34:191, ♀, ♂; Timberlake, 1958, Univ. Calif. Publ. Entom., 14:370 (new synonymy).

Perdita bisignata Cockerell, 1922, Amer. Mus. Novitates, 33:11, ♀ (new synonymy).

Recently through the kindness of Doctor T. B. Mitchell I have examined two typical males of *maura* which were collected in Florida. Both specimens were collected in the same county as the female specimens of *halictoides* taken by Bradley and compared with the type of *halictoides* both by Schwarz and by Mitchell. There can remain hardly any good basis or reason, therefore, for continuing to recognize *maura* as distinct from *halictoides*.

P. punctata was described by Cockerell as a variety of *sexmaculata* although he later recognized it as a good species. It was described from one female collected at Fort Collins, Colorado, on *Solidago*, August 8, 1895, by C. F. Baker. This specimen is now in the U. S. National Museum, where I examined it in June, 1958, and found it to be the same as *P. maura* and *P. bisignata*. All these names now fall as synonyms of *halictoides*.

Additional material of *halictoides* examined as follows.—IOWA: 1 female, Ames, Story Co., June 23, 1925; 1 female, Sergeant Bluff, Woodbury Co., Sept. 19, 1930 (C. N. Ainslie); 1 male, Iowa Co., July 7, 1934 (W. E. Dodds). MICHIGAN: 1 female, Midland Co., Sept. 2, 1944 (R. R. Dreisbach). ILLINOIS: 1 female, 1 male, Carlinville, Macoupin Co. (Robertson). FLORIDA: 1 male, Daytona, Volusia Co., April 7, 1914 (C. W. Johnson); and 1 male, Volusia Co., July 24, 1954 (H. V. Weems).

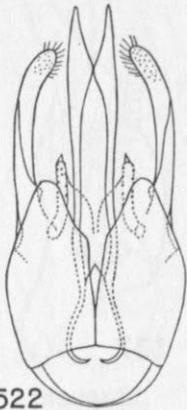


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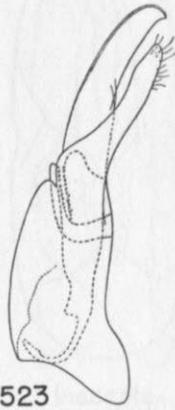
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- numerata numerata (Perdita), 572, 573, 688
- octomaculata octomaculata (Perdita), 642, 643, 723
- paroselae (Perdita), 578, 579, 691
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- plucheae (Perdita), 584, 585, 694
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- retusa (Perdita), 608, 609, 706
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- wasbaueri (Heteroperdita), 656, 657, 730
- xanthochroa (Perdita), 530, 531, 666
- xanthodes (Perdita), 528, 529, 665



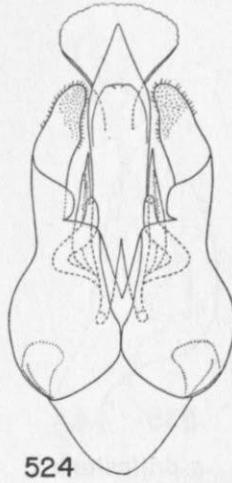
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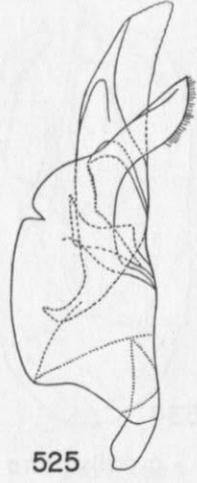
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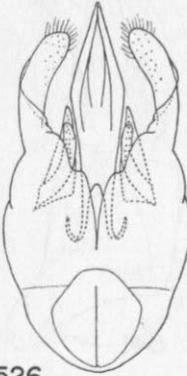
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525

perixantha



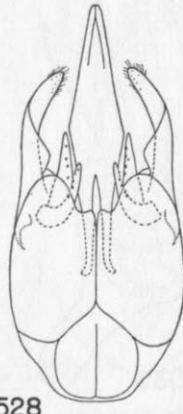
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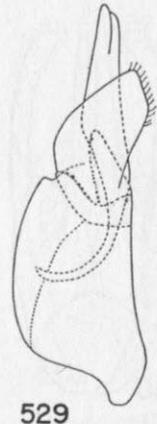
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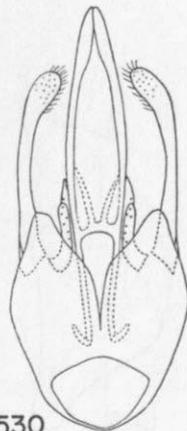
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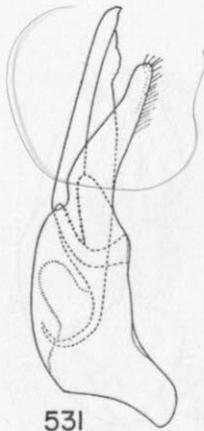
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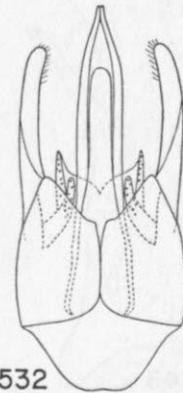
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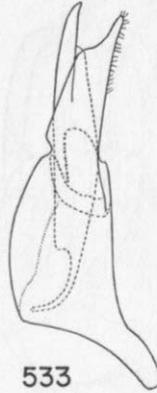
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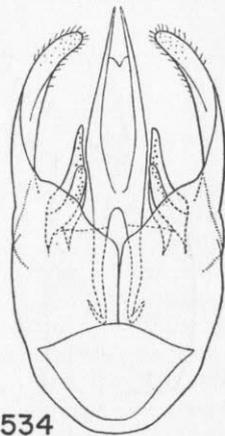
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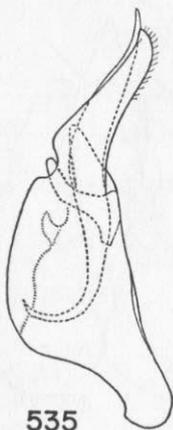
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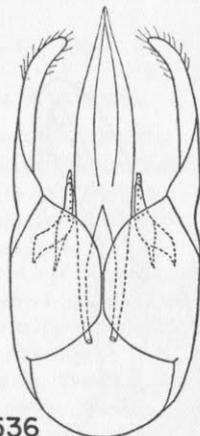
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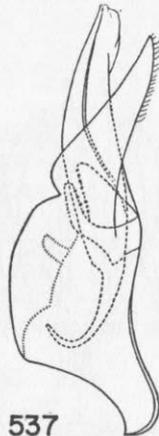
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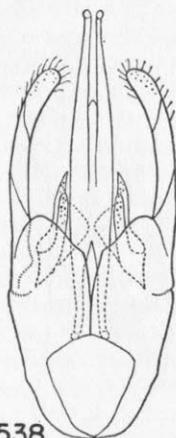
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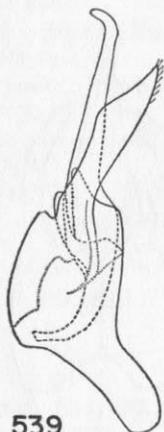
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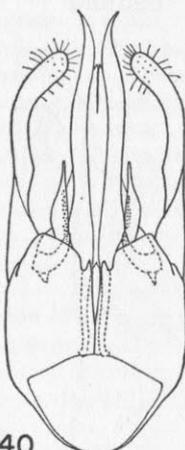
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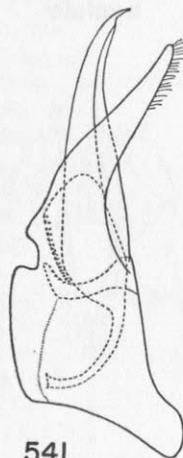
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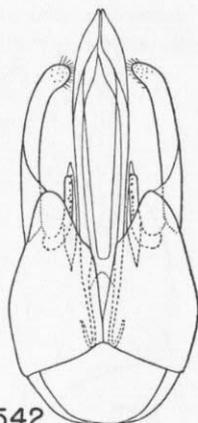
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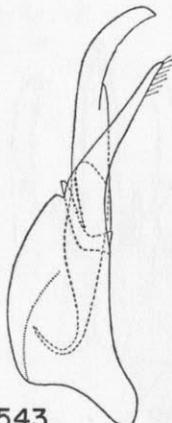
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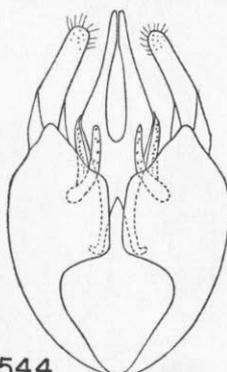
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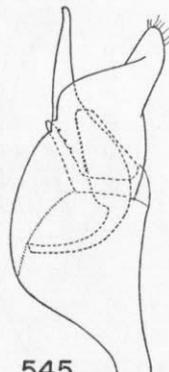
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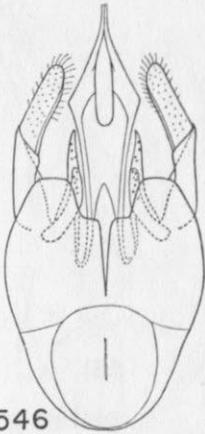
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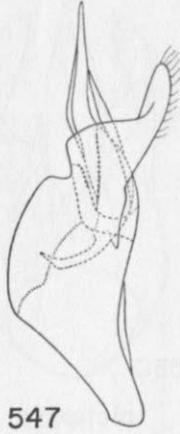
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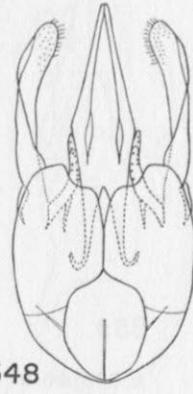
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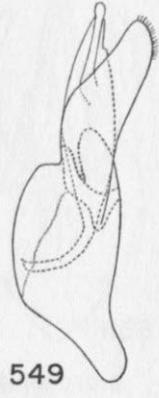
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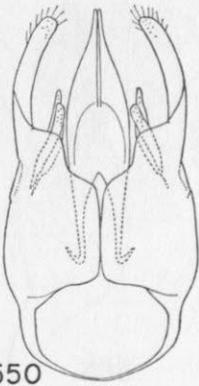
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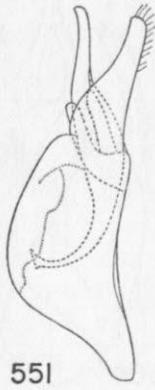
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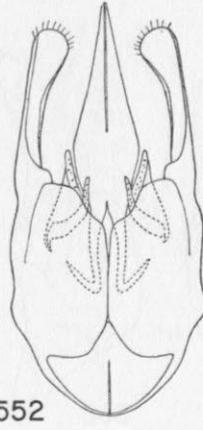
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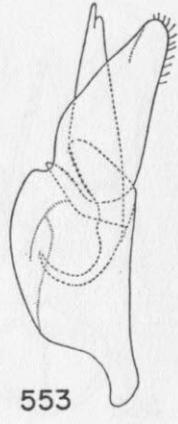
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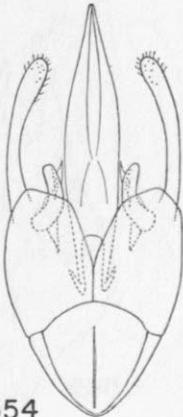
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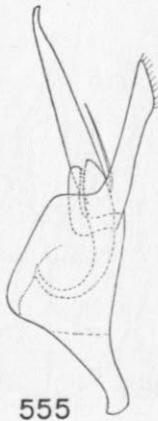
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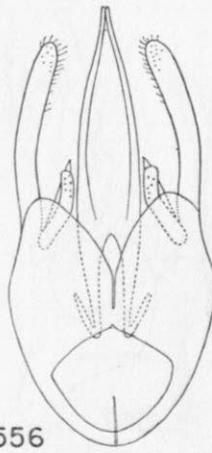
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dilecta



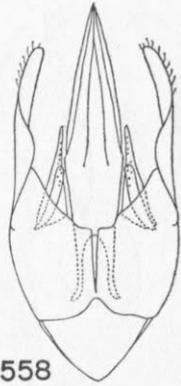
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labergei



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labergei



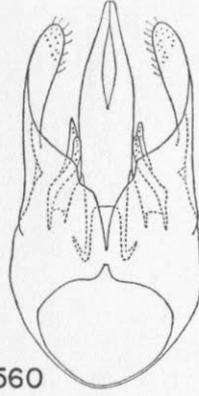
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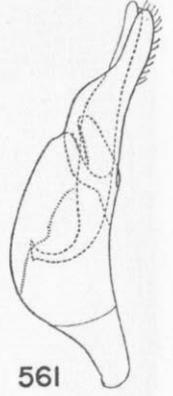
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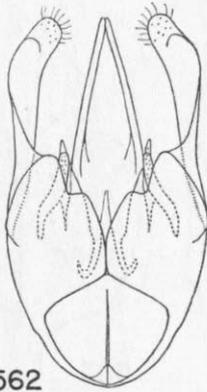
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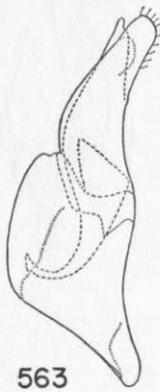
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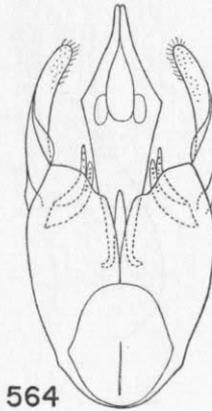
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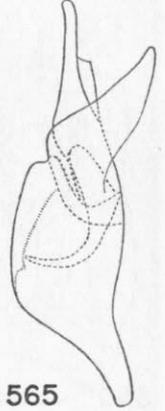
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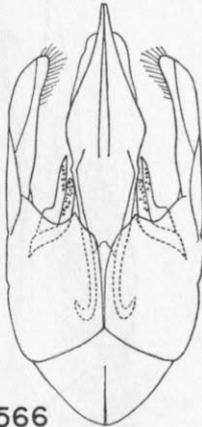
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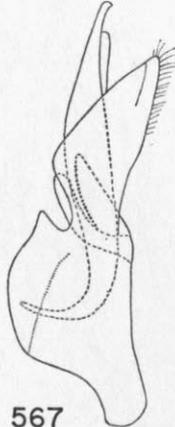
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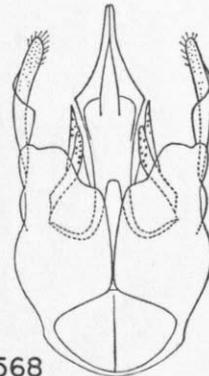
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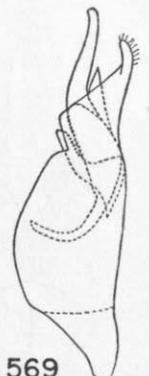
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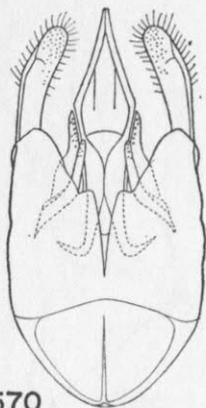
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elegans



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elegans



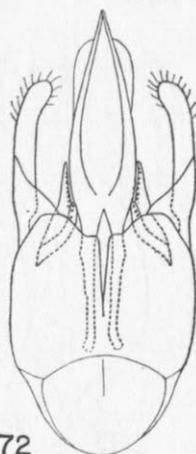
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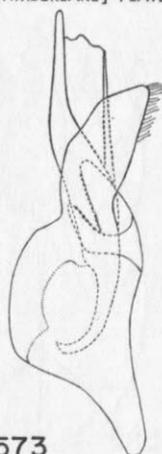
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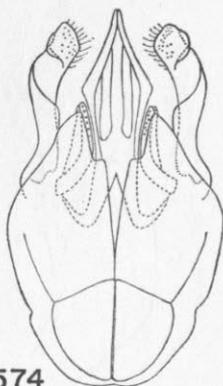
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n. numerata



573

n. numerata



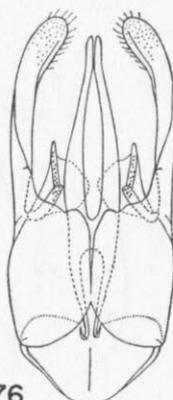
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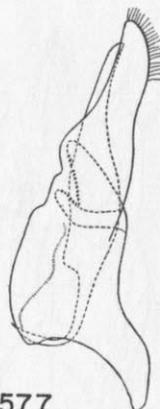
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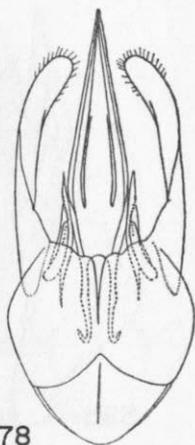
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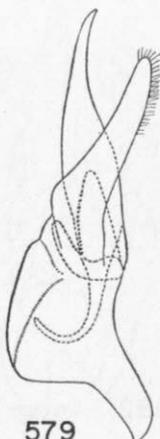
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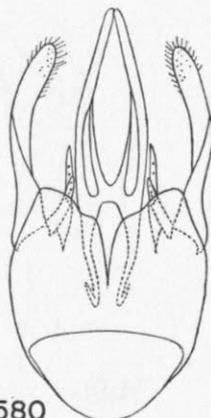
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paroselae



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paroselae



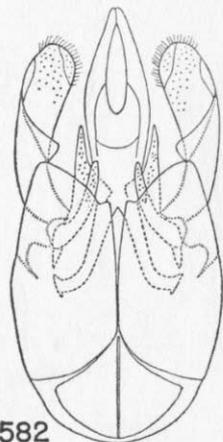
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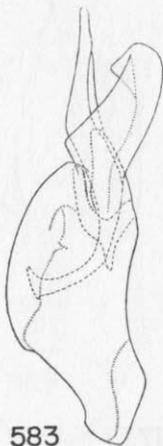
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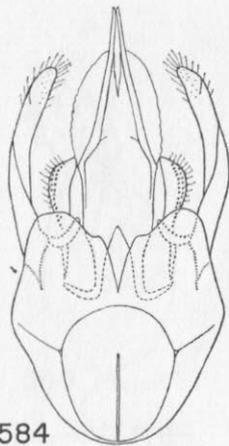
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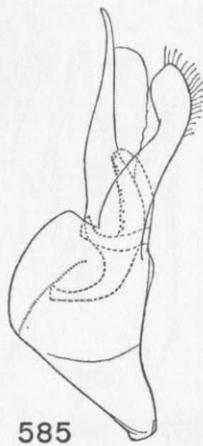
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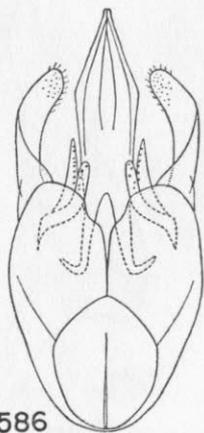
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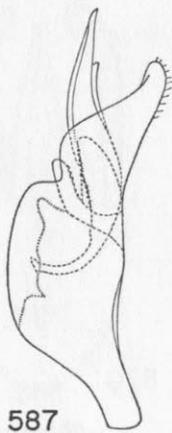
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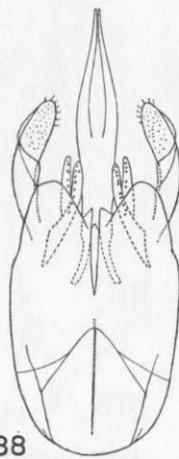
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nitidella



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nitidella



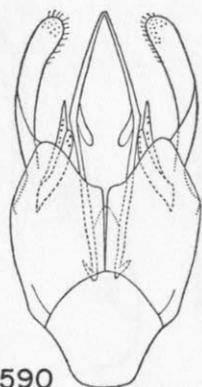
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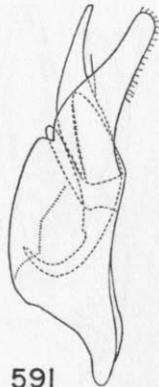
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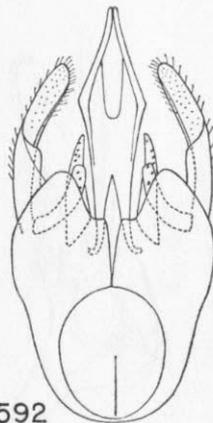
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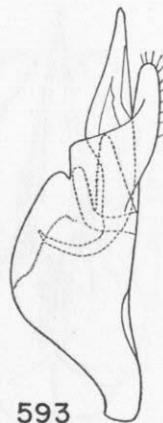
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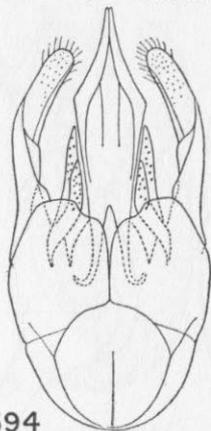
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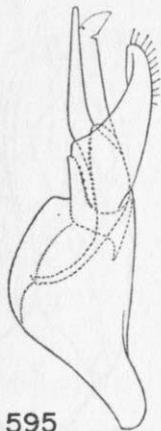
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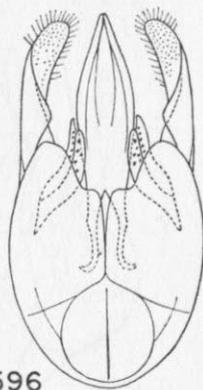
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gutierreziae



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gutierreziae



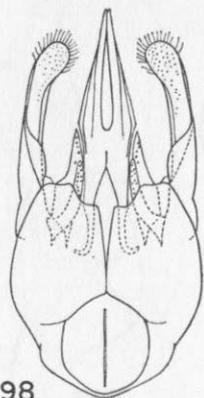
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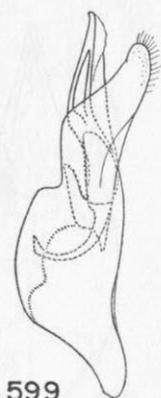
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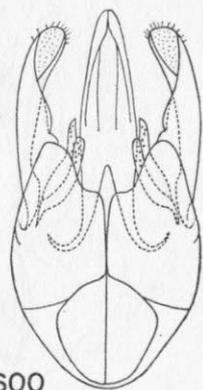
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s. antiochensis



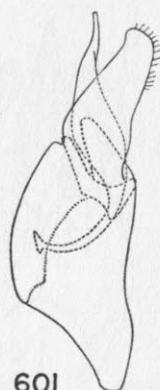
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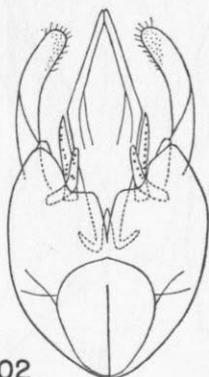
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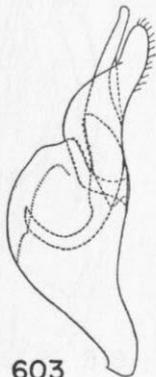
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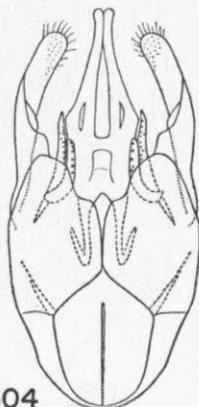
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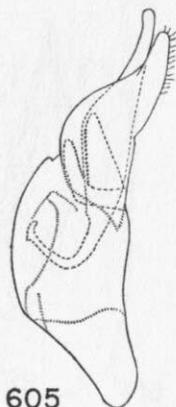
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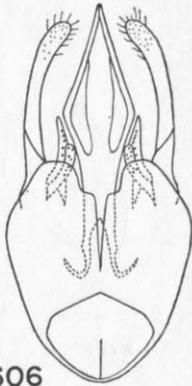
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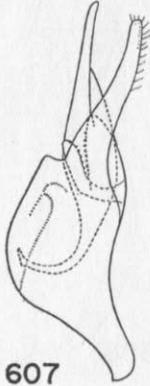
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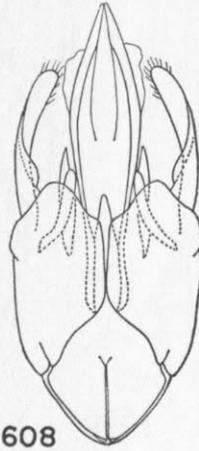
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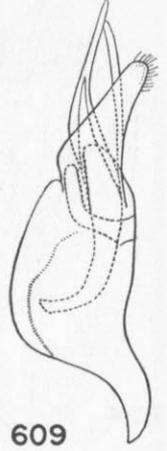
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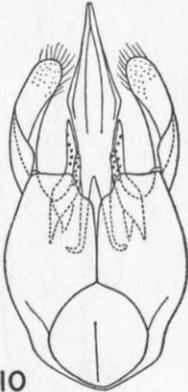
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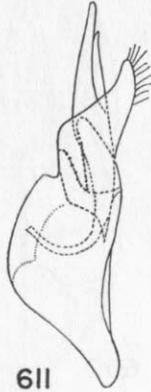
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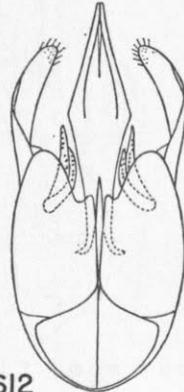
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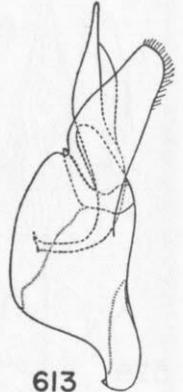
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ensenadensis



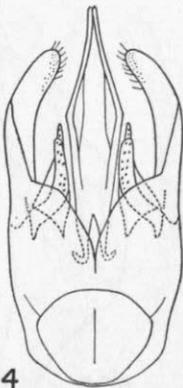
612

halli



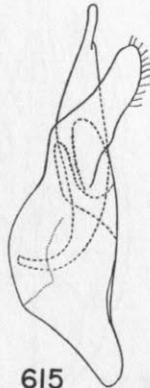
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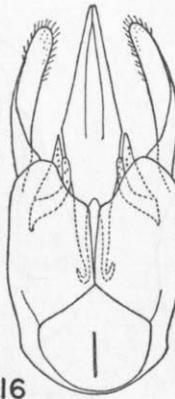
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pectidis



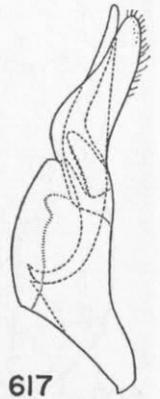
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pectidis



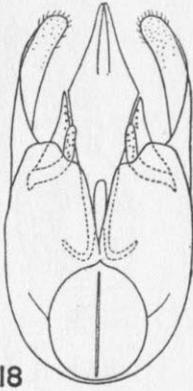
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cognata



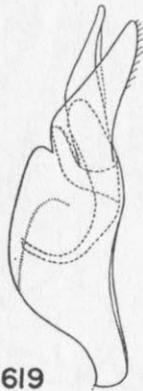
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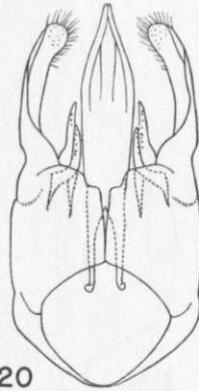
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translineata



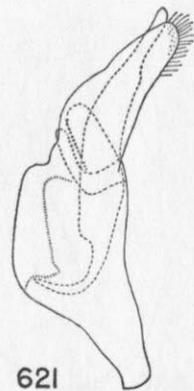
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translineata



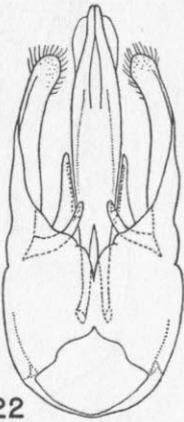
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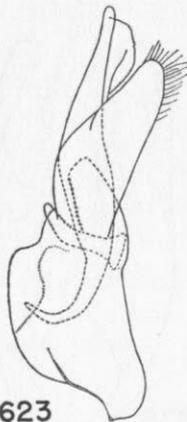
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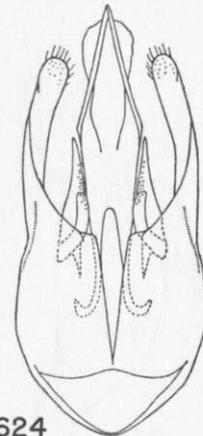
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cazieri



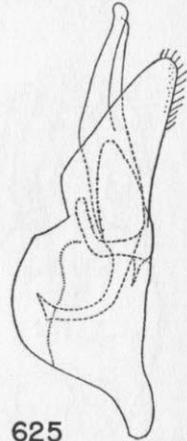
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cazieri



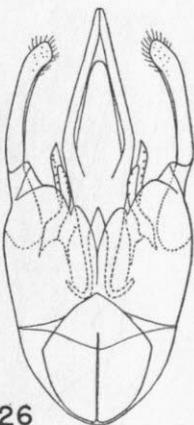
624

butleri



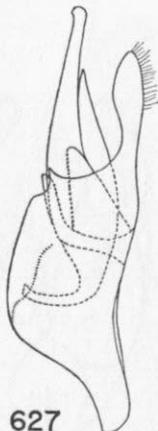
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butleri



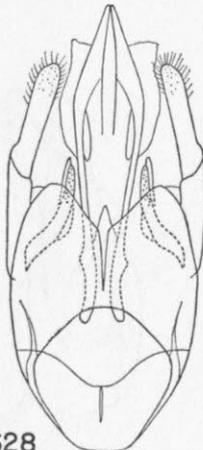
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aplopappi



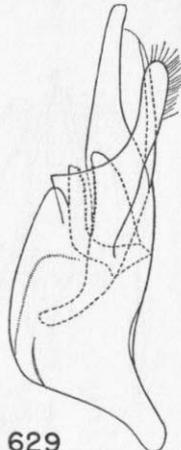
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aplopappi



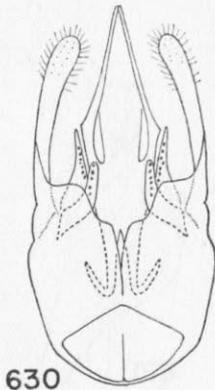
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bruneri



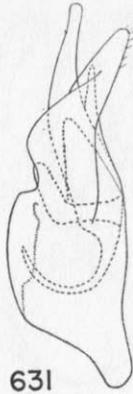
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bruneri



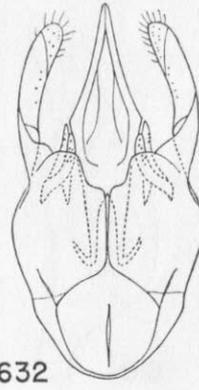
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swenki



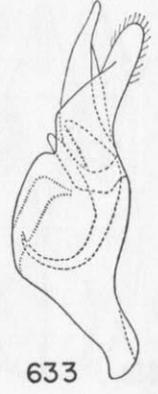
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swenki



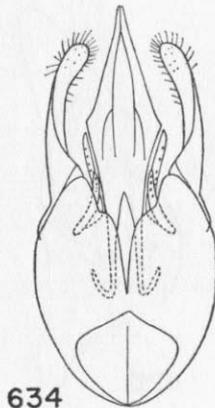
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prionopsidis



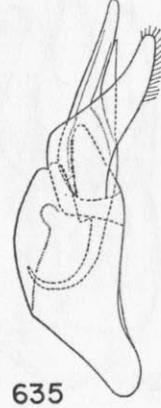
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prionopsidis



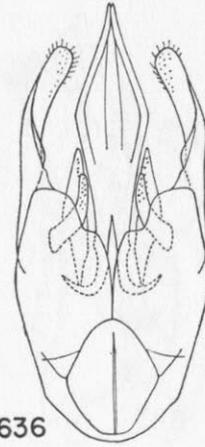
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fallax



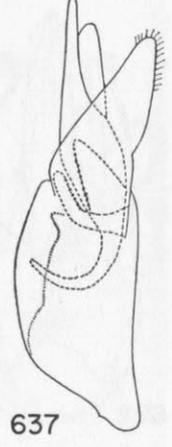
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fallax



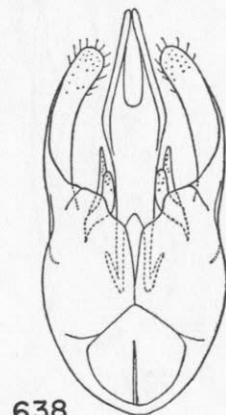
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affinis



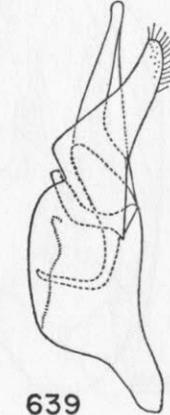
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affinis



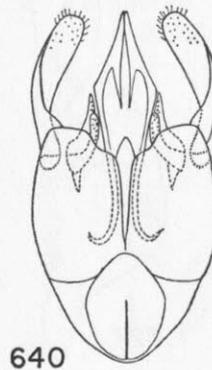
638

c. consobrina



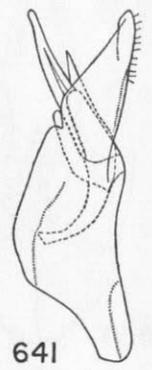
639

c. consobrina



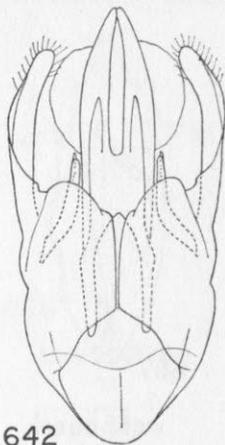
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atriventris



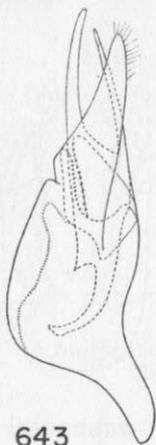
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atriventris



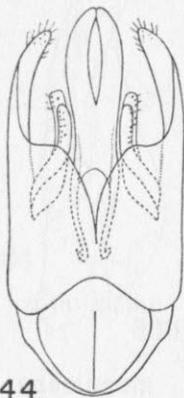
642

o. octomaculata



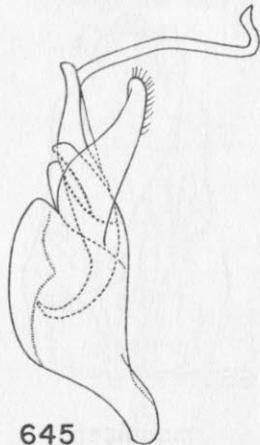
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o. octomaculata



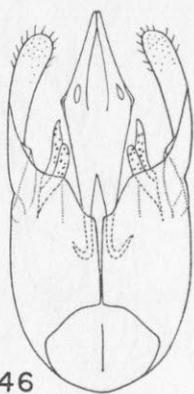
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jonesi



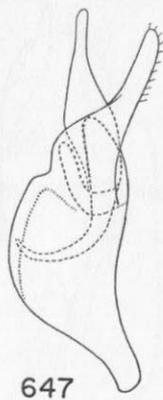
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jonesi



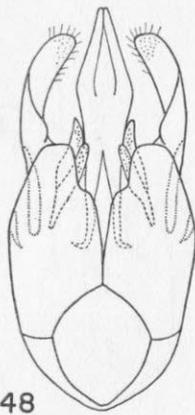
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discreta



647

discreta



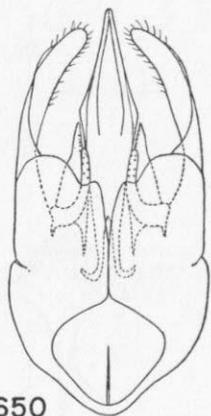
648

dolichocephala



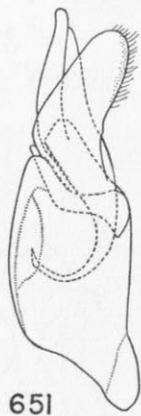
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dolichocephala



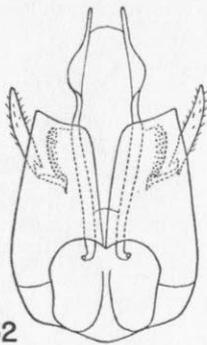
650

tridentata



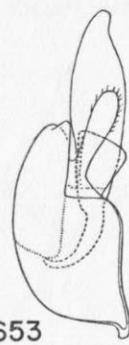
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tridentata



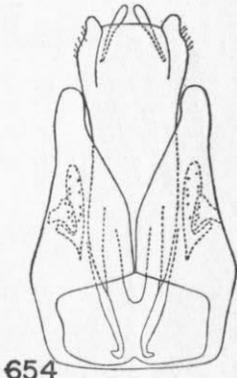
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knulli



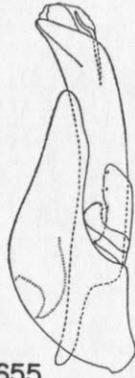
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knulli



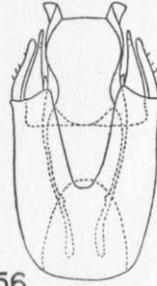
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magniceps



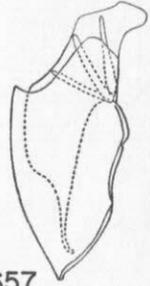
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magniceps



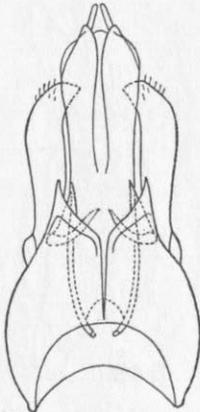
656

wasbaueri



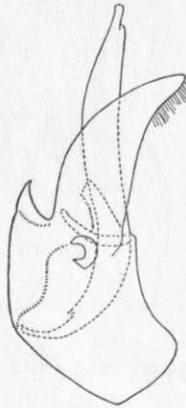
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wasbaueri



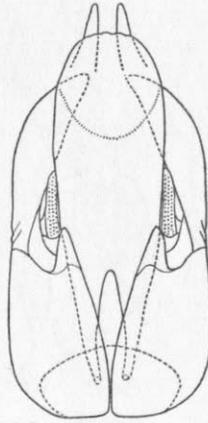
658

stephanomeriae



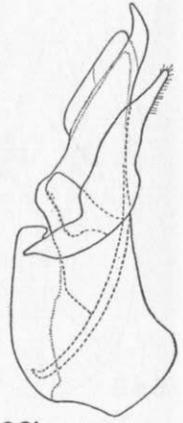
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stephanomeriae



660

chrysophila



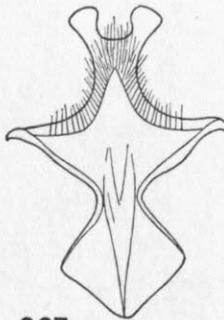
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chrysophila



662

beatula



663

perixantha



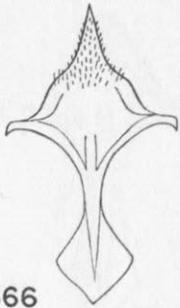
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luteola



665

xanthodes



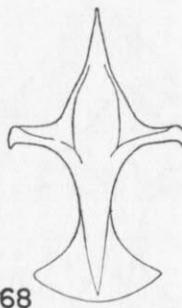
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xanthochroa



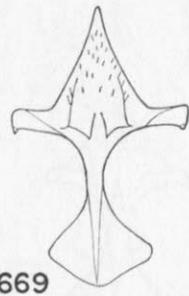
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p.perpallida



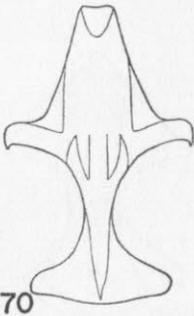
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g.dallasiana



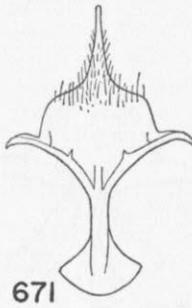
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stephensi



670

v.variegata



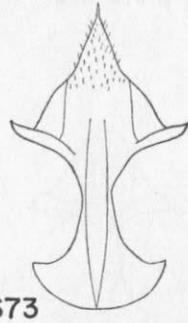
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m.maculipennis



672

m.maculipennis



673

bridwelli



674

luteiceps



675

trifida



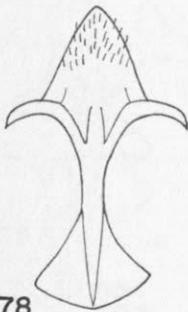
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flaviceps



677

abdominalis



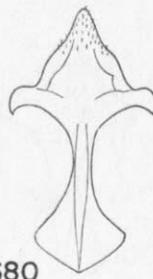
678

polygonellae



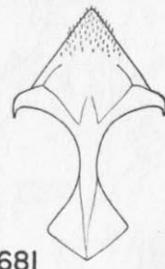
679

dilecta



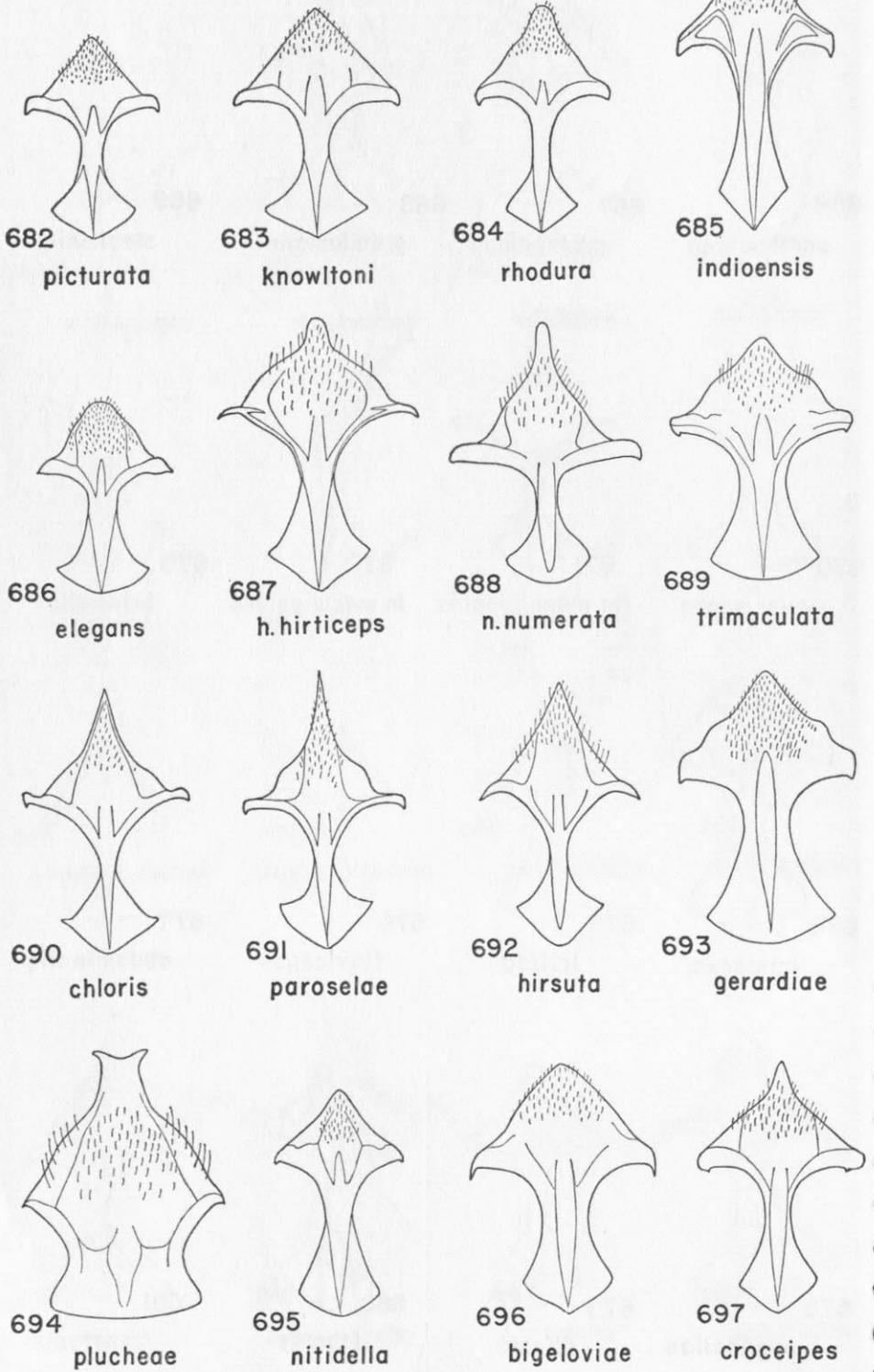
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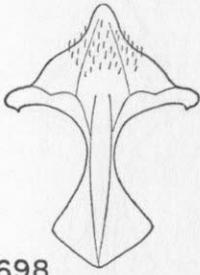
labergei



681

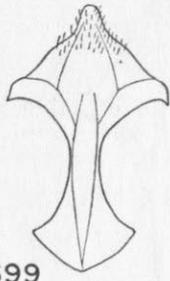
c.crotonis





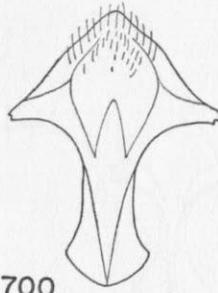
698

media



699

gutierreziae



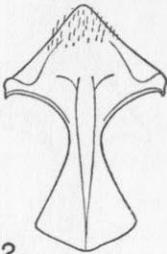
700

laticincta



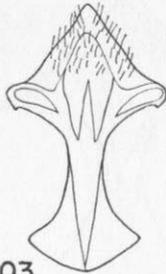
701

s. antiochensis



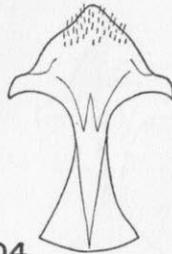
702

aridella



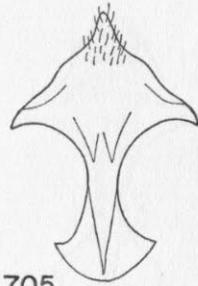
703

rectangulata



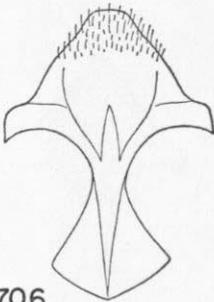
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snowii



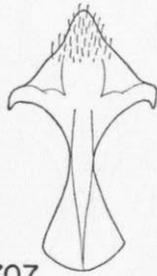
705

lasiogastra



706

retusa



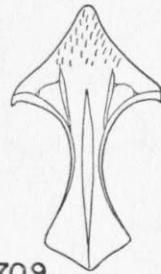
707

ensenadensis



708

halli



709

pectidis



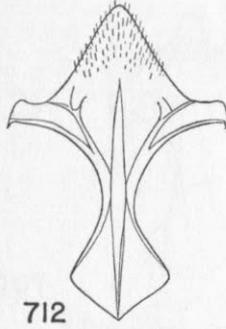
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cognata



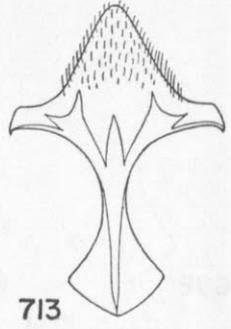
711

translineata



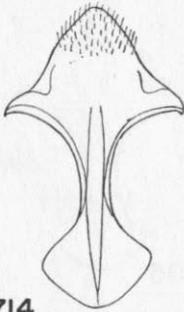
712

durangoensis



713

cazieri



714

butleri



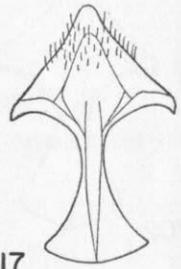
715

aplopappi



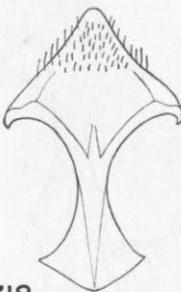
716

bruneri



717

swenki



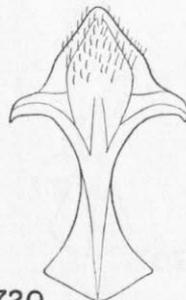
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prionopsidis



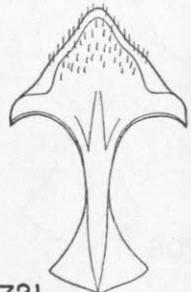
719

fallax



720

affinis



721

c. consobrina



722

atriventris



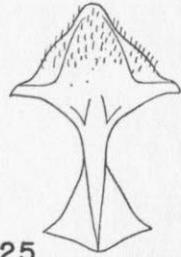
723

o. octomaculata



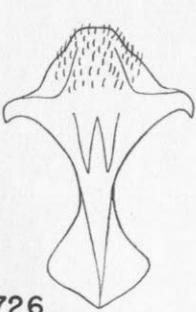
724

jonesi



725

discreta



726

dolichocephala



727

tridentata



728

knulli



729

magniceps



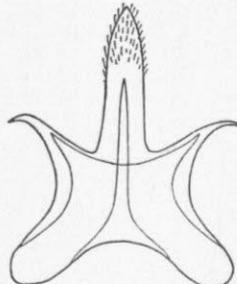
730

wasbaueri



731

stephanomeriae



732

chrysofila