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

(Hymenoptera, Apoidea)

Part V

BY

P. H. TIMBERLAKE

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IN PARTS III AND IV of this revision the species of the typical subgenus of *Perdita* belonging in the *zonalis*, *halictoides*, and *octomaculata* groups have been treated. This study is now extended to include the species belonging in that section of *Perdita* which may be called the *ventralis* group. In order to facilitate the study of these bees a key to the groups treated in Part III and subsequent parts is here offered. This key may afford some help in classifying the more typical members of the groups, but because of the multiplicity and extreme diversity of these insects, I make no claim for its infallibility.

KEY TO GROUPS

- 1. Mesonotum polished; abdomen yellow or creamy white, with dark bands, and face of male usually more or less entirely yellow or whitish below level of antennae; head of male not enlarged, cheeks narrow and simple; genitalia with an oval caulis, mediodorsal lobes generally short, parameral lobes unusually broad, and sagittae short, depressed, and more or less slender *zonalis* group
Disagreeing either in sculpture, color, or structural characters 2
- 2. Maxillary palpi with reduced number of joints; head and thorax either polished or dull; genitalia somewhat as in *zonalis* group, but caulis without dorsal lobes and parameral lobes sometimes peculiarly notched or cristate (the imperfectly known *valida* group also falls here. See p. 106) *halictoides* group
Maxillary palpi six-jointed 3
- 3. Head and thorax almost always more or less tessellate and dull; color pattern variable, sometimes entirely yellow or dark, but usually dark with light marks or bands on abdomen, and face of male often yellow above level of antennae; mandibles of female simple; caulis of genitalia with dorsal lobes little developed, parameral lobes usually slender, sagittae more or less fusiform and often angulated on sides before apex; subgenital plate generally triangular, with apex more or less acute *octomaculata* group
Not conforming to above pattern of characters 4
- 4. Caulis of genitalia with well-developed mediodorsal lobes projecting over sagittae as seen in lateral view *ventralis* group
Caulis with mediodorsal lobes little developed or absent *sphaeralceae* group¹

VENTRALIS GROUP

The species belonging here exhibit so much diversity that I have separated them into four sections. The characters distinguishing these sections are defined briefly in the following key, but will be more fully described in the discussions of the separate sections.

¹ *Sphaeralceae* group to be treated in a subsequent part or parts.

KEY TO SPECIES

1. Females2
 Males61
2. Pterostigma more or less large and broad, usually about three-fourths as broad as first submarginal cell; antennae generally about normal length, with joints of flagellum at least as long as wide; thorax dark or bluish green, often becoming black or blackish on disk of mesonotum, or sometimes entirely ferruginous3
 Pterostigma more or less narrow or not exceptionally broad; antennae usually short, flagellum more or less clavate, with joints broader than long; mesonotum rarely blackish on disk; species of Pacific Coast region monolectic on *Eriogonum*39
3. Pterostigma moderately broad, not equaling first submarginal cell; more or less oligolectic on *Mentzelia*, *Dalea*, *Larrea*, *Petalonyx*, etc., but several species on *Solidago*, *Gutierrezia*, *Pectis*, and *Aplopappus* (*ventralis* section)4
 Pterostigma more or less equaling first submarginal cell and evenly rounded beneath; marginal cell short and strongly oblique to wing margin; polylectic on diverse flowers including *Rhus*, *Schinus*, *Nolina*, *Dasylyrion*, *Photinia*, *Acacia*, *Adenostoma*, *Agave*, etc., but three species on Compositae (*subfasciata* section)24
4. Almost entirely yellow5
 Head and thorax mainly dark green, blue green, or ferruginous6
5. Head somewhat longer than wide, with rather elongate subantennal plates and facial foveae; dark markings black or brownish, including a spot above each antennal socket, a blotch covering ocelli or irregular band across vertex, and a large circular mark on each side of posterior part of mesopectus, but any or all of these marks may be faint or absent
wootona Cockerell
 Head no longer than wide, with subantennal plates and facial foveae comparatively short; dark markings more or less distinctly green and restricted to a mark on each side of mesopectus *viridinotata*, n. sp.
6. Pygidial plate comparatively broad, with apex obtuse or broadly rounded7
 Pygidial plate becoming very narrow and recurved on apical part, with apex acute and disk convex; clypeus entirely fuscous or black, or sometimes with a yellow T-mark, and lateral face marks moderately large; abdomen fuscous, often with a broad, enclosed yellow band more or less distinct on tergites 1 to 4 *nigridia*, n. sp.
7. Face with normal convexity, clypeus strongly convex and if rather strongly punctured the facial foveae narrowly linear; pygidial plate not broadly rounded at apex8
 Face unusually flattened, especially at and above level of antennae; face and mesonotum finely but strongly and rather closely punctured; facial foveae well impressed and much wider than interval between them and eyes; pygidial plate as broad as long and broadly rounded at apex23
8. Clypeal and lateral face marks present9
 Face markings restricted to lateral marks or absent13
9. Tubercles and sometimes hind margin of disk of pronotum white; abdomen, legs, and antennae often more or less extensively creamy white; mesonotum distinctly tessellate but shining10
 Thorax entirely dark; clypeus, and rather small triangular lateral marks, not much higher than wide, and often a supra-clypeal mark, yellow; abdomen yellow, base of first tergite somewhat dusky; antennae and legs dark, with anterior side of front tibiae and front tarsi yellow; mesonotum faintly tessellate, disk of scutum and scutellum polished
glabrescens, n. sp.
10. Smaller, about 4 to 4.5 mm. long; lateral face marks extending between foveae and eyes, sometimes even to summit of foveae; thorax sometimes with light markings besides those on pronotum and tubercles11
 Larger, with lateral face marks ending acutely at or below level of anterior end of foveae; thorax entirely dark except markings on pronotum; facial foveae narrow, not much wider than interval between them and eyes12

11. Thorax with white markings on pronotum and sometimes on flanks of propodeum, but almost never on meso- or metanotum; facial foveae broad, sometimes twice as wide as interval between them and eyes; frons and mesonotum rather strongly tessellate and dullish; form rather slender *bicuspidariae*, n. sp.
 Thorax with white markings on pronotum, mesoscutum, scutellum, and metanotum, those on scutum on lateral margins opposite tegulae and on disk opposite posterior end of tegulae having form of a transverse and interrupted lunate mark; facial foveae about equaling width of interval between them and eyes; frons and mesonotum tessellate and moderately shining *lunulata*, n. sp.
12. Clypeus entirely white; lateral marks white, more than twice as high as wide, and intruding slightly between foveae and margin of eyes; legs and abdomen creamy white, femora black except at apex, hind tibiae black at least on outer margin, and abdomen with dark spots or bands more or less developed (in var. *lauta*, legs and abdomen almost entirely white)
mentzeliarum Cockerell
 Clypeus fuscous, with a small, triangular white mark at middle of upper border; lateral marks white, triangular, at most barely intruding between foveae and eyes; legs and abdomen marked as in *mentzeliarum*, but hind legs sometimes entirely dark and abdomen fuscous, with a light band on tergites 1 or 2 to 4; in pale examples clypeus entirely white and legs and abdomen almost entirely light, thus closely resembling *mentzeliarum*, but with lateral face marks smaller and legs and abdomen more yellowish
punctifera Cockerell
13. Well-developed lateral face marks present 14
 Face entirely dark, rarely with vestigial lateral marks 17
14. Head dark, except lateral face marks 15
 Cheeks broadly yellowish white nearly to summit of eyes; lateral marks intruding between foveae and eyes nearly to summit of foveae; antennae dark, scape suffused with white beneath, more broadly so at base; abdomen dark, with an enclosed whitish band at base of tergites 2 and 3, and a narrow, interrupted band on tergite 1. *perplexa*, n. sp.
15. Mesonotum polished on disk; antennae and thorax entirely dark 16
 Mesonotum tessellate and dullish; scape of antennae and tubercles yellowish white; lateral marks yellowish white, rather small and triangular at anterior corners of face; legs dark, apex of femora and front tibiae whitish, middle and hind tibiae more suffused with black; abdomen blackish, with a broad, enclosed white band at base of tergites 2 to 4 (in var. *pallidior* Cockerell, white marks of face reach level of foveae; legs are yellowish white except for dark blotch on front femora, middle and hind tibiae; abdomen yellowish white with dark bands or spots on basal segments) *mentzeliae* Cockerell
16. Dark blue green, with clypeus, supraclypeal area, and disk of mesoscutum and scutellum black; lateral face marks yellow, moderately small but often reaching level of antennae; mandibles yellow at base and shading through testaceous to red at apex; abdomen dark, with a narrow, enclosed and interrupted white band at base of tergites 2 to 4
lateralis lateralis, n. subsp.
 Similar to *lateralis* but lateral face marks evanescent or absent; mandibles more suffused with fuscous coloration, with basal yellow mark small; mesonotum less strongly punctured and with finer, less conspicuously white hair
lateralis daleae, n. subsp.
17. Mesonotum as well as face more or less strongly tessellate and dull 18
 Mesonotum polished or nearly polished and shining 19
18. Mesonotum moderately tessellate and shining; mandibles, except at apex, and anterior side of front and middle tibiae, yellowish white; abdomen dark, with a pale-yellow band on tergites 2 to 4 or 5, the bands rather broad, not quite reaching lateral margins of segments, and notched medially behind; mesonotum with rather sparse, short, erect white hair
amplipennis, n. sp.
 Mesonotum strongly tessellate and dull, with close-set, erect whitish hair; basal half of mandibles and anterior side of front tibiae white; abdomen entirely dark
grandiceps Cockerell

19. Abdomen banded with yellow or yellowish white; mesonotum with abundant, erect whitish hair, or at least with conspicuous white hair on anterior border.....20
 Abdomen mainly yellow or dark orange, or ferruginous; mesonotum virtually impunctate and nude21
20. Dark blue green, disk of mesoscutum and scutellum black, clypeus brown or blackish; mesonotum faintly tessellate, with subappressed, mosslike white hair on anterior border, and face with similar white hair opposite antennae; abdomen dark, with a yellowish-white band at base of tergites 2 to 5 *brevihirta*, n. sp.
 Head and thorax shining dark green, without markings, face and mesonotum with abundant, erect whitish hair; anterior side of front tibiae yellow; abdomen dark above, with a broad yellow band on tergites 2 to 4, the bands more or less suffused, not reaching lateral margins of segments and interrupted on tergite 2; venter also yellow..... *ventralis* Fox
21. Slender, with head somewhat longer than wide; abdomen ferruginous22
 Form normal, head broader than long; head and thorax dark blue green; clypeus, supra-clypeal area, meso- and metanotum, black; upper part of face and vertex with a dark bronzy luster; front and middle tibiae and tarsi yellow; abdomen orange yellow, tergite 1 fuscous, margins of tergite 2 suffused with fuscous coloration, sometimes a pale fuscous spot on each side of tergite 3 *semicrocea* Cockerell
22. Head and thorax dark green, clypeus black, disk of mesoscutum nearly black; legs dark, front tibiae and tarsi yellow; abdomen dark ferruginous, sometimes slightly infuscated *exilis*, n. sp.
 Similar to *exilis*, except head, thorax, abdomen and legs uniformly ferruginous *crandalli*, n. sp.
23. Head and thorax dark green, clypeus black; face entirely dark, or occasionally with a small yellow spot on inner anterior corners of lateral plates opposite middle of disk of clypeus; anterior side of front tibiae yellow and rarely some yellow on middle tibiae, legs otherwise dark; abdomen black with apical margin of tergite 5 more or less broadly ferruginous and tergite 6 bright ferruginous, and a white band, narrow, enclosed, and sometimes interrupted, at base of tergites 2 to 4 *erythropyga*, n. sp.
 Similar, but clypeus usually yellowish white except for anterior border and two broad dark stripes on disk, diverging anteriorly, or clypeus sometimes dark except for a small mark on lateral margins of disk; lateral marks also yellow and transverse, but usually with orbital extension nearly to level of antennae; anterior side of front and middle tibiae and apex of front and middle femora yellow; white bands on tergites 2 to 4 broad and entire, and usually an abbreviated band, or trace of a band, on tergite 1; wings whitish hyaline *fulvicauda*, n. sp.
24. Mandibles broad, obliquely truncate at apex, with inner surface strongly concave.....25
 Mandibles of normal tapering form, with a smaller inner tooth before apex.....28
25. Tubercles dark; yellow bands of abdomen restricted to tergites 3 to 5 or to tergite 4.....26
 Tubercles and base of mandibles conspicuously pale yellow; abdomen with a yellow band on tergites 2 to 527
26. Head and thorax dark green, base of mandibles obscurely yellowish; abdomen dark, with an enclosed yellow band on tergites 2 or 3 to 4 or 5; head and thorax tessellate and moderately dullish; face and mesonotum with short, thin whitish hair.... *subfasciata* Cockerell
 Similar, but abdomen with only one much abbreviated and interrupted yellow band situated on tergite 4; head and thorax dark blue green, disk of mesoscutum and scutellum black *subfasciata* Cockerell, var.
27. Frons, vertex, and mesonotum distinctly tessellate and moderately dullish; head and thorax dark blue green, clypeus and disk of mesoscutum black; hair of face and mesonotum moderately abundant, erect and white, with that on mesonotum rather coarse and moss-like; wings milky hyaline, nervures pallid *snellingi*, n. sp.
 Similar, but tessellation of thorax faint, disk of mesoscutum almost polished and shining; subcosta and margins of stigma pale ferruginous..... *colei*, n. sp.
28. Head and thorax entirely dark29

- Tubercles or face marks yellow or creamy white30
29. Entirely dark, without markings; mandibles dusky at base, testaceous at middle, dark red at apex, and slender, with a large inner tooth; legs dark, anterior side of front tibiae yellow; head and thorax tessellate and rather dull, face and clypeus rather closely punctured; face below level of antennae evenly convex, disk of clypeus much broader than high with lateral extensions very broad and visible in frontal aspect of head
- keiferi* Timberlake
- Abdomen sometimes with a narrow and abbreviated yellow band at base of tergites 2 and 3; mandibles large, rather thick, with a small inner tooth, yellow on basal half and shading into red at apex; face less closely punctured; convexity of face more confined to clypeus and supraclypeal area, disk of clypeus large, lateral extensions broad but reflexed and little visible in frontal aspect of head; larger than *keiferi*, length, about 5 mm.
- inornata*, n. sp.
30. Lateral face marks with a transverse anterior part and a narrow orbital extension that reaches middle of eyes31
- Lateral face marks small or absent, and when developed usually transversely triangular, rarely with a thin orbital extension to level of antennae.....32
31. Labrum and clypeus dark brown or black, disk of clypeus often narrowly margined with yellow above; abdomen dark, with a clear-yellow band on tergites 1 to 4, apex of abdomen and venter duller yellow; legs mainly yellow, but hind tibiae and tarsi dark
- rehni rehni* Cockerell
- Similar, but labrum, clypeus, and two spots or transverse marks on supraclypeal area pale yellow or yellowish white, clypeus with two dark stripes on disk; yellow bands of abdomen broad and not enclosed, except on tergite 2.....*rehni extensa*, n. subsp.
32. Abdomen predominantly yellow33
- Abdomen sometimes entirely dark, but usually with yellow bands enclosed at base of tergites34
33. Legs and abdomen mainly yellow, latter with a broad, dark subapical band on tergites 1 to 5; base of mandibles, small quadrate lateral marks, and scape of antennae beneath, yellow; labrum and clypeus brownish or dull yellow; mesonotum tessellate, rather dull, with subappressed, almost squamiform hair.....*acaciae*, n. sp.
- Similar, but yellow bands on tergites 2 to 5 nearly enclosed at lateral margins of segments; base of mandibles, labrum, clypeus, small transverse lateral marks and scape of antennae, except apical spot, yellow; head and thorax dullish green, hair of mesonotum a little thinner and less squamiform than in *acaciae**michelbacheri*, n. sp.
34. Mesonotum strongly tessellate, rather dull, and with short subsquamiform pubescence...35
- Mesonotum more weakly tessellate, more shining, and with sparse, fine erect pubescence...36
35. Mandibles except red tips, clypeus except usually two stripes on disk, tubercles, legs mainly except hind tibiae and tarsi, band on tergites 2 to 4 or 5, and often a median mark on tergite 1, yellow*polytropica polytropica*, n. subsp.
- Similar, but yellow marks on face and abdomen more or less evanescent if not entirely absent; front and middle femora and middle tibiae mainly dark on posterior side
- polytropica obsoleta*, n. subsp.
36. Legs mainly dark except on anterior side of front and middle tibiae and at apex of front femora37
- Legs mainly yellow except hind tibiae and tarsi; clypeus yellow, but lateral marks absent or evanescent; abdomen with a yellow band at base of tergites 2 to 4 or 5, not quite reaching lateral margins of segments, except sometimes on tergite 5; tessellation of mesonotum generally weak, disk of mesonotum sometimes almost smooth*dasyliirii* Cockerell
37. Abdomen with a yellow band at base of tergites 2 to 4 or 5, and sometimes a yellow mark on tergite 1; pygidial plate narrowly rounded at apex.....38
- Abdomen entirely dark; clypeus pale yellow, with two broad brown stripes on disk; mandibles, except tips and tubercles, pale yellow; mesonotum moderately shiny, the tessellation distinct but rather weak; pygidial plate acute at apex.....*melanura*, n. sp.

38. Mandibles, clypeus, small lateral marks, and tubercles, pale yellow, lateral marks transversely triangular, rarely with a slender orbital extension to level of antennae; thorax moderately shining, tessellation weak to moderately strong but never so obsolete as in *dasytirii*
rhois rhois Cockerell
 Two dark stripes on disk of clypeus more or less developed and lateral face marks much reduced or absent; tubercles, trochanters of legs, and tergite 1, dark; yellow bands on tergites 2 to 4 or 5 enclosed, or sometimes absent on more apical segments, or so narrow as to be concealed by preceding segment.....*rhois reducta* Cockerell
39. Larger, about 4 or 5 mm. long; face entirely dark, or rarely with a small yellowish mark on clypeus; abdomen sometimes entirely dark, but usually with yellow bands at base of tergites; pterostigma more or less slender (*claypolei* section).....40
 Smaller, generally 4 mm. or less long; face dark, or often with yellow or white clypeus; abdomen entirely dark or banded (one anomalous species mainly yellow, with dark markings on vertex, mesonotum, and mesopectus); pterostigma generally broader and rounded beneath (*nasuta* section)47
40. Abdomen entirely dark, but varying to pale ferruginous, or ferruginous with broad, but more or less nubilous, brown or pale fuscous bands at apex of segments; mesonotum polished; pterostigma as long as first submarginal cell and unusually slender.....41
 Abdomen usually with more or less sharply defined yellow bands at base of tergites 2 to 4, sometimes with a yellow mark on tergite 1; or if abdomen entirely dark, mesonotum distinctly tessellate and pterostigma shorter than first submarginal cell.....42
41. Head, thorax, and abdomen entirely dark, head and thorax blue, with disk of mesoscutum and scutellum black; face weakly tessellate, mesonotum polished; wings dusky hyaline, stigma almost lanceolate*yosemitensis*, n. sp.
 Head and thorax dark blue and polished, tubercles yellowish white; abdomen entirely dark or varying to pale ferruginous, but in latter case usually with more or less definite dark apical bands; wings dusky hyaline, stigma slightly less slender than in *yosemitensis*
jucunda, n. sp.
42. Abdomen banded with yellow on four or five segments, or if only on tergites 2 to 4 the bands broad although enclosed; size smaller than usual, and scape of antennae more or less yellow beneath43
 Abdomen sometimes entirely dark but usually banded on tergites 2 to 4; or if tergite 1 yellow at base scape of antenna entirely dark45
43. Smaller, about 4 mm. long; frons more or less shining, with weak to moderately strong tessellation44
 Larger, about 4.5-5 mm. long; frons dullish and rather strongly tessellate; tergites 1 to 4 or 5 more or less broadly yellow at base; scape yellow beneath; anterior tibiae entirely and middle tibiae broadly yellow in front; mesonotum polished
claypolei limatula, n. subsp., var.
44. Tessellation of frons moderately strong; mesonotum faintly tessellate; scape of antennae usually more or less entirely yellow; clypeus often somewhat yellowish across the apex; abdomen yellow at base of tergites 1 to 4; wings dusky hyaline.....*timberlakei* Cockerell
 Tessellation of frons rather weak; mesonotum polished; scape usually dark although suffused with yellow beneath, but sometimes almost entirely yellow; clypeus entirely dark; abdomen with a more or less broad yellow band at base of tergites 2 to 4 or 5; wings clear hyaline*lucens*, n. sp.
45. Abdomen banded with yellow46
 Abdomen entirely dark; head and thorax dark except for yellowish-white tubercles; mesonotum rather strongly tessellate and dull*claypolei australior*, n. subsp.
46. Head distinctly broader than long; frons distinctly tessellate and rather dull; mesonotum weakly tessellate and shining; yellow bands at base of tergites 2 to 4 rather narrow and enclosed, and one or more sometimes interrupted medially; tubercles usually, but not always, yellowish white*claypolei claypolei* Cockerell
 Similar, but base of tergite 1, bands on tergites 2 to 4, the tubercles, and anterior side of front tibiae, pale yellow, the scape of antennae typically dark; frons dullish; mesonotum polished*claypolei limatula*, n. subsp.

47. Head and thorax dark blue or blue green48
 Entirely pale yellow, except for a green transverse streak through ocelli, small mark on center of occiput, large mark on mesoscutum, and circular mark on each side of posterior part of mesopectus; wings nearly clear hyaline, nervures pale testaceous brown
distans, n. sp.
48. Clypeus pale yellow or white; scape and pedicel of antennae and first joint of flagellum usually more or less clear pale yellow beneath49
 Face entirely dark, or rarely a yellowish stripe on middle of clypeus55
49. Abdomen yellow or banded with yellow, or if mostly dark having base of tergites, especially tergite 1, suffused with yellow; scape and pedicel of antennae entirely pale yellow50
 Abdomen entirely fuscous; clypeus yellowish white; scape and pedicel yellow only beneath; tubercles yellowish only at apex; legs brown, with front tibiae and tarsi yellow
gentilis, n. sp.
50. Legs entirely yellow; abdomen yellow, or more or less tinged with orange, or ferruginous.51
 Legs partly dark, at least the femora52
51. Abdomen pale orange yellow, or yellow with ferruginous tinge; wings hyaline, nervures brownish testaceous, subcosta somewhat darker*nasuta nasuta*, n. subsp.
 Abdomen yellow, faintly marked with a small suffused dusky spot on each side of tergites 1 to 4; wings milky hyaline, nervures pallid, subcosta and margins of stigma slightly brownish*nasuta galacticoptera*, n. subsp.
52. Abdomen yellow more or less suffused with fuscous or mainly fuscous with tergite 1 yellowish at base and base of following tergites more or less suffused with yellow53
 Abdomen dark, with a definite yellow band at base of tergites 2 to 4 or 5; head broader than long, minor orbits converging below; disk of clypeus more or less definitely higher than wide54
53. Head much broader than long; disk of clypeus broader than high, with lateral extensions visible in frontal aspect; abdomen usually fuscous and suffused with yellow at base of segments, but varying to entirely yellow or orange yellow; femora dark except at apex, hind tibiae infuscated except toward base*nasuta obscurescens*, n. subsp.
 Somewhat larger than *nasuta*, with head less broad and clypeus higher; clypeus and transverse supraclypeal mark white, the two forming a triangular mark which is broader than high; abdomen generally yellow, more or less extensively suffused with fuscous coloration on lateral and apical margins of segments; wings whitish hyaline
aerophila aerophila, n. subsp.
54. Abdomen fuscous, with a yellow band, more or less broad but enclosed at base of tergites 2 to 4 or 5; legs fuscous, with extreme tip of front and middle femora, front and middle tibiae, and tarsi, yellow, and hind tibiae more or less yellow; wings only slightly whitish, but nervures pallid*thermophila thermophila*, n. subsp.
 Yellow bands of abdomen narrower and more abbreviated; middle as well as hind tibiae much infuscated and pedicel of antennae dark above; subcosta and margins of stigma more infuscated*thermophila trilobata*, n. subsp.
55. Tubercles yellow; scape of antennae usually yellow; abdomen banded with yellow56
 Tubercles, antennae, and abdomen dark; legs dark, with front tibiae and tarsi yellowish; wings milky hyaline, nervures pallid, subcosta and margins of stigma slightly brownish
labrata, n. sp.
56. Scape of antennae entirely yellow, or yellow on underside57
 Antennae dark; tubercles yellow; abdomen with a broad enclosed yellow band at base of tergites 2 to 4; legs dark, with front tibiae and tarsi and anterior side of middle tibiae and tarsi yellow; wings milky hyaline, nervures pale testaceous
aerophila fuscicornis, n. subsp.
57. Abdomen fuscous, entirely dark or suffused with yellow at base of tergites 2 and 3 or 2 to 458
 Abdomen with broad yellow bands59
58. Abdomen suffused with yellow at base of tergites 2 and 3 or 2 to 4; scape and pedicel of antennae clear yellow, or the pedicel fuscous above; wings whitish hyaline, nervures pallid,

- ocelli, two narrow vittae on mesoscutum, circular mark on each side of mesopectus, and faint bands on abdomen (one specimen almost all yellow, with vittae of mesoscutum and marks on mesopectus faintly indicated by pale brown); apical tergite with broadly truncate median lobe. *bicuspidariae*, n. sp.
69. Yellow of face extending above antennae in median line or straight across. 70
 Yellow of face extending above antennae only on each side; yellow marks on thorax small or evanescent except on pronotum. 72
70. Small shining species with yellow of face extending to or above level of foveae, but sometimes with a narrow extension of dark color on each side to antennal sockets. 71
 Yellow of face extending above antennae for a short distance in median line or straight across; undersurface of head, the cheeks nearly to summit of eyes, sternum and pleura of thorax, sides of propodeum, legs, and abdomen, yellow; a large green mark on each side of posterior part of mesopectus and an oblique band from beneath base of front wings to hind coxae. *mentzeliarum* Cockerell
71. Yellow of face extending to level of foveae, but the dark color occasionally descending narrowly on each side to antennal sockets; nearly the anterior half of underside of head yellow; margins of pronotum including tubercles, and a more or less developed T-mark on mesopectus, yellow; abdomen orange yellow, with base of tergite 1 infuscated; head usually moderately enlarged, with cheeks broad but receding and flanks of pronotum not impressed. *exilis*, n. sp.
 Head yellow nearly to summit of eyes both in front and behind, the yellow of face nearly reaching level of anterior ocellus; broad band on vertex of head, notum of thorax, and oblique hind margin of mesopleura, black with a slight bluish luster; flanks and margins of disk of pronotum, sides and pectus of thorax, and small spot on anterior corners of mesoscutum, yellow; abdomen yellow, but with a broad fuscous band on each segment above; cheeks broad and receding, with a small conical process anteriorly. *dimidiata*, n. sp.
72. Face below antennae, anterior half of cheeks with line of demarcation almost perpendicular to orbits, legs, and abdomen, yellow; tergite 1 except apical border, basal corners of tergite 2 and a spot subapically on each side of its disk (or subapical band on tergites 2 and 3), brown or fuscous; mesosternum dark green except for a small yellow spot on each side anteriorly. *mentzeliae*, var. *pallidior* Cockerell
 Similar, but anterior two-fifths of cheeks yellow; flanks of propodeum often stained or blotched with yellow; abdomen usually yellow or orange yellow, with lateral margins of tergite 1 broadly brownish or fuscous, and tergite 2 sometimes having a very small brownish spot on each side subapically (dark specimens run with *mentzeliae* in couplet 75)
punctifera Cockerell
73. Face more or less convex below antennae and impunctate; cheeks generally much broadened and often dentate anteriorly; flanks of pronotum usually strongly impressed, with posterior corners of disk more or less prominent; but some, usually small specimens, have cheeks and pronotum little modified. 74
 Face below antennae more depressed than usual, shining, with rather abundant white hair; clypeus and supraclypeal area punctured; flagellum of antennae thicker than usual, the joints mostly a little thicker than long; mesonotum polished and hairy; cheeks moderately wide and unarmed; flanks of pronotum not impressed; two or three apical segments of abdomen fulvous or reddish. 86
74. Face markings yellow. 75
 Face markings white, covering area below antennae and terminating on orbits a little below middle of eyes; head and thorax polished, almost impunctate, black, with a faint greenish tinge on pleura and propodeum; head large, cheeks broad, widest above level of middle of eyes, and unarmed; flanks of pronotum little impressed; wings milky hyaline, subcosta and margins of stigma dark brown. *semicrocea* Cockerell
75. Disagreeing with characters of *mentzeliae*, especially in having yellow markings less extensive and inner orbits of eyes not divergent below. 76
 Face below antennae, anterior half of cheeks, antennae, and legs, bright yellow, lateral face marks extending broadly to foveae; head more or less enlarged, with inner orbits divergent

- below, cheeks very broad and with an anterior process; flanks of pronotum deeply impressed; head and thorax dark green; disk of mesoscutum and scutellum black; abdomen usually yellow but with more or less fuscous marking toward base; wings milky hyaline
mentzeliae Cockerell
76. Head but little enlarged, cheeks if very broad strongly receding with occipital concavity deep but restricted in width. 77
Head usually much enlarged, cheeks broad and receding but slightly toward occiput, occipital concavity broad 79
77. Cheeks broad but almost flatly receding to occiput, occipital concavity deep and constricted. 78
Cheeks broad but rather convexly receding, occipital concavity about normal in depth and width; flanks of pronotum not impressed; face pale yellow below level of antennae, lateral marks extending bluntly to level of foveae; legs pale yellow, femora and hind tibiae varied with fuscous; abdomen orange yellow, with base of tergite 1 infuscated; wings hyaline, the stigma yellowish. *glabrescens*, n. sp.
78. Cheeks broad, usually broadest behind middle of eyes, with width of temples almost equaling width of occipital concavity; flanks of pronotum moderately impressed, with lateral margins of disk notched by the impression; dark blue green; mesonotum almost impunctate; clypeus, triangular lateral marks, and scape of antennae, yellow; abdomen brownish fuscous, with a suffused yellow band at base of tergites 2 to 4 or 5. *austini* Cockerell
Head and pronotum much as in *austini*, but the special characters less accentuated, the cheeks broadest behind and narrowed gradually anteriorly; head and thorax dark green; disk of mesoscutum and the scutellum black; face below level of antennae, lateral marks extending bluntly to foveae, scape of antennae, flagellum beneath, tubercles, and legs, in large part yellow; abdomen brown or pale fuscous, with an enclosed yellow band at base of tergites 2 and 3. *brevihirta*, n. sp.
79. Flanks of pronotum more or less strongly impressed, or in other respects in disagreement with characters of *nigridia*. 80
Flanks of pronotum weakly impressed, but posterior width of disk of pronotum sometimes no more than half the greatest width of mesonotum; head usually much enlarged, quadrate, cheeks very broad, rounded behind and unarmed; dark green and blackish, the abdomen dark brown or fuscous, without markings; clypeus, broad lateral marks extending above antennae, usually a supraclypeal mark, and more rarely the subantennal plates, bright yellow; mesonotum somewhat dullish and with minute sparse punctures. *nigridia*, n. sp.
80. Mesonotum more or less tessellate, although sometimes rather weakly. 81
Mesonotum polished, or almost polished, at least on disk of scutum. 83
81. Mesonotum strongly tessellate and rather dull. 82
Mesonotum more weakly tessellate and shining, the scutum more shining than the frons; thorax entirely dark green; anterior half of clypeus and quadrate lateral marks, truncate at level of antennae, orange yellow; abdomen yellow, with tergite 1 and a broad band at apex of following segments brown, the bands fainter toward apex; cheeks broad, rounded and unarmed; wings clear hyaline. *wheeleri* Timberlake
82. Head and thorax dark, slightly bluish green, the mesoscutum a little brassy, the thorax entirely dark; clypeus except two broad brown marks on disk, lateral, subantennal, and supraclypeal marks, bright yellow; supraclypeal mark divided broadly in middle, and the green of frons descending broadly on each side to constrict the lateral marks into slender anterior and orbital spurs, the latter barely reaching level of antennae; abdomen brown, unmarked; wings milky hyaline. *grandiceps* Cockerell
Head and thorax dark blue green, mesonotum somewhat brassy; face below level of antennae, except sutures, bright yellow, lateral marks broadly triangular and reaching foveae; tubercles yellow; abdomen brownish fuscous, with a narrow, enclosed, and interrupted yellow band at base of tergites 2 and 3; wings milky hyaline, subcosta brownish, margins of stigma still darker. *vicina*, n. sp.
83. Wings ordinary in length, stigma not over four times longer than wide; face usually much less than entirely yellow below level of antennae. 84
Wings unusually ample, stigma narrow, almost four times longer than wide and about half

as wide as first submarginal cell; head and thorax shining and blue green; face below antennae, antennae except above, and tubercles, yellow; abdomen yellow, with tergite 1 and a subapical band on following two or three segments fuscous; wings milky hyaline
amplipennis, n. sp.

84. Thorax entirely dark.....85
 Head and thorax dark blue green, disk of mesoscutum and scutellum black; clypeus except two spots or a band on upper border of disk, lateral marks ending acutely near level of antennae, supraclypeal mark, and sometimes a small spot on subantennal plates, yellow; tubercles and a band, sometimes interrupted, at base of tergites 2 to 3 or 4, yellow; wings hyaline, subcosta and margins of stigma brown.....*lateralis* *lateralis*, n. subsp.
85. Head and thorax dark blue, disk of mesoscutum and scutellum black; clypeus except two spots or a band on upper border of disk, lateral marks sometimes reaching level of antennae, and usually two oval spots on supraclypeal area, yellow; abdomen fuscous, becoming more brownish on apical segments and on the apical margin of basal segments, and with a yellow band at base of tergites 2 to 5, the bands more suffused sometimes or absent on distal segments; wings milky hyaline.....*lateralis* *daleae*, n. subsp.
- Head and thorax uniformly dark green, thorax shining, frons dullish; clypeus except two spots on upper border of disk, triangular lateral marks, and subantennal marks, yellow; supraclypeal area green; abdomen fuscous, with a greenish tinge on tergite 1 and yellow band at base of tergites 2 to 5, the bands narrow, enclosed and sometimes interrupted, especially on tergite 2; wings hyaline.....*ventralis* Fox
86. Head and thorax dark green, thorax entirely dark; face below antennae yellow, except that dark color of frons descends on each side to intrude between lateral and subantennal marks; abdomen fuscous or blackish, apical segments fulvous, and a narrow, interrupted yellow band at base of tergites 2 and 3 and sometimes 4; wings hyaline.*erythropyga*, n. sp.
 Similar, but face sometimes almost entirely yellow below level of antennae; apex of abdomen more extensively and conspicuously fulvous, with tergite 4 sometimes entirely fulvous; pubescence white and more conspicuous; wings somewhat whitened, subcosta and margins of stigma pale brown.....*fulvicauda*, n. sp.
87. Yellow of mesothorax restricted to a T-mark on pectus or to an interrupted band on pectus behind the front coxae.....88
 Yellow of mesothorax covering a large part or all of episternum, and yellow of face reaching to or above foveae, the dark color of face never descending to antennal sockets.....89
88. Green of frons extending to each antennal socket, the yellow extending to foveae on each side and forming a short rounded median lobe above level of antennae; anterior third of cheeks yellow; abdomen dark, with a yellow band at base of tergites 2 to 3 or 4
keiferi Timberlake
 Green of frons sometimes not quite reaching antennal sockets, and median yellow mark of frons ascending as high or higher than lateral marks; mesopectus with a broad-limbed yellow T-mark; head sometimes enlarged, with cheeks broad and angled or toothed anteriorly, but flanks of pronotum not much impressed.....*snellingi*, n. sp.
89. Yellow of face extending only to foveae.....90
 Yellow of face reaching almost to level of anterior ocellus, foveae appearing as dark dots.94
90. Cheeks no broader than eyes and strongly receding, head not enlarged.....91
 Cheeks generally broader than eyes even in small-headed individuals.....92
91. Face to level of foveae, antennae, most of pronotum, anterior part of mesepisternum, middle of mesopectal region, and legs, bright yellow; abdomen yellow, but tergite 1 and preapical band on tergites 2 to 4 fuscous; mandibles much dilated at base on outer margins
colei, n. sp.
 Upper margin of yellow on face convexly arcuate, the curve extending from foveae on each side nearly to level of anterior ocellus; more than anterior half of cheeks and more than half of lateral part of mesepisternum yellow; abdomen yellow, but tergite 1 and three narrow bands dark; mandibles much less dilated at base.....*subfasciata* Cockerell
92. Flanks of pronotum strongly impressed, its disk more or less, or sometimes greatly, narrowed; occipital concavity of head unusually broad and deep.....93

Head generally not much enlarged, the cheeks broad but at most only slightly dentate anteriorly, the occipital concavity broad but not exceptionally deep; flanks of pronotum slightly to moderately impressed, its disk much broader than long; anterior two-thirds of cheeks, face to level of foveae, and sides and undersurface of thorax, entirely yellow; abdomen yellow, with tergite 1 and broad apical band on following segments fuscous
rhois Cockerell

93. Flanks of pronotum moderately impressed, its disk not greatly restricted in width, but posterior corners much more prominent than in *rhois*; head enlarged, cheeks very broad, dentate anteriorly and widest opposite posterior end of eyes, where the width about equals half the width of vertex through the ocellar region; markings much as in *rhois* but mesopectus often with a circular dark patch on each side and yellow bands of abdomen much broader. *inornata*, n. sp.
- Flanks of pronotum much impressed, so strongly in extreme cases that disk of pronotum becomes much longer than wide; cheeks broad, anterior process usually small but sometimes comparatively enormous; yellow markings much as in *inornata*, but posterior half of mesopleura and flanks of propodeum dark, this dark area confluent with posterior dark patches on mesopectus; abdomen yellow, tergite 1 except two subapical spots or short band, and an apical band on following segments, brown or fuscous. . . *rehni* Cockerell
94. Mesopleura and sternum of thorax entirely or almost entirely yellow; postgenae nearly uniformly hairy, the hairs not obviously longer posteriorly. 95
- A dark patch on each side of mesopectus; head quadrate, cheeks very broad, with postgenae becoming more conspicuously hairy posteriorly. 96
95. Cheeks broad, widest above middle of eyes and armed anteriorly with a small tubercle, occiput broadly and deeply concave; mesoscutum almost polished and with sparse, erect, inconspicuous hair; a narrow dark streak along upper margin of mesepisternum; tergite 1 with two yellow spots, and the yellow and dark bands on following segments about equal in width; legs sometimes entirely yellow. *dasyliirii* Cockerell
- Cheeks less widened, unarmed and widest opposite middle of eyes; mesoscutum tessellate, somewhat dullish and dotted with conspicuous although rather sparse white hair; mesopleura with a dark streak above or entirely yellow; tips of hind femora, hind tibiae, and tarsi, dark. *polytropica*, n. sp.
96. Head except vertex and occiput, pronotum except band on disk, lateral margins of mesoscutum, entire sides and undersurface of thorax except a large circular mark on each side of mesopectus, venter of abdomen, and band at base of tergites 2 to 6, creamy white; legs and antennae slightly more yellowish; cheeks very broad, but unarmed, widest opposite middle of eyes; mesoscutum tessellate, dullish and with sparse, coarse white hair
mittelbacheri, n. sp.
- Similar, but light parts pale yellow; dark band on vertex narrowed or broken on each side where it approaches summit of eye; abdomen pale yellow, with a narrow, brown apical band on tergites 1 to 5 and a dark line or stripe on the median crease of tergite 1; white hair of mesoscutum coarser and more squamiform. *acaciae*, n. sp.
97. Face white below level of antennae, the white area sometimes intruding between antennal sockets but usually going only slightly above them except at sides; face below antennae usually nude, only slightly convex medially, lateral plates depressed or slightly concave; thorax dark, except tubercles or other marks on pronotum (*claypolei* section) 98
- Face yellow to or above level of foveae in middle as well as at sides, the dark color of frons sometimes descending on each side to antennal sockets; face below antennae often curiously modified; thorax in one species marked with yellow besides usual marks on pronotum (*nasuta* section) 103
98. Scape of antennae more or less short and thick, often less than twice as long as thick; white part of face nude; outer nervures of second discoidal cell extremely faint. 99
- Scape of antennae about three times longer than thick; face with thin, short, erect and inconspicuous pile; wings faintly dusky, outer nervures of second discoidal cell distinct, although weak and pale testaceous; mesonotum polished; abdomen dark with a nubilous

- yellow band at base of tergites 2 to 4 and a yellow mark on tergite 1; white of face with a short median protrusion onto frons.....*yosemitensis*, n. sp.
99. Scape of antennae, excluding radicle, broadly oval and less than twice as long as thick; antennal sockets large, their inner margins diverging below, and usually with the space between their upper ends distinctly less than their length.....100
- Scape of antennae tapering toward base and slightly more than twice as long as thick; antennal sockets comparatively small, the space between their upper ends slightly exceeding their length; mesonotum polished; base of abdomen yellow, a suffused band at apex of tergites 1 to 3 or 4, and apical segments brown, or abdomen nearly all yellow; antennae and legs mainly yellow.....*jucunda*, n. sp.
100. White part of face extending medially only a short distance onto frons, usually merely intruding between antennal sockets.....101
- Median lobe of white on frons large, nearly equaling lateral lobes in height, the green projecting acutely on each side to antennal sockets; antennae and legs yellow, flagellum pale brownish above; abdomen yellow, with base of tergite 1, apical margin of following segments, and last two or three entirely brown or fuscous.....*lucens*, n. sp.
101. Tubercles and mark on posterior corners of disk of pronotum yellowish white; abdomen dark, with a yellow band at base of tergite 2, or on tergites 2 and 3, or sometimes 2 to 4; mesonotum faintly tessellate or almost polished.....102
- Thorax dark blue or blue green, except for a white mark on tubercles; abdomen and hind legs dark; supraclypeal mark usually rounded above and protruding but little between antennal sockets; mesonotum rather distinctly tessellate but not much dulled
- claypolei claypolei* Cockerell, and *claypolei australior*, n. subsp.
102. Larger, about 3-3.5 mm. long; flagellum of antennae rather incrassate, the joints slightly nodose; white of face often extending slightly onto frons in median line; mesonotum dark blue or bluish green and almost polished; abdomen with an enclosed yellow band at base of tergite 2, or tergites 2 and 3, or rarely 4.....*claypolei limatula*, n. subsp.
- Length, about 2.5-3 mm.; flagellum less nodose; white of face intruding between antennal sockets but usually not going above their level; mesonotum more or less faintly tessellate and shining; abdomen fuscous, usually with a yellow band at base of tergites 2 and 3
- timberlakei* Cockerell
103. Thorax entirely dark except for marks on pronotum and tubercles.....104
- Pronotum almost entirely, lateral margin of mesoscutum behind the tegulae, scutellum, metanotum, median mark on propodeum, and large mark on mesepisternum, pale yellow; face to level of anterior ocellus, cheeks to summit of eyes, antennae, and legs, yellow; abdomen yellow, with two transverse marks on tergite 1 and very narrow apical bands pale brown
- distans*, n. sp.
104. Clypeus normal or no more than strongly arched on apical margin of disk.....105
- Anterior margin of disk of clypeus elevated into a large, laminate, quadrate plate, level with disk of labrum and nearly perpendicular to longitudinal axis of head; dark green, with face almost to level of anterior ocellus, anterior end of cheeks, antennae, pronotum in large part, legs, and abdomen, yellow (the subsp. *galacticoptera* differs only in having whiter wings).....*nasuta nasuta*, n. subsp.
105. Face normal, or disk of clypeus strongly arched apically.....106
- Face rather deeply concave on each side opposite prominent and bluntly conical supraclypeal area; labrum extremely short and narrowly transverse.....108
106. Face impressed opposite clypeus, disk of latter strongly arched and prominent on anterior border; antennae short and incrassate, joints of flagellum much broader than long...107
- Face below level of antennae, including entire anterior border of clypeus, evenly and moderately convex from side to side; antennae moderately short and slightly clavate; face yellow to level of foveae, the green of frons sometimes extending triangularly on each side toward antennal sockets; legs and abdomen yellow, the latter with base of tergite 1 and a narrow apical band on each segment brown, bands sometimes reduced to a spot on each side (the subsp. *trilobata* differing only slightly)..*thermophila thermophila*, n. subsp.

107. Face yellow to level of foveae, with the green of frons often descending on each side to antennal sockets; pronotum except for a dark band from flank to flank, legs except hind coxae, and abdomen, yellow, but with tergite 1 and broad apical band on following segments brown *clypeata clypeata*, n. subsp.
 Face yellow to level of anterior ocellus; antennae, legs, and pronotum, entirely yellow; abdomen yellow, with base of tergite 1 and a small spot on each side of apical margin of tergites fuscous or pale brown *similutea*, n. sp.
108. Scape of antennae nearly normal except for being only about twice as long as wide, or shorter 109
 Scape of antennae subacutely produced beneath, thus appearing obliquely broader than long; mandibles, labrum, face to level of foveae, antennae, legs, two spots on pronotum, tubercles, and band at base of tergites 2 to 3 or 4, yellow; head and thorax otherwise dark green and abdomen dark brown or fuscous (the subsp. *niveipennis* differs in having whiter wings) *varleyi varleyi*, n. subsp.
109. Scape of antennae roughly quadrate, not tapering toward base, about one-half as wide as long; antennae, legs, and face to level of foveae, yellow; abdomen yellow with tergite 1 and apical band on following segments brown or fuscous (the subsp. *diserepans* about identical, but subsp. *fuscicornis* with a broader scape) ... *xerophila xerophila*, n. subsp.
 Scape of antennae tapering toward base, its greatest width a little more than half its length; coloration similar, but flagellum somewhat brownish above toward base, hind tibiae fuscous on outer side, and abdomen dark, with base of tergites 2 to 3 or 4 suffused with yellow
labrata, n. sp.

VENTRALIS SECTION

Members of this section are either almost entirely yellow, or dark blue or green on head and thorax. In many of the latter the disk of the mesoscutum and the scutellum are black, and although the abdomen may be mainly yellow it is more commonly dark with light markings. The female of one species is entirely ferruginous, but its closest ally has an entirely blue and blackish head and thorax. The males of this section have large yellow face markings that often extend above the antennae in the median line as well as at the sides.

The species belonging here are mostly oligolectic. Seven species collect pollen from *Mentzelia* more or less exclusively; four visit *Dalea*, but they also visit such other flowers as *Larrea*, *Prosopis*, *Phacelia*, *Eriogonum*, etc.; two have been collected at flowers of *Fallugia* and may obtain their pollen from this flower, but this is not yet certain; two collect pollen from *Petalonyx*; four have been taken only at flowers of Compositae (*Aplopappus*, *Gutierrezia*, *Solidago* and *Pectis*), from which they may derive pollen; and the flower-visiting habit of four species is unknown.

Female.—Agreeing rather closely in most characters with members of *octomaculata* group, except that mandibles have a distinct inner tooth. Head and thorax generally tessellate and more or less dull, although never with extreme opaque type of sculpture, and sometimes more or less smooth and polished. Proboscis of medium length and not much if any exceeding fossa when folded in repose; maxillary palpi usually somewhat shorter than galeae; labial palpi but little longer than galeae. Facial foveae well impressed, moderately to rather long, and close to margin of eyes. Pterostigma usually rather large, about three times as long as wide, and not as wide as first submarginal cell. Tarsal claws with a small inner tooth. Pygidial plate usually moderately broad, depressed on disk, and obtuse or rounded at apex, but apical part in one species rather narrow, acute, and somewhat convex on disk. Pubescence scanty to moderately abundant; scopa of hind tibiae composed of long, somewhat curved simple hairs.

Male.—Head often ordinary in small individuals, but more or less enlarged in large, well-nourished specimens, with broad cheeks, more or less strongly dentate anteriorly. Commensurate

with enlargement of head, flanks of pronotum become more or less deeply impressed, imparting increasing prominence to posterior corners of disk. Tarsal claws bifid, inner tooth nearly as long as outer. Tergite 7 narrowed gradually to rounded apex. Subgenital plate generally triangular and narrowing to acuminate, acute to rounded, or sometimes truncate apex. Caulis of genitalia with dorsal lobes projecting over sagittae as seen in lateral view and not fimbriate beneath, except a trace in one species. Parameral lobes generally slender, about as long as caulis and much longer than dorsal lobes. Sagittae fusiform, acute to blunt at apex, with the lateral rods often spreading apart toward apex for protrusion of internal sac, but in one species entire sagittal structure enormously swollen and furcate at apex.

Perdita wootonae Cockerell

(Figs. 733, 734, 845)

Perdita wootonae Cockerell, 1898, Ent. News, 9:215, ♀, ♂; Swenk and Cockerell, 1907, Ent. News, 18:57; Cockerell, 1922, Amer. Mus. Novitates, 33:1; Timberlake, 1928, Proc. Hawaii. Ent. Soc. 7:152.

This yellow species occurs on *Mentzelia*, mostly at low altitudes east of the Rocky Mountains from New Mexico to Nebraska, although Cockerell has recorded it from an elevation of over 10,000 feet at Tennessee Pass, Colorado. The female is distinguished from other small yellow *Perdita* by having the head slightly longer than wide, with a very large clypeus and subantennal plates, and by the insertion of antennae at the middle of face. The male, especially in macrocephalous examples, is distinguished by its quadrate head with very broad dentate cheeks, and by the deeply impressed flanks of the pronotum. Both sexes usually have a black patch on each side of the posterior part of the mesopectus and their ocelli are more or less encircled with black.

Female.—Pale yellow, almost verging on creamy white, the foveae of face and of tergite 2 black. Ocelli more or less encircled with black, the dark area sometimes forming a narrow irregular band from eye to eye at their summits; sometimes a small black spot present above each antennal socket. A circular dark patch on each side of mesopectus sometimes pale brown or evanescent. Mandibles yellow, becoming red at apex. Proboscis centrally fuscous, including first joint of labial palpi, but stipites yellow and galeae brown. Antennae and legs yellow; flagellum more or less brown above, but sometimes only basal joints darkened with short narrow crossbands. Tegulae yellow at base and broadly subhyaline on outer margin. Wings milky hyaline, nervures pallid, subcosta and margin of stigma yellow.

Head slightly longer than wide, with antennae inserted halfway between level of anterior ocellus and anterior margin of clypeus. Proboscis rather elongate, yet contained in proboscival fossa when folded in repose. Mandibles stout, with small inner tooth, and reaching to far margin of fossa. Clypeus large, convex, and prominent; disk about one and one-fourth times as broad as high. Subantennal plates more than twice as long as wide and pointed at anterior end. Facial foveae well impressed, narrow, barely more than their own width from margin of eyes, and extending from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Pterostigma large and moderately broad; parts of marginal cell beneath and beyond it about equal. Frons, vertex, and mesonotum very minutely tessellate, moderately shining, and with only a few very fine and scattered punctures. Pubescence very fine, short, and sparse on face and mesonotum; rather long and moderately dense on cheeks and sternum; longer and denser on front coxae. Pygidial plate triangular, about as long as wide at base, and with apex narrowly truncate. Length: about 4.5–6.5 mm.; anterior wing, 4–4.6 mm.

Male.—Similar to female but deeper yellow in color; antennae sometimes entirely clear yellow, and dark markings of face and sternum often reduced or absent, at least in small-headed examples.

Head quadrate, inner orbits of eyes parallel, and proportions of parts of face about as in female. Cheeks broader than eyes even in small-headed examples, and more or less strongly dentate anteriorly in macrocephalous examples. Mandibles tapering, acute at apex, and each reaching, in macrocephalous examples, well beyond far margin of proboscis fossa. Flank of pronotum strongly impressed in proportion to degree of enlargement of head. Sculpture and pubescence as in female. Tergite 7 narrowed to moderately wide and rounded apex. Subgenital plate triangular or arrowhead shaped, rather convex beneath and carinately ridged at apex; very fine short hairs on a little less than apical half of disk, not or barely fringing its margins except at extreme apex. Caulis of genitalia broader than long, with short blunt dorsal lobes and long slender parameral lobes; sagittal rods slender, divergent at apex for emission of bulky eversible penial sac. Length: about 4-5.5 mm.; anterior wing, 3-4 mm.

The type locality of *wootonae* is five or six miles beyond Tularosa, Otero Co., New Mexico, on the road to the mountains. It has been recorded also from Denver, Pueblo, La Junta, Wray, and Tennessee Pass in Colorado, and from Crawford and Glen in Nebraska.

Material examined.—COLORADO. Denver Co.: 1 male, 1 female, Denver, the male on *Mentzelia nuda*, the female on *Eriogonum effusum*, July 29, 1922 (L. O. Jackson). Weld Co.: 2 males, Roggen, on *Mentzelia*, Aug. 26, 1935 (C. D. Michener). Pueblo Co.: 1 male, Pueblo, Aug. 9, 1920 (F. C. Lutz). KANSAS. Finney Co.: 18 males, 11 females, 2 miles south of Garden City, on *Mentzelia*, Sept. 3, 1951 (Michener and W. E. La Berge). Barber Co.: 2 males, 4 miles south of Aetna, on *Mentzelia*, July 11, 1955 (La Berge). Gray Co.: 32 males, 64 females, Charleston, on *Mentzelia decapetala*, Sept. 5, 1949 (Michener and Beamer). NEBRASKA. Sioux Co.: 2 males, 1 female, Glen, Aug. 10, 1905; 2 males, Glen, Aug. 13, 1906 (H. S. Smith); 10 males, 94 females, Glen, 4,000 feet, on *Mentzelia*, Aug. 18, 1906 (M. H. Swenk); 3 males, 3 females, Glen, 4,000 feet, on *Mentzelia*, July 12, 1910 (L. Bruner); 5 males, 1 female, Glen, on *M. decapetala*, Aug. 10, 1955 (L. W. Quate); 20 males, 19 females, 3 miles east of Glen, on *Mentzelia*, Aug. 10, 1955 (La Berge). Dawes Co.: 50 males, 77 females, Crawford, on *Mentzelia*, July 28 and 29, 1901 (M. Cary). Garden Co.: 2 males, 3 females; Oshkosh, on *M. decapetala*, Aug. 11, 1955 (Quate); 6 males, 8 females, 8 miles northeast of Oshkosh, on *Mentzelia*, Aug. 12, 1955 (La Berge). Sheridan Co.: 1 male, 1 female, 10 miles south of Gordon, on *Mentzelia*, Aug. 9, 1955 (La Berge). Scotts Bluff Co.: 1 male, Mitchell, on *Tragopogon porrifolius*, Aug. 5, 1914 (L. M. Gates).

Perdita viridiotata, n. sp.

(Figs. 735, 736, 846)

This species is similar to *wootonae* in its pale-yellow color, but the dark patch on each side of the mesopectus is dark green. The head of the female differs from that of *wootonae* in being no longer than wide, with the clypeus and subantennal plates normal in size and the facial foveae much shorter.

Female.—Pale yellow, except for a large green patch (sometimes lacking) on each side of posterior half of mesosternum, and blackish foveae of face and tergite 2. Antennae and legs yellow; joints of flagellum with small pale brown mark on outer side. Tegulae yellow at base and broadly subhyaline on outer margin. Wings whitish hyaline, nervures pallid, subcosta and stigma yellow.

Head as broad as long. Clypeus broadly reflexed anteriorly on each side; dorsal truncation of disk almost straight and bisecting inner margin of subantennal plates nearly at their middle. Facial foveae well impressed, slightly arcuate, a little more than their own width from margin of eyes, and a little less than half as long as space included between antennal sockets and anterior ocellus. Mandibles stout, tapering, and with small inner tooth. Proboscis shorter than in *wootonae*, apex of galeae in repose falling short of base of stipes. Pterostigma large, not quite equaling

width of first submarginal cell; parts of marginal cell beneath and beyond it subequal. Pygidial plate broad at base and bluntly rounded at apex. Head and thorax minutely tessellate and slightly dullish; puncturation excessively fine and very sparse. Pubescence white and generally sparse, with face and mesonotum almost nude, hair of front coxae long and dense, hair on dorsal margin of hind tibiae slightly plumose and not much longer than greatest width of tibiae. Length: about 5 mm.; anterior wing, 3.8-4 mm.

Male.—Pale yellow, except for greenish marks, including small mark (sometimes absent) on each side of vertex a little behind level of ocelli and halfway between each lateral ocellus and nearest eye, large round patch on each side of posterior part of mesosternum, and a thick-armed v-shaped mark on propodeum. Oval patch at base of tergite 1 and apical band on tergites 1 and 2, brownish fuscous; the bands not reaching lateral margins, that on tergite 2 broadly subinterrupted in middle and that on tergite 1 joined to basal mark by a dark line in median crease. Tegulae and wings as in female but stigma more pallid centrally.

Head as broad as long; cheeks about as broad as eyes, widest (but just slightly) somewhat in front of summit of eyes and dentate anteriorly in one of two examples. Facial foveae small and punctiform. Occiput broadly concave, width of concavity equaling distance between summit of eyes. Flanks of pronotum well impressed, but disk not abbreviated and with posterior corners rounded and moderately prominent. Sculpture and pubescence about as in female, but mesonotum somewhat more shining than frons. Tergite 7 and subgenital plate shaped much as in *wootoniae*, but plate more narrowly triangular and not carinately ridged on apical part of disk. Genitalia similar to those of *wootoniae* but dorsal lobes of caulis smaller, volsellae much more exposed, and parameral lobes shorter and a little thickened on apical half. Length: about 4 mm.; anterior wing, 3 mm.

Holotype female, allotype, and paratypes.—Eleven females, 2 males, Alamogordo, Otero Co., New Mexico, Sept. 13, 1937 (R. H. Crandall). The male paratype has lost the abdomen.

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

Perdita holoxantha, n. sp.

(Figs. 737, 738, 847)

This is another pale-yellow species allied to *wootoniae* and *mentzeliae* and distinguishable by the characters in the preceding key. Only the male is known.

Male.—Uniformly pale sulphur yellow, including antennae and legs, and without dark markings. Apex of mandibles bright red; facial foveae reddish brown. Foveal lines of tergite 2 concolorous. Tegulae subhyaline and yellowish at base. Wings whitish hyaline; nervures, including subcosta, very pallid.

Head as broad as long, cheeks very broad but receding, rounded, unarmed, and widest opposite anterior end of upper third of eyes. Occiput deeply and broadly concave; concavity a little broader than space between summit of eyes. Ocelli behind a line tangent to posterior end of eyes; lateral pair definitely closer to occipital margin than to nearest eye. Facial foveae punctiform. Proboscis moderately long, apex of galeae in repose not reaching base of stipites. Mandibles long, tapering, acute, and reaching well beyond far margin of proboscis fossa. Flanks of pronotum moderately impressed and posterior corners of disk rather prominent and rounded. Pterostigma about two-thirds as wide as first submarginal cell; part of marginal cell beyond it much shorter than part beneath. Head and thorax shining, with faint tessellation visible under high magnification. Pubescence sparse, erect, and short, although long and much denser on sternum and underside of front coxae. Tergite 7 obtusely rounded at apex; subgenital plate nearly as in *viridinotata*, but a little more acute at apex. Genitalia much as in *viridinotata* except that parameral lobes are more slender and much less hairy. Length: nearly 3 mm.; anterior wing, 2.7 mm.

Holotype male.—St. George, Washington Co., Utah, May 26, 1919 (collector not known), in collection of American Museum of Natural History.

Perdita nigridia, n. sp.

(Figs. 777, 778, 867)

This species collects pollen from *Mentzelia involucrata* in the Colorado Desert of southern California and although it has the habitus of other species that visit *Mentzelia* the aedeagus and subgenital plate of the male exhibit some similarity to the same parts of members of the *subfasciata* subgroup. In this respect it may be considered a connecting link between the two subgroups.

Female.—Head and thorax dark green; labrum, clypeus, supraclypeal area, mesoscutum except anterior border, scutellum, and metanotum, black or blackish. Lateral face marks pale yellow, much higher than wide, acute above, and intruding between foveae and margin of eyes. Clypeus entirely dark or with a median longitudinal yellow stripe (sometimes very faint or broad) joining an arcuate yellow band on posterior margin of disk. Mandibles yellow at base and shading into red at apex. Collar of pronotum, more or less small cuneate marks on posterior corners of disk, and tubercles, yellow. Abdomen brownish fuscous with an enclosed yellow band, more or less distinct but nubilous, on tergites 1 to 3 or 4; sometimes tergite 4 except for a darker apical band, and tergite 5, brownish yellow. Legs fuscous, front femora at apex and front tibiae on anterior side yellow. Antennae fuscous, flagellum brown beneath. Proboscis dark. Tegulae yellow at base and broadly hyaline on outer margin. Wings hyaline, nervures testaceous, subcosta and margins of stigma brown.

Head as broad as long. Clypeus convex; disk somewhat broader than high, broadly rounded above, and with lateral extensions but slightly visible in frontal aspect of head. Facial foveae well impressed, about twice as broad as interval between them and margin of eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Proboscis moderately long, included within fossa in repose; apex of galeae reaching base of stipes. Mandibles with small but distinct inner tooth and reaching far margin of proboscoidal fossa. Pterostigma about four times as long as wide and somewhat narrower than first submarginal cell; part of marginal cell beneath stigma slightly longer than part beyond. Pygidial plate longer than wide at base, its sides rapidly converging to a narrow acute apical part somewhat convex on disk and curved downward. Frons, vertex, and notum of thorax minutely tessellate and moderately dullish; face below antennae and sides of thorax smoother and more shining; anterior half of frons and anterior border of mesoscutum with moderately close minute punctures, becoming sparse on other parts of face and mesonotum. Pubescence whitish: rather thin, short, and erect on face and mesonotum; longer and moderately dense on cheeks and sternum; long and dense on front coxae. Length: 4.5–6 mm.; anterior wing, 3.4–3.6 mm.

Male.—Head and thorax dark green; disk of mesoscutum, scutellum, and metanotum, blackish. Mandibles except red tips, labrum, and most of face below level of antennae, yellow. Lateral marks in macrocephalous examples very broad to level of antennae and thence obliquely truncate to level of foveae; supraclypeal mark transverse or sometimes reduced to two dots; subantennal plates entirely dark, or yellow more or less margined with black. In rare specimens clypeus brownish, with a yellow T-mark on disk as in female. Cheeks usually broadly yellow on anterior third of orbits, but varying to a small yellow spot before base of eye, or entirely dark. Tubercles and collar of pronotum yellow; rarely a spot on each side of hind margin of disk. Abdomen brownish to brownish fuscous, without markings; venter brownish yellow. Legs blackish; apex of front femora, front tibiae and tarsi, and middle tibiae beneath, yellow; middle and hind tarsi brownish. Antennae fuscous, flagellum much browner than pedicel or scape and becoming brownish yellow beneath. Tegulae and wings as in female, except subcosta and margins of stigma darker brown.

Head sometimes small, rotund, but usually more or less enlarged; sometimes very large and quadrate, with very broad but rounded cheeks. Occiput broadly and moderately deeply concave. Disk of clypeus small in macrocephalous examples, not much broader than high; lateral extensions narrow, as long as width of disk, and mostly visible in frontal aspect of head. Facial foveae

punctiform. Mandibles broad at base, tapering to acute apex, and reaching far margin of proboscoidal fossa. Flanks of pronotum at most only moderately impressed even in specimens with very large head. Inner tooth of tarsal claws about half as long as outer tooth. Sculpture and pubescence about as in female. Tergite 7 with a pygidiform medioapical lobe finely carinate on lateral margins; margins converging slightly toward moderately narrow truncate apex. Subgenital plate about one and one-half times as long as wide; apex truncate and apical part of disk with fine, short pubescence. Dorsal lobes of caulis rather long and acute in both dorsal and lateral views, and with trace of fimbriation on inferior margin; superior pair of volsellae concealed by dorsal lobes of caulis, inferior pair considerably longer and exposed; parameral lobes as long as caulis, moderately incurved, and subacute at apex; sagittae slenderly fusiform, the two rods slightly separated in apical part but converging to common obtuse apex. Length: 3.5-5 mm.; anterior wing, 2.8-3.2 mm.

Holotype male, allotype, and paratype.—Seven males, 1 female, Salt Creek, Orocopia Mts., Riverside Co., California, on *Mentzelia involucrata*, March 20, 1927 (Timberlake). *Additional paratypes*.—CALIFORNIA. Riverside Co.: 13 males, Whitewater, on *Eriogonum fasciculatum*, April 25 and 26, 1936; 1 male, Whitewater, on *Mentzelia involucrata*, April 19, 1937; 9 males, 3 females, 14 miles south of Twentynine Palms, on same flower, April 14, 1935; 20 males, 2 females, Morongo Pass, on same flower, April 22, 1937; 4 males, 1 female, Box Canyon, April 4, 1937, 2 males, March 24, 1953, and 5 males, 4 females, April 7, 1958, all on same flower, and 1 male, on *M. albicaulis*, March 9, 1958; 1 male, 15 miles south of Highway 60, Blythe to Niland road, Chuckawalla Mts., on *M. involucrata*, April 13, 1949 (Timberlake); 2 males, same road, on same flower, 11 miles south of Highway 60, April 13, 1949 (R. C. Dickson); 12 males, 12 females, Lost Palm Canyon, April 9, 1939 (Mrs. R. C. Dickson); 4 males, Fan Hill Canyon, 10 miles northeast of Thousand Palms, April 6, 1935 (W. R. M. Mason). Inyo Co.: 1 male, Surprise Canyon, Panamint Mts., on *Eucnide wrens*, April 22, 1957 (Timberlake). ARIZONA. Mohave Co.: 2 males, 1 female, Hoover Dam, March 27, 1953 (G. E. Bohart); 2 males, 1 female, Willow Beach Lake, on *Encelia farinosa*, March 27, 1953 (Bohart).

Types in U. S. National Museum (No. 43,391); paratypes in collections of the University of California at Riverside and Berkeley, the Department of Agriculture at Ottawa, Canada, and of G. E. Bohart.

Perdita perplexa, n. sp.

(Figs. 739, 740, 848)

This little-known species was collected from flowers of *Mentzelia* in New Mexico, and agrees with other species found on the same flower in habitus and general features of coloration. The female differs from *P. mentzeliae* Cockerell in having the cheeks broadly white and the lateral face marks reaching the upper end of the foveae on the orbits. The male has much yellow on the thorax, including the notum.

Female.—Head and thorax black, becoming slightly greenish on face above antennae; cheeks broadly almost to summit of eyes, and narrowly triangular lateral face marks, yellowish white; lateral marks abruptly constricted at lower end of foveae and continuing between them and margin of eyes to upper end of foveae. Collar of pronotum, band on hind border of disk (slightly interrupted at middle), and tubercles, yellowish white. Abdomen blackish; narrow white band, not reaching lateral margins, at base of tergites 2 and 3; two small suffused whitish spots at summit of basad declivity of tergite 1. Legs dark brown; trochanters, apex of front and middle femora more broadly in front and with a streak extending nearly to base along upper margin, front tibiae, front and middle tarsi, and anterior side of middle tibiae, pale yellow. Antennae fuscous, flagellum yellowish brown beneath, scape whitish on underside at base. Tegulae testaceous hyaline, base yellowish white. Wings milky hyaline, nervures dilute yellowish, subcosta and stigma more yellowish, inner margin of stigma slightly brownish.

Head as broad as long; clypeus large, convex, and prominent. Facial foveae well impressed, somewhat broader at anterior end than interval between them and eyes and reaching from slightly below level of antennal sockets nearly two-thirds of distance to level of anterior ocellus.

Mandibles as in *mentzeliae*; proboscis moderately short. Pterostigma large, but not equaling width of first submarginal cell; part of marginal cell beneath stigma equal to part beyond. Pygidial plate plane, rather narrowly rounded at apex. Face and thorax minutely tessellate and moderately dull, mesonotum duller than frons, face below antennae shinier, clypeus almost polished. Puncturation of face and mesonotum very fine and sparse; large area on posterior middle of mesoscutum impunctate. Pubescence fine and sparse on face and mesonotum; anterior half of scutum with short erect hair, posterior half nude. Length: 5.5 mm.; anterior wing, 4 mm.

Male.—Head bright yellow; occiput and vertex black with a slight greenish tinge. Yellow on lower edge of cheeks extending beyond summit of eyes, but summits encompassed by dark color or vertex extending broadly outward on each side. Yellow of face almost touching anterior ocellus, with upper margin straight and transverse. Mandibles, except red tips and labrum, yellow, but proboscis brown. Prothorax entirely yellow except for brown band on notum behind collar. Remainder of thorax yellow beneath and on sides, except for broad blackish band extending from beneath tegula to middle coxa, and large quadrate slightly greenish dark patch on each side of mesopectus. Lateral margins of mesoscutum yellow (more broadly anteriorly); posterior third of broad median area on disk extending forward about two-thirds of length, clear yellow, area then shading to brown, except a marginal streak of clear yellow on each side. Scutellar area except dark depression on each side of disk, short transverse streak on metanotum, and short longitudinal streak on basal middle of propodeum, yellow. Dorsum of thorax otherwise black, tinged with blue green on propodeum and slightly tinged with green on anterior border of mesoscutum. Abdomen yellow; tergite 1 entirely brownish fuscous; tergite 2 dark around border, enclosing a yellow band; following tergites, except last, each with successively paler brown bands at base and apex, that at apex of tergite 6 very faint and narrow. Legs yellow, except for pale-brown spot near apex of hind femora above, and brown streak on outer side of hind tibiae. Antennae yellow; pedicel, and flagellum above, pale brown. Tegulae and wings as in female.

Head very large, quadrate, and much broader than thorax. Cheeks extremely broad, with short broad conical tubercle anteriorly. Mandibles long, quadrate expansion at base on outer side, tapering from middle and each reaching, when closed, nearly to base of other. Proboscis moderately long, apex of galeae not reaching base of stipites in repose. Sculpture and pubescence about as in female, but face and mesonotum more weakly tessellate and more shining and face impunctate. Tergite 7 rather narrowly obtuse at apex. Subgenital plate narrowly triangular; apex rounded; short, rather dense setae on apical half of convex ventral surface of disk. Dorsal lobes of caulis short and broadly rounded, volsellae well exposed in dorsal view; parameral lobes slightly clavate and hairy on apical half; fused body of sagittae ovate, with rods moderately spread apart apically. Length: 4.5 mm.; anterior wing, 3.4 mm.

Holotype female and allotype.—Seventeen miles east of Quemado, Catron Co., New Mexico, on *Mentzelia*, Aug. 26, 1931 (Timberlake), in collection of the Citrus Experiment Station, Riverside.

Perdita bicuspidariae, n. sp.

(Figs. 741, 742, 849)

Although *P. bicuspidariae* is undoubtedly allied to other species found on *Mentzelia*, certain of its characters are quite different, particularly the facial foveae of the female, the broad bidentate apex of the apical tergite, and the genitalia of the male. It collects pollen from *Mentzelia involucreta* in the deserts of southern California.

Female.—Head and thorax dark green, becoming bluish on propodeum and black on supra-clypeal area, subantennal plates, mesoscutum except anterior border, scutellum, and metanotum. Mandibles except red tips, labrum, clypeus, and lateral marks, white; suffused supra-clypeal mark rarely present. Collar of pronotum, interrupted band on hind margin of disk, and tubercles, white. Sometimes a small white spot on flanks of propodeum just above hind coxae; rarely almost whole posterior half of propodeum white, including entire flanks, two spots on metapleura, and a small spot on anterior middle of mesopleura; in one specimen also a small white spot on

scutellum. Abdomen pale yellowish white, marked above with pale fuscous or brown coloration; basal declivity of tergite 1 more or less entirely dark, with color deepening on apical corners of declivity; dark band on apical margin of tergites 1 to 4 or 5, supplemented by dark spot on basal corners, markings becoming progressively fainter toward apex of abdomen. White area on tergite 1 sometimes reduced to narrow subapical band, or sometimes covering most of basal declivity; white band on tergite 2 sometimes enclosed. Legs yellowish white; posterior side of front and middle femora and tibiae except at knees, dorsal side of hind femora and hind tibiae, and tarsi, pale fuscous or brown, with dark markings sometimes faint except on hind tibiae and tarsi. Antennae fuscous, scape white beneath, flagellum dull yellowish beneath. Tegulae white at base, broadly subhyaline on outer margin. Wings whitish hyaline, nervures pale testaceous, subcosta more or less pale ferruginous, margins of stigma faintly brownish.

Form rather slender; head nearly as broad as long. Disk of clypeus convex, somewhat broader than high, broadly rounded above, truncate anteriorly. Mandibles stout, curved, with well-developed inner tooth, and reaching slightly beyond far margin of proboscival fossa. Proboscis of moderate length, apex of galeae not quite reaching base of stipites when folded in repose. Facial foveae deeply impressed, generally more than twice as wide as space between them and margin of eyes, and reaching from level slightly above middle of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Pterostigma as long and nearly as broad as first submarginal cell; part of marginal cell beneath it distinctly longer than part beyond, latter being as long as wide. Inner tooth of tarsal claws about half as long as outer tooth. Pygidial plate plane; sides converging to narrow, subtruncate, or slightly emarginate apex. Head and thorax finely tessellate and moderately shining, face below antennae smooth and more shining; punctures on middle of face and on anterior part of mesoscutum extremely fine and sparse. Pubescence white, very sparse and short on middle of face, vertex, and anterior part of mesoscutum; longer on underside of head and on mesopleura; long and dense on front coxae and mesopectus. Length: about 3.5-4 mm.; anterior wing, 2.7-3 mm.

Male.—Head, thorax, and abdomen yellow, with dark markings very variable in extent. In palest specimens an abbreviated greenish band just enclosing ocelli; mark on occiput and two narrow vittae on mesoscutum, brownish; γ -shaped mark on propodeum and large circular mark on each side of mesopectus, black; basal declivity of tergite 1, and band at apex of tergites (becoming successively fainter toward apex of abdomen), brown. Dark marks of thorax sometimes greenish, with vittae of mesoscutum widened anteriorly; sometimes propodeum almost all yellow; sometimes mark at base of tergite 1 irregularly trifold and remainder of abdomen only faintly marked. In darkest specimens, occiput and vertex dark greenish, with dark color descending halfway between level of foveae and anterior ocellus, but with cheeks remaining yellow to summit of eyes. Thorax above dark green, except pronotum, lateral margins of mesoscutum, a transverse mark on posterior middle of mesoscutum, and mark on scutellum. Sides of thorax and flanks of propodeum yellow, except for a blackish oblique band from beneath tegulae to middle coxae. Dark markings at base of abdomen more or less extensive, tergite 1 sometimes entirely dark and the yellow on tergite 2 reduced to a narrow, nubilous basal band, but dark markings on apical segments narrow and faint. Yellow mark on posterior middle of mesoscutum sometimes much enlarged, so that disk has two dark vittae broadly confluent in front. Type male an intermediate example with rather broad dark band across vertex, narrowed where it touches eyes, vittae on mesoscutum widened anteriorly, with a dark cloud between their anterior ends, and dark γ -mark on propodeum obsolescent. Legs entirely yellow, or hind tibiae and tarsi faintly brownish. Antennae yellow, flagellum brownish above and dull yellowish beneath, pedicel dark brown or fuscous above. Mandibles except red tips, and proboscis, yellow. Tegulae and wings as in female, except spot at base of tegulae yellow instead of white.

Head about normal size to moderately enlarged, becoming quadrate in the more macrocephalous specimens, with cheeks broader than eyes and rounded beneath. Disk of clypeus broader than high, lateral extensions reflexed although narrowly exposed in frontal aspect. Facial foveae rather large but punctiform. Mandibles tapering from broad base to acute apex and reaching a little beyond far margin of proboscival fossa. Flanks of pronotum no more than normally impressed. Sculpture and pubescence similar to that of female but punctures and tessellation weaker. Face and cheeks almost entirely nude, hair of mesonotum very sparse and short, that on

undersurface of head and thorax long and rather dense. Tergite 7 with a broad truncate apical lobe, slightly bisinuous across middle and with a short blunt tooth at outer corners. Subgenital plate with parallel sides and rounded apex, and about one and one-half times longer than wide; apical part of disk with very fine short pubescence. Aedeagus very small; dorsal lobes of caulis acute in both dorsal and lateral views; parameral lobes broadly strap-shaped and inserted low on sides of caulis; fused sagittae unusually slender, very thin dorsoventrally in lateral view and strongly curved upward. Length: about 3–3.5 mm.; anterior wing, 2.2–2.8 mm.

Holotype male, allotype, and paratypes.—Five males, 10 females, Salt Creek, Orocopia Mts., Riverside Co., California, on *Mentzelia involucreta*, March 19–20, 1927 (Timberlake). *Additional paratypes.*—Riverside Co.: 10 males, 9 females, April 4, 1937, 1 female, April 17, 1952, 2 males, March 24, 1953, and 1 female, April 9, 1958, all from Box Canyon, on same flower; 5 males, 1 female, Morongo Pass, April 22, 1937, and 3 males, 1 female, 13.6 to 15 miles south of Highway 60 on the Blythe to Niland road, Chuckawalla Mts., April 13, 1949, on same flower (Timberlake); 4 males, 1 female, Lost Palm Canyon, April 9, 1939 (Mrs. R. C. Dickson). Imperial Co.: 1 male, Painted Canyon, on *Hyptis emoryi*, April 12, 1945 (R. A. Flock).

Types (No. 43,387) in U. S. National Museum, and paratypes in collection of the Citrus Experiment Station, Riverside.

Perdita lunulata, n. sp.

This species may be recognized by the transversely lunate and slightly interrupted white mark close to the posterior margin of the mesoscutum. Its placement in the *ventralis* group is tentative, pending discovery of the male, but the female seems to be rather similar to the species frequenting *Mentzelia*. The unique female was taken with many specimens of *P. similis* Timberlake and a small series of *P. jucunda* Timberlake at flowers of *Eriogonum*, but only the females of *jucunda* were collecting pollen.

Female.—Head and thorax dark green; supraclypeal area, subantennal plates, mesoscutum except anterior border, impressed area on each side of scutellum, and metanotum except light mark on disk, black. Anterior two-thirds of cheeks and undersurface of head, mandibles except red apical half, labrum, clypeus, and lateral marks, yellowish white. Lateral marks much higher than wide and tapering almost evenly from base to acute apex at summit of foveae. Pronotum white, with a dark band from flank to flank constricted on each side opposite posterior corners of disk. Mesoscutum with narrow, white lateral margins failing to reach anterior corners; a gently arcuate band of white across middle of disk, close to posterior margin, slightly interrupted in middle, and acutely produced forward at outer ends. Scutellum white, including axillae and posterior crest on each side. Metanotum with a transverse white mark gradually narrowing to an acute point at outer ends. Abdomen white, with four brownish-fuscous bands: band at base of tergite 1 somewhat anchor-shaped, with median shaft very slender and lateral arms very broad; following bands cover apex of segments rather broadly and base of each succeeding segment narrowly; light band at base of tergite 2 slightly broader than apical dark band and narrowly enclosed laterally; at junction of tergites 4 and 5 another band faintly indicated by an oval preapical brown spot on each side of 4 and by pale-brownish basal margin of tergite 5. Legs pale yellowish; streak on posterior side of middle tibiae, small spot on posterior side of hind femora, another on apex above, hind tibiae except beneath, and hind tarsi, brownish fuscous. Antennae fuscous; flagellum yellowish brown beneath; scape pale yellow except for dark spot above at apex. Tegulae testaceous hyaline, with a white spot at base. Wings whitish hyaline, nervures including stigma uniformly pallid.

Head as broad as long. Disk of clypeus somewhat broader than high, with lateral extensions very broad within and narrowing much more than half to base of mandibles. Mandibles moderately stout, with a small inner tooth. Proboscis rather short, galeae not reaching base of stipites in repose. Facial foveae about as wide as 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 large, about three times as long as wide; part of marginal cell beneath

it about same length as part beyond. Pygidial plate about as long as wide at base, sides converging to rather narrow and rounded apex. Head and thorax moderately shining, with distinct but not strong tessellation; minute and sparse punctures on face below antennae, on upper part of frons in front of ocelli, and on anterior half of mesoscutum. Pubescence thin and whitish: short and erect on vertex and anterior half of mesonotum; rather long and dense on undersurface of head and thorax; face nude. Length: 4.5 mm.; anterior wing, 3.8 mm.

Holotype female.—Painted Desert, Apache Co., Arizona, on *Eriogonum aureum*, Aug. 18, 1958 (G. I. Stage), in collection of the Citrus Experiment Station, Riverside.

Perdita mentzelium Cockerell

(Figs. 743, 744, 850)

Perdita mentzelium Cockerell, 1897, N. Mex. Exper. Stat. Bull. 24:43, ♀, ♂; Cockerell, 1902, Amer. Nat. 36:811; Cockerell, 1905, Entom., 30:145.

Perdita mentzelium var. *lauta* Cockerell, 1905, Entom. 30:145, ♀, ♂.

P. mentzelium was based on material from the Organ Mountains, New Mexico, in which the clypeal and lateral face markings of the female were well developed, and the yellow of the face of the male extended above the antennae in the median line, with the lateral marks extremely broad above. The variety *lauta* has the dark markings on the legs and abdomen reduced or sometimes almost absent. The type locality of *mentzelium* is Riley's Ranch, Organ Mountains, Dona Ana County, and the type locality of *lauta* is 5 to 6 miles above Tularosa, on the road to the mountains, Otero County.

Female.—Head and thorax dark green; supraclypeal area, subantennal plates, mesoscutum except anterior border, and scutellum, black. Mandibles except red tips, clypeus, triangular lateral face marks reaching level of foveae or intruding slightly between them and eyes, collar of pronotum, tubercles, and an almost continuous band on hind margin of pronotum between the tubercles, creamy white. Abdomen creamy white; base of tergite 1, apical band on tergites 1 to 3 (often more or less broken), and spot at basal corners of tergites 2 to 4, fuscous. Legs white; base of coxae, femora except at base and apex and more or less on dorsal margin, streak on outer margin of middle tibiae, and hind tibiae except ventral edge, fuscous. Labrum fuscous or brownish, antennae pale yellow, pedicel and flagellum faintly brownish above. Tegulae subhyaline, with a basal white spot. Wings milky hyaline, nervures very pallid, stigma yellowish. (In var. *lauta*, dark markings of legs and abdomen more or less evanescent. In females from Chihuahua, Mexico, recorded below, more or less white developed on supraclypeal area and subantennal plates, with face becoming almost entirely white below level of antennae in some specimens.)

Head as broad as long; clypeus broadly truncate above, between subantennal plates. Facial foveae a little wider than interval between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Mandibles with a small inner tooth and not quite reaching far margin of broad proboscoidal fossa. Proboscis of moderate length, galeae in repose not reaching base of stipites. Pterostigma large, about three times as long as wide, and nearly as wide as first submarginal cell; part of marginal cell beneath stigma somewhat longer than part beyond. Pygidial plate plane, triangular, and rather narrowly obtuse at apex. Head and thorax minutely and rather delicately tessellate and moderately shining; face below antennae smooth and shining; frons and mesonotum with fine scattered punctures. Pubescence whitish; fine and sparse on face; short and erect on mesonotum, becoming somewhat dense on posterior border and forming faint prescutellar band. Length: about 5–5.5 mm.; anterior wing, 3.8–4 mm.

Male.—Dark parts of head and thorax dark green or bluish; disk of mesoscutum and scutellum black. Face yellow to level of foveae; dark color of frons usually extending as a triangular lobe to each antennal socket; yellow in median line sometimes reduced to a slender projection, but

that on sides of face ending broadly and often notched by foveae. Undersurface of head and cheeks yellow nearly to summit of eyes. Sides and undersurface of thorax yellow with a dark crossband on disk of pronotum, an oblique band (sometimes interrupted) from beneath tegulae to base of middle coxae, and a large circular dark mark on each side of posterior part of mesospectus. Abdomen yellow, sometimes with base of tergite 1 and two subapical spots on same segment fuscous. Mandibles except red tips, labrum, antennae, and legs, yellow. Rarely a faint dark band at apex of tergites 2 and 3 and a duskiness on outer edge of hind tibiae. Tegulae and wings as in female.

Head in many smaller specimens small, with only moderately broad unarmed cheeks; but in some specimens greatly enlarged, quadrate, broader than long and broader than thorax, with lateral plates of face below antennae distinctly broader than space between them, and very broad cheeks either with or without an anterior tooth. Mandibles tapering, acute, and reaching far margin of proboscis fossa. Facial foveae small and punctiform. Flanks of pronotum more or less deeply impressed in correlation with size of head; disk transversely impressed behind collar, with posterior corners becoming very prominent and rounded. Head and thorax shining and nearly polished; tessellation distinct only on frons, anterior part of mesoscutum, and propodeum. Pubescence much as in female. Tergite 7 narrowing from base to rather broadly rounded apex. Subgenital plate triangular, convex on ventral surface, and ridged apically almost as in *wootoniae*. Genitalia much smaller than in *mentzeliae* or *wootoniae*; dorsal lobes of caulis moderately wide and rounded at apex and nearly reaching apex of volsellae; parameral lobes slender, incurved at apex, and sparsely hairy; fused sagittae elongate oval as seen from above, with the rods not divaricate at apex. Length: about 3.5–4.8 mm.; anterior wing, 2.8–3.5 mm.

Material examined.—NEW MEXICO. Otero Co.: 2 females, 2 males (including types of *lauta*), near Tularosa (E. O. Wooton); 1 female, 25 miles west of Tularosa, July 1, 1940 (E. E. Kenaga). Dona Ana Co.: 1 male, close to the Agricultural College, Mesilla Park, on *Mentzelia*, May 21 (Cockerell). Santa Fe Co.: 9 females, 2 males, Santa Fe, on *M. pumila*, July 19, 1952 (R. H. and L. D. Beamer, W. E. La Berge, and C. Liang). Luna Co.: 2 females, 13 males, 1.5 to 2 miles south of Gage, on *M. pumila*, Sept. 14, 1957 (Timberlake and Dickson). ARIZONA. Cochise Co.: 1 female, 7 males, Portal, on *M. pumila*, Sept. 10, 1954 (Timberlake). TEXAS. El Paso Co.: 1 female, Fabens, July 7, 1917 (collector probably J. C. Bradley). MEXICO. Chihuahua: 40 females, 2 males, Las Delicias, July 13, 1947 (W. Gertsch, D. Rockefeller Expedition).

Perdita mentzeliae Cockerell

(Figs. 745, 746, 851)

Perdita mentzeliae Cockerell, 1896, Proc. Acad. Sci., Phila., 48:60, ♂, ♀; Cockerell, 1905, Entom., 38:145; Timberlake, 1929, J. New York Ent. Soc. 37:122; Linsley and Hurd, 1959, Ent. News, 70:64, 65, 67.

Perdita pallidior Cockerell, 1896, Proc. Acad. Sci., Phila., 48:61, ♂, ♀ (new synonymy).

Perdita pulchrior Cockerell, 1896, Proc. Acad. Sci., Phila., 48:62, fig. 7, ♂ (new synonymy).

P. mentzeliae is the darkest of the species described by Cockerell from the flowers of *Mentzelia*. In the female the white face markings are restricted to small lateral marks; in the male the yellow of the face does not go above the antennae, except on each side, and usually there is no yellow on the under parts of the thorax. The form with the dark markings on the legs and abdomen reduced or evanescent was described by Cockerell as *pallidior* and *pulchrior* (the latter macrocephalous), but since both dark and light forms often fly together there is no reason to regard them as more than varieties, although there may be some evidence to indicate that the dark form is more prevalent northward. The type locality of *mentzeliae* is Santa Fe and both *pallidior* and *pulchrior* were described from Albuquerque, New Mexico.

Female.—Head and thorax dark green; clypeus, supraclypeal area, mesoscutum except anterior border, and scutellum, black. Tubercles of pronotum and lateral face marks, creamy white; the latter rarely evanescent, usually more or less quadrate, and not reaching above level of summit of clypeus (except in var. *pallidior*). Abdomen fuscous above with narrow enclosed white bands or the bands broad enclosed on tergites 2 to 4 or 5; often with a white mark on tergite 1, which may either take the form of an abbreviated band on the disk, be more or less interrupted, or extend broadly and irregularly forward down the middle; the light bands on following segments sometimes enlarged and open at outer ends; apical tergites usually and venter whitish. (In var. *pallidior* the abdomen may become entirely light except for four spots on tergite 1.) Legs fuscous; trochanters more or less, apex of front and middle femora together with their tibiae and tarsi except for a dark patch on posterior side of middle tibiae, pale yellow or yellowish white. (In var. *pallidior*, legs sometimes entirely light, or with dusky shading on anterior side of front femora and on outer side of middle and hind tibiae.) Antennae pale fuscous or brown above, including a spot at apex of scape, scape otherwise pale yellow, and underside of flagellum dull yellowish. Mandible reddish on apical half and white at base. Tegulae subhyaline with a basal white mark. Wings milky hyaline, nervures pallid, stigma more or less yellowish.

Head only slightly longer than wide, with large protruding clypeus. Facial foveae generally slender although somewhat wider than space between them and eyes and about two-thirds as long as space between antennal sockets and anterior ocellus. Mandibles stout, tapering, with small inner tooth, and reaching far margin of proboscis fossa. Proboscis moderately long but included within fossa, apex of galeae not quite reaching base of stipites. Pterostigma large, but not so broad as first submarginal cell; parts of marginal cell beneath and beyond it about equal. Pygidial plate triangular, slightly longer than wide, and with narrowly rounded apex. Head and thorax moderately shining, with fine tessellation distinct except on clypeus, and minute punctures widely scattered on frons and anterior half of mesoscutum. Pubescence whitish, very sparse and short on face and mesonotum; longer and more abundant on underside of head and thorax. Length: about 5–6.25 mm.; anterior wing, 3.8–4.5 mm.

Male.—Head and thorax dark green, becoming black on disk of mesoscutum and scutellum. Anterior third to one-half of undersurface of head and cheeks, mandibles except red tips, labrum, and face to level of antennae, with lateral marks extending bluntly to foveae, bright yellow. Collar and hind margin of disk of pronotum, tubercles, lower end of flanks of pronotum, and very rarely a small spot on anterior part of mesopleura, yellow. Abdomen fuscous on tergites 1 to 3 or 5, or with suffused yellow bands on tergites 2 to 4, otherwise yellow. (In var. *pallidior* often entirely yellow or orange yellow except on basal declivity of tergite 1.) Legs yellow, with hind tibiae and tarsi mostly brown, and hind femora brown behind except at apex (varying to entirely yellow in var. *pallidior*). Antennae clear yellow, with flagellum pale brown above in typical form. Tegulae and wings as in female.

Head often more or less enlarged, sometimes becoming very large and quadrate, with lateral plates of face much broader than intervening area. Cheeks more or less broad and armed anteriorly with a conical process. Mandibles tapering from broad base to very acute apex, and in extreme macrocephalous examples each reaching almost to base of other. Facial foveae punctiform. Pronotum deeply impressed on flanks; posterior corners of disk prominent and rounded; lateral margins of disk more or less strongly emarginate as seen from above. Sculpture and pubescence much as in female. Tergite 7 with moderately narrow apex. Subgenital plate triangular, acute and keeled on outer side at apex, and with fine short pubescence on apical half of disk. Genitalia much as in *wootoniae*, but dorsal lobes of caulis more truncate at apex. Length: 4–5 mm.; anterior wing, 3.2–4 mm.

This species has been previously recorded from Santa Fe, Albuquerque, Raton, and near Tularosa, New Mexico, and from Antonito, Colorado.

Material examined.—COLORADO. Las Animas Co.: 2 females, 1 male, Trinidad, on *Mentzelia*, at 6:45 P.M., July 4, 1939 (T. D. A. Cockerell). NEW MEXICO. Santa Fe Co.: 1 male, Santa Fe, on *Mentzelia*, evidently from the original type series taken Aug. 3, 1895 (Cockerell, No. 4,140);

3 females, Santa Fe, on *M. pumila*, July 19, 1952 (R. H. and L. D. Beamer, W. E. La Berge, and C. Liang). Otero Co.: 1 female, near Tularosa (E. O. Wooton). Dona Ana Co.: 1 male, Mesilla, July 4 (C. M. Bailey); 2 females, 3 miles east of Mesilla Park, on *M. pumila*, Sept. 13, 1957 (Timberlake). Luna Co.: 2 males, 2 to 2.5 miles south of Gage, on *M. pumila*, Sept. 14, 1957 (Timberlake and Dickson). Hidalgo Co.: 2 males, Rodeo, Aug. 19, 1958 (G. B. Pitman). ARIZONA. Cochise Co.: 2 females, 5 males, Portal, on *M. pumila*, Sept. 10, 1954 (Timberlake); 4 females, 12 males, 4 miles east of Portal, on *M. pumila*, Sept. 9, 1958; 4 females, 14 males, same place and flower, Sept. 2, 1958 (P. D. Hurd, Jr.); 1 female, Apache Pass, Dos Cabezas Mts., Aug. 26, 1954 (F. Werner).

Perdita punctifera Cockerell

(Figs. 747, 748, 852)

Perdita punctifera Cockerell, 1914, Proc. Ent. Soc. Wash., 16:32, ♀.

Perdita mentzeliarum Cockerell, 1914, Proc. Ent. Soc. Wash., 16:31 (misdetermination).

This is another segregate of the forms allied to *mentzeliae* and is perhaps most closely related to *mentzeliarum*: many females have the clypeus white, as does that species, and consequently are difficult to distinguish. They are somewhat smaller and have slightly shorter lateral face marks. The males, on the other hand, agree much better with *mentzeliae*: some specimens are hardly distinguishable by external characters but differ a little in the genitalia. It is not surprising, therefore, that some females should be misidentified as *P. mentzeliarum*, as Cockerell has done, and some males as *P. mentzeliae*.

Cockerell described *punctifera* in 1914 from females collected at Stone Cabin Canyon, Santa Rita Mountains, Arizona, at flowers of *Gossypium thurberi*, and identified part of his material as *P. mentzeliarum*. Since that time many *punctifera* have been collected in Arizona at flowers of *Mentzelia pumila*. Their activity, like that of allied species visiting this plant, is synchronized with the opening of the flowers, which takes place about an hour before sundown in midsummer. On the mesa west of Blythe, California, an annual form of *Mentzelia pumila* that blooms at the end of April opens its flowers in midafternoon, with accompanying activity by the *Perdita*.

Female.—Head and thorax dark green; mesoscutum except anterior border, scutellum, metanotum, supraclypeal area, and subantennal plates, black. Clypeus black, except for a small, white triangular streak at middle of upper border, but varying to pale brown or entirely white. Rarely a whitish spot or suffusion on supraclypeal area. Lateral face marks white, triangular, and sometimes hardly higher than wide, but generally reaching nearly to level of antennae, although not intruding between foveae and eyes. Tubercles, collar of pronotum, and sometimes a small spot on each side of posterior margin of disk, white. Abdomen fuscous above in darkest specimens, with a narrow, enclosed pale-yellow band at base of tergites 2 to 4 or 5, but more commonly having dark color restricted to three or four basal segments, with margins of tergites 1 and 2 remaining dark, or sometimes reduced to four spots on tergite 1 and two subapical spots on one or two following segments; pale color of abdomen generally becoming a testaceous yellow in dried specimens. Legs often pale yellow except hind tibiae and tarsi, but in darker specimens becoming brown or fuscous, except for front and middle pair remaining light at apex of femora, on tibiae except more or less behind, and on tarsi. Antennae pale yellow, with a spot at apex of scape, pedicel and flagellum above, pale brown; in pale examples scape more or less white. Mandibles pale yellow at base and rufotestaceous on apical half. Labrum dark. Tegulae subhyaline with whitish base. Wings whitish hyaline, nervures pallid, stigma sometimes more or less yellowish.

Head as broad as long. Facial foveae somewhat broader than space between them and eyes, and about two-thirds, or slightly more, as long as space between level of antennal sockets and anterior ocellus. Mandibles rather stout and blunt at apex, with inner tooth represented by abrupt contraction of width close to apex. Proboscis moderately long, apex of galeae in repose falling short of base of stipites. Venation as in allied species; part of marginal cell beneath stigma generally equal to part beyond, or sometimes part beyond slightly longer. Pygidial plate not much longer than wide at base, plane, and rather narrowly rounded or subtruncate at apex. Sculpture and pubescence as in *mentzeliae*, head and thorax moderately shining, face and mesonotum almost nude. Length: 4-5 mm.; anterior wing, 3.4-4 mm.

Male.—Similar to male of *mentzeliae*, but sometimes flanks of pronotum entirely yellow and flanks of propodeum with a slight yellow suffusion. Sometimes with an interrupted and irregular yellow band across anterior part of mesopectus, occasionally extending to pleural region. As in *mentzeliae*, face yellow to level of antennal sockets with lateral marks going somewhat higher, and cheeks yellow on anterior third to half. Legs yellow, but generally with a slight suffusion of fuscous coloration on hind tibiae and sometimes on hind femora. Abdomen generally orange yellow; tergite 1 more or less entirely fuscous; margins of tergite 2 and apical band on tergite 3, dark, or with dark markings sometimes evanescent.

Head not enlarged or only moderately, much more commonly than in *mentzeliae*, with cheeks broad, rounded beneath, and unarmed; anterior process of cheeks comparatively weak even in strongly macrocephalus specimens. Structure, sculpture, and pubescence much as in *mentzeliae*. Subgenital plate somewhat blunter at apex than in *mentzeliae*. Genitalia similar, but dorsal lobes of caulis less broad at apex and volsellae much more exposed. Length: 3.5-5 mm.; anterior wing, 2.8-3.8 mm.

Material examined.—ARIZONA. Pima Co.: 1 female, Stone Cabin Canyon, Santa Rita Mts., on *Gossypium thurberi*, Aug. 27, 1913 (W. D. Pierce), a cotype; 1 male, Tucson, May 22, 1935 (Owen Bryant). Gila Co.: 3 females, 2 males, 38 miles northeast of Globe, June 16, 1950 (L. D. Beamer). Maricopa Co.: 27 females, 17 males, Gila River near Tolleson, on *Mentzelia pumila*, May 29, 1933 (Timberlake). Yavapai Co.: 4 females, 19 males, Lonesome Valley, 15 miles north of Prescott, on *M. pumila*, July 3, 1932, and 7 females, 2 males on same flower, 6 miles northwest of Prescott, July 4, 1932 (Timberlake); 252 females, 10 males, 21 miles southwest of Prescott, on same flower, July 17, 1950 (C. D. Michener); 1 female, 1 male, 4 miles south of Jerome, July 7, 1952 (R. H. and L. D. Beamer, W. E. La Berge, and C. Liang). CALIFORNIA. Riverside Co.: 7 females, 32 males, 18 miles west of Blythe, on *M. pumila*, April 29, 1952 (Timberlake); 7 females, 5 males, same place and day (G. A. Marsh).

Perdita lateralis lateralis, n. subsp.

(Figs. 749, 750, 853)

On April 3 to 5, 1925, on my first visit to the Colorado Desert, I collected a few specimens of this species at flowers of *Larrea* and *Prosopis*, but it has proved to be one of the rarer species of *Perdita* and has never been taken in numbers. The female may be recognized by the pale-yellow lateral face marks and by the interrupted yellow bands on the middle segments of the abdomen.

Female.—Head and thorax dark green; clypeus, supraclypeal area, mesoscutum except anterior border, scutellum, and metanotum, black. Base of mandibles, and rather small lateral face marks reaching on orbits variably from level of summit of clypeus to level of lower margin on antennal sockets, pale yellow. Mandibles shading through rufotestaceous to dark red at apex. Labrum and thorax dark. Abdomen fuscous to blackish, more brownish beneath, pygidial plates rufotestaceous; on tergites 2 to 4 an enclosed pale-yellow or yellowish-white basal band more or less distinctly interrupted medially. Legs fuscous; anterior surface of front tibiae and tarsi pale brown, with a yellow streak more or less apparent on outer anterior edge of tibiae. Proboscis fuscous, more brownish apically. Antennae fuscous, scape entirely dark, flagellum pale brown

beneath. Tegulae subhyaline, with a dark spot at base. Wings whitish hyaline, nervures pallid, stigma yellowish, subcosta pale brown except at base and apex.

Head barely longer than wide, with clypeus large and strongly projecting. Facial foveae distinctly wider than narrow interval between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Proboscis of moderate length, not exceeding the fossa, with galeae and stipites of equal length. Mandibles rather stout, reaching far margin of fossa, and with a well-developed inner tooth. Pterostigma large, but not quite equaling width of submarginal cells; part of marginal cell beneath it about equal to part beyond. Pygidial plate plane, with convergent sides and rather narrowly rounded apex. Head and thorax tessellate and shining; frons more strongly tessellate and rather dullish; face below antennae, and mesonotum except anterior border of scutum, polished. Punctures on face and mesonotum fine, distinct, and moderately close, becoming sparse on clypeus and posterior part of disk of mesoscutum. Pubescence white: rather short, erect, and conspicuous on face and mesonotum; denser on cheeks and underparts of thorax. Length: 4-5.5 mm.; anterior wing, 3.3-3.7 mm.

Male.—Head and thorax dark blue-green; mesonotum and metanotum black, except anterior border of mesoscutum. Mandibles except red tips, labrum, clypeus except usual pair of dots and a small blotch on each side of upper margin of disk, triangular lateral marks reaching level of foveae, supraclypeal mark notched above or sometimes divided, and sometimes a small more or less irregular spot on subantennal plates, yellow. Tubercles yellow. Abdomen fuscous; apical margin of tergites and apical segments brown; a nubilous, interrupted yellow band at base of tergites 1 to 2 or 3, more or less distinct. Legs fuscous; anterior side of front and middle femora and tibiae, and tarsi, yellow; underside of hind tibiae sometimes yellowish. Antennae fuscous above; scape yellow except for a dark apical spot; flagellum somewhat orange yellow beneath. Proboscis brown, becoming more fuscous at base. Tegulae and wings as in female, but subcosta (except at base) and margins of stigma, brown.

Head either small, with cheeks not much broadened and gradually narrowed anteriorly; or more or less enlarged (usually only moderately), with cheeks broad and obtusely angulate anteriorly; or rarely quadrate, with cheeks conically dentate anteriorly. Facial foveae small and about twice as long as wide. Mandibles tapering, acute, and reaching far margin of proboscis fossa, or beyond fossa in macrocephalous specimens. Flanks of pronotum but little impressed except in macrocephalous specimens; anterior corners of disk rounded and not prominent. Sculpture and pubescence much as in female. Tergite 7 narrowed about three-fourths to rounded apex. Subgenital plate triangular, a little longer than wide; ventral surface convex but not carinate; disk with very fine setae on apical half. Dorsal lobes of caulis short and broad, with volsellae well exposed; parameral lobes appearing slender and slightly clavate in dorsal view, and broad and tapering as seen from side; sagittae thickly fusiform, with the rods more or less divergent at apex. Length: about 3.5-4.5 mm., anterior wing, 2.9-3.2 mm.

Holotype female, allotype, and paratypes.—Six female, 5 male, Palm Canyon, Riverside Co., California, on *Larrea divaricata*, except one pair on *Prosopis juliflora*, April 3-5, 1925 (Timberlake). *Additional paratypes*.—CALIFORNIA. Riverside Co.: 2 males, Whitewater, on *Larrea*, April 26, 1936; 1 female, Andreas Canyon, near Palm Springs, on *Prosopis*, April 11, 1936; 1 female, Palm Springs, on *Prosopis*, April 22, 1928; 1 female, Palm Springs, on *Larrea*, April 24, 1938; 1 female, 5 males, 4 miles north of Palm Springs, on *Dalea californica*, May 10, 1941; 3 females, 4 males, Box Canyon, on *Larrea* and 1 male on *Hyptis emoryi*, March 24, 1952 (Timberlake); 1 female, Palm Springs, April 28, 1940 (R. M. Bohart); 1 male, Palm Springs, April 21, 1951 (E. I. Schlinger); 1 female, near Palm Springs, May 10, 1941 (E. C. Van Dyke); 1 female, Magnesia Canyon, April 11, 1951 (R. C. Bechtel); 1 female, Fan Hill Canyon, 10 miles northeast of Thousand Palms, April 30, 1955 (W. R. M. Mason). Imperial Co.: 1 female, Fish Creek Mts., April 1, 1955 (Mason). San Diego Co.: 2 males, Palm Canyon, Borego, on *Larrea*, March 29, 1936; 2 males, Borego, on *Larrea*, April 26, 1954 (Timberlake); 2 females, 6 males, Borego, April 26, 1954 (P. D. Hurd, Jr.); 1 female, Borego, April 24, 1955 and 1 male, on *Chaenactis*, April 28 (Hurd); 1 male, Borego, April 27, 1955 (R. O. Schuster). San Bernardino Co.: 1 female, Morongo Valley, June 8, 1958 (O. C. La France). ARIZONA. Maricopa Co.: 1 female, 1 male, Maricopa Mts., April 13, 1947 (H. and M. Townes). Pinal Co.: 8 males, Picacho, on

Larrea, April 22, 1955 (G. D. Butler). Yuma Co.: 1 male, Wellton, March 27, 1940 (R. C. Dickson).

Types in collection of the U. S. National Museum (No. 43,400). Paratypes in collections of the University of California, Riverside, Berkeley, and Davis; University of Kansas; University of Arizona; Canadian Department of Agriculture, Ottawa; and private collections of Messrs, G. E. Bohart and G. I. Stage.

Perdita lateralis daleae, n. subsp.

P. daleae is evidently a form of *lateralis*, the female differing only in having the face entirely dark, or rarely with small, transverse lateral marks. So far, *daleae* has been found only in the mountains of Inyo County, California.

Female.—Head and thorax dark blue green; labrum, clypeus, supraclypeal area, mesoscutum except margins, scutellum, and metanotum, black. Face and thorax entirely dark except for occasional small lateral face marks. Abdomen black, with a pale-yellow interrupted basal band on tergites 2 to 4 not reaching lateral margins. Legs blackish; anterior side of front tibiae, and tarsi, brown. Antennae black, flagellum brown beneath. Mandibles yellowish at base, becoming rufotestaceous at middle, more or less shaded with fuscous coloration on margins, and red at apex. Proboscis blackish. Tegulae pale testaceous hyaline, becoming fuscous at base. Wings whitish hyaline; nervures pallid; stigma yellowish, especially on margins; subcosta tinged with brown.

Head slightly longer than wide; clypeus large, protruding, with broadly truncate apex. Facial foveae broader than narrow interval between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Mandibles stout, with a small inner tooth, and reaching far margin of proboscidial fossa. Proboscis of moderate length, barely exceeding the fossa; stipites and galeae equal in length. Pterostigma rather large, as in allied species; part of marginal cell beyond it somewhat longer than part beneath. Pygidial plate plane and rather narrowly rounded at apex. Head and thorax minutely tessellate, somewhat more strongly so on somewhat dullish frons; clypeus, supraclypeal area, disk of mesoscutum, and scutellum, polished. Puncturation fine, the punctures moderately close on anterior third of mesoscutum and sides of face, including sides of clypeus and supraclypeal area, and almost absent on middle of disk of mesoscutum. Pubescence whitish, rather short and erect on face and thorax, conforming to puncturation in distribution, longer on cheeks and underside of thorax. Length: about 4.5–5 mm.; anterior wing, 3.8–4 mm.

Male.—Similar to *lateralis* in color and markings. Clypeus usually fuscous across upper third or half of disk, but ranging to all yellow; supraclypeal area and subantennal plates often with four nearly equal yellow spots, but sometimes dark; lateral marks generally more quadrate or transverse, but face markings of both *lateralis* and *daleae* variable and in some cases in agreement. Thorax entirely dark. Abdomen colored as in *lateralis*, but yellow bands sometimes absent. Underside of hind tibiae more frequently yellow.

Macrocephalous more often than *lateralis*, with margin between outer surface of cheeks and undersurface of head more sharply angled and anterior process of cheeks larger and bluntly rounded. Flanks of pronotum in macrocephalous specimens deeply impressed, with posterior corners of disks rounded and prominent. Mandibles large, slender, and acute, each reaching nearly to base of other, and inner margin slightly expanded at middle and with a sharp edge. Sculpture and pubescence as in *lateralis*. Subgenital plate and genitalia similar, with former a little more broadly triangular and more arcuate on margin, and dorsal lobes of caulis more oblique and more rounded at apex. Length, 3.25–4 mm.; anterior wing, 3–3.4 mm.

Holotype female and allotype.—Westgard Pass, Inyo Co., California, on *Dalea fremontii*, June 15, 1937 (C. D. Michener). *Paratypes*.—Inyo Co.: 11 females, 21 males, Westgard Pass, on *Dalea*, May 27, and 11 females, 13 males, June 15, 1937 (Michener); 14 females, 8 males, Mazourka Canyon, Inyo Mts., 6,000 feet, on *Dalea*, May 23, and 7 females, 20 males, on *Dalea*, except 1 male on *Chaenactis*, May 25, and 1 female, 4 males, on *Erigonum fasciculatum*, June 1, 1937 (Michener); 2 females, 1 male, Westgard Pass, June 3, 1937 (N. W. Frazier); 1 female,

Mazourka Canyon, May 25 (Frazier); 2 males, Panamint Mts., May 29 (Frazier); 1 female, Inyo Mts., June 1, 1937 (E. C. Van Dyke); 1 female, near Kearsarge, May 25 (Van Dyke); 5 females, 19 males, Mazourka Canyon, on *Dalea*, May 25, 1937 (collector not known); 2 females, 9 males, Westgard Pass, June 3, 1937 (collector not known); 1 female, Panamint Mts., May 29, 1937 (A. E. Meier); 5 females, 13 males, 7 miles west of Westgard Pass, on *Dalea*, June 26, 1953 (J. W. MacSwain) and 1 female, 1 male, same data (M. Wasbauer); 1 female, 1 male Surprise Canyon, Panamint Mts., on *Dalea Fremontii* var. *johnsonii*, April 28, 1953, and 1 male, on *Eriogonum inflatum*, April 23, 1957 (Timberlake); 1 female, 2 males, Surprise Canyon, on *E. inflatum*, April 24, 1957 (P. D. Hurd, Jr.).

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

A series of 13 females and 12 males, from Goldfield, Esmeralda County, Nevada, on *Larrea*, May 25, 1954 (M. Cazier) could be placed with *daleae*, but probably should be considered as intermediate between *daleae* and *lateralis*. The females all have lateral marks between the clypeus and anterior end of eyes that are probably no larger than in some individuals of *daleae* from Inyo County, but these marks are constant instead of sporadic and evanescent.

Perdita amplipennis, n. sp.

(Figs. 751, 752, 854)

This species flies with *daleae* in Inyo County, California. Its flower-visiting habits are not known, except that one female was taken on *Eriogonum* and one male on *Stanleya*, but the pollen borne by some of the females appears to be identical with that on *daleae* females collected at the same time. The females may be distinguished from *daleae* by the four broad yellow bands on the abdomen and by the longer and narrower pterostigma. The wings are little if any larger than those of closely allied species, but are certainly much more ample than in many other species of *Perdita*.

Female.—Head and thorax dark blue green; labrum, usually most of face below level of antennae, mesoscutum except anterior border, scutellum, and metanotum, black. Face and thorax entirely dark. Abdomen blackish, or tinged with brown; a broad pale-yellow band on tergites 2 to 4 or 5, sometimes reaching lateral margins on tergite 4, and more or less distinctly notched medially behind, especially on more basal segments. Legs dark, tinged with brown, front knees and anterior side of front tibiae pale yellow, front tarsi pale brown. Antennae dark, flagellum brown beneath. Mandibles yellowish white at base, pale testaceous beyond middle, red at apex and on inner margin. Proboscis brown. Tegulae subhyaline, base testaceous or yellowish. Wings milky hyaline, whiter than in *daleae*; nervures pallid; subcosta pale brownish.

Head about as broad as long, with clypeus large and strongly protruding. Facial foveae generally a little bowed inward, sometimes widening on lower half, as wide or wider than interval between them and eyes, and reaching from level of middle of antennal sockets nearly three-quarters of distance to level of anterior ocellus. Mandibles stout, bluntly rounded at apex; inner margin abruptly narrowed near apex, thus inner tooth not perfectly formed. Proboscis moderately long, galeae nearly reaching base of stipites when folded in repose. Pterostigma generally over four times as long as broad, and a little more than half as wide as first submarginal cell; parts of marginal cell beneath and beyond it equal. Pygidial plate plane, with moderately narrow truncate apex. Head and thorax minutely tessellate; tessellation on disk of mesoscutum and on scutellum generally faint; frons and vertex rather dull. Puncturation of face and mesonotum much fainter than in *daleae*, but not sparser. Pubescence white, thin, short, erect, and about same density as in *daleae*. Length: 4.5–5 mm.; anterior wing, 3.8–4 mm.

Male.—Dark blue green; disk of mesoscutum and scutellum black. Mandibles except red tips,

labrum, face to level of antennae, anterior end of cheeks and gular region, and tubercles, yellow. Yellow of face reaching on orbits nearly to foveae, but more or less narrowly, and subantennal plates sometimes varying to entirely black. Abdomen orange yellow, but tergite 1 and a rather broad subapical band on tergites 2 to 5 fuscous, with the yellow on tergite 2 enclosed. Legs yellow; middle and hind coxae and posterior side of femora fuscous; sometimes a slight cloud on posterior side of tibiae, or hind femora and tibiae mostly clouded except on underside. Antennae yellow, pedicel and flagellum fuscous above. Tegulae and wings as in female, except margins of stigma as well as subcosta brownish.

Head as broad as long, quadrate in macrocephalous specimens; cheeks very broad and produced anteriorly into a conical process, sometimes very large and blunt. Occipital concavity rather deep but broad, equal in width to space between summit of eyes. Pterostigma generally somewhat longer and narrower than in female, sometimes fully five times as long as wide and not more than half as wide as first submarginal cell; part of marginal cell beneath stigma longer than part beyond. Sculpture and pubescence much as in female; disk of mesoscutum and scutellum polished. Tergite 7 gradually narrowed to obtuse point, with sides converging at an angle of about 75 degrees. Subgenital plate triangular, but considerably more rounded at apex than in *daleae*, and about twice as long as wide at base. Dorsal lobes of caulis moderately wide and obtuse, volsellae well exposed in dorsal view; parameral lobes rather wide toward apex as seen from above and with sharply carinate dorsal edge, but narrowed apically as seen from side; sagittae rather thickly fusiform, with the acute tips spreading apart. Length: 3.5-4 mm.; anterior wing, 3.3-3.4 mm.

Holotype female, allotype, and paratypes.—Thirty-five females, 7 males, 7 miles west of Westgard Pass, Inyo Co., California, presumably on *Dalea*, June 26, 1953 (J. W. MacSwain). *Additional paratypes*.—Inyo Co.: females, at type locality, June 26 (W. D. McLellan); 1 female, Mazourka Canyon, Inyo Mts., 6,000 feet, on *Eriogonum fasciculatum*, June 1, 1937 (C. D. Michener); 1 female, Mazourka Canyon, July 2, 1953 (MacSwain); 1 male, Surprise Canyon, Panamint Mts., on *Stanleya pinnata*, April 24, 1957 (P. D. Hurd, Jr.). Mono Co.: 1 male, Blanco's Corral, White Mts., 10,000 feet, June 28, 1953 (McLellan).

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

Perdita vicina, n. sp.

(Figs. 753, 754, 855)

P. vicina is rather similar to *amplipennis* and closely allied, but its mesonotum is distinctly tessellate and somewhat dullish, and its abdomen is dark, with an interrupted pale-yellow band on the second and third segments. It is known only from a single male taken in the Charleston Mountains of Clark County, Nevada.

Male.—Head and thorax dark green; more bluish on propodeum; middle of disk of mesoscutum and scutellum black with slight brassy luster. Anterior third of cheeks and gular region, mandibles except reddish apical third, labrum, face below antennae with lateral mark reaching obliquely to foveae, scape of antennae, and flagellum beneath, yellow. Thorax dark except yellow tubercles and lower end of flanks of pronotum. Abdomen fuscous above, more brownish on apical margin of segments and orange yellow beneath; pale-yellow band at base of tergites 2 and 3, narrowly interrupted on tergite 2 and broadly on tergite 3. Legs dark; anterior side of femora and of front and middle tibiae, trochanters and coxae, line on anterior side of hind tibiae, and front tarsi, yellow. Pedicel and flagellum of antennae above, fuscous, becoming more brownish toward apex. Proboscis dark. Tegulae subhyaline with fuscous base. Wings whitish hyaline, nervures pallid, subcosta and margins of stigma brown.

Head large, subquadrate; cheeks broad, slightly dentate anteriorly. Occipital concavity broad and moderately deep. Mandibles long, slender, very acute at apex, and quadrately expanded on outer margin at base. Facial foveae faint, about twice as long as wide. Flanks of pronotum well impressed, posterior corners of disk rounded and rather prominent. Pterostigma somewhat more

than half as wide as first submarginal cell; parts of marginal cell beneath and beyond it equal. Tarsal claws strongly bent and deeply bifid, inner tooth not much shorter than outer. Head and thorax minutely tessellate: tessellation strong on rather dull frons and vertex; weaker on moderately dullish thorax; face below antennae smooth. Puncturation very fine, obscure, and sparse, distinct only on mesoscutum. Pubescence thin, whitish, erect: moderately long on face and mesonotum; longer and denser on cheeks and underparts of thorax. Sides of tergite 7 converging evenly to rounded apex, as in *amplipennis*. Subgenital plate broader and more rounded at apex than in *lateralis* and *amplipennis*. Dorsal lobes of caulis rounded at apex, with deep, parallel-sided, and apically rounded sinus between them; volsellae well exposed in dorsal view; parameral lobes long, very slightly clavate and incurved; sagittae a little more strongly fusiform than in *amplipennis*, but otherwise similar. Length: 4 mm.; anterior wing, 3.4 mm.

Holotype male.—Kyle Canyon, about 5,600 feet, Charleston Mts., Clark Co., Nevada, on *Fallugia paradoxa*, June 4, 1941 (Timberlake), in collection of the Citrus Experiment Station, Riverside.

Perdita wheeleri Timberlake

(Figs. 755, 756, 856)

Perdita wheeleri Timberlake, 1928, Amer. Mus. Novitates, 321:5, ♂.

This species was described from a single male collected in the Indian gardens in the Grand Canyon, Arizona, in May, 1905, by W. M. Wheeler, and the type is in the American Museum of Natural History. No more material has been seen. The species seems to be closely allied to *lateralis*, *amplipennis*, and *vicina*, so that my earlier surmise that it might visit *Mentzelia* does not necessarily hold. The original description needs amplification only in regard to the subgenital plate and aedeagus.

Male.—Subgenital plate triangular and very nearly identical with that of *lateralis*. Dorsal lobes of caulis less broadly rounded at apex than in *lateralis* both in dorsal and lateral view; volsellae well exposed and nearly equal in length; parameral lobes of caulis as seen from above appear long, slender, and slightly incurved, and moderately wide in lateral view; sagittae fusiform, moderately wide, and more tapering toward apex than in allied forms, with the rods sharply pointed to apex in both dorsal and lateral views.

Perdita grandiceps Cockerell

(Figs. 757, 758, 857)

Perdita grandiceps Cockerell, 1896, Proc. Acad. Sci., Phila., 48:96, ♂; Cockerell, 1899, Canad. Ent. 31:256, ♀.

This remarkable species was described from a single male taken at Las Cruces, New Mexico, on flowers of *Solidago*, September 3, 1895 by Cockerell. Three years later C. H. Tyler Townsend collected three males and one female on flowers of *Fallugia paradoxa*, at La Cueva, Organ Mountains, New Mexico, from which the female was briefly described. It was also collected at Alamogordo, New Mexico, in May, 1902, by H. L. Viereck, but apparently has not been found since. It is distinguished from its closest allies by the dull head and thorax, lack of light marking in the female, and restriction of the yellow in the male to the anterior margin of face. The genitalia of the male are very distinctive, but not so greatly modified as in *P. semicrocea* Cockerell.

Female.—Head and thorax dark blue green; labrum, clypeus, mesoscutum except anterior third, scutellum, and metanotum, black or blackish; light markings absent. Abdomen black, or

tinged with brown; pygidial plate ferruginous. Legs brown, anterior side of front tibiae yellow. Antennae dark fuscous or blackish, flagellum brownish yellow beneath. Mandibles pale yellow at base and red on somewhat more than apical half. Proboscis fuscous. Tegulae pale testaceous hyaline, base pale brown. Wings milky hyaline, nervures and stigma entirely pallid.

Head distinctly broader than long; clypeus moderately projecting; anterior corners of disk roundly produced, and anterior margin between them broadly emarginate. Facial foveae linear, wider than interval between them and eyes, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Mandibles moderately thick, with a well-developed inner tooth. Proboscis moderately short, galeae shorter than stipes. Pterostigma moderately large, about three-fourths as broad as first submarginal cell, and parts of marginal cell beneath and beyond it about equal. Pygidial plate plane, with sides converging to narrowly rounded or almost acute apex. Head and thorax finely and strongly tessellate and dull. Punctures distinct only on face below antennae, those of clypeus comparatively coarse; setigerous punctures of mesonotum rather close-set but very fine. Pubescence whitish, short, thin, but copious for a *Perdita*; hair of mesonotum erect and somewhat mosslike; that of cheeks and underparts of thorax much longer and denser. Length: nearly 5 mm., anterior wing, 3.8 mm.

Male.—Dark blue-green; disk of mesoscutum and scutellum blackish. Mandibles except red tips, labrum, clypeus, except a brown mark on each side of more than upper half of disk, rather small lateral marks, marks covering subantennal plates, and two small supraclypeal spots, pale yellow. Yellow area between dark marks of clypeus parallel sided and generally about twice as long as wide. Dark mark between supraclypeal spots nearly as broad as median yellow area on clypeus and in line with it. Lateral marks broadly and roundly emarginate above by extension of green; inner lobe toward clypeus narrow; orbital lobe going to level of antennal sockets or only halfway. Thorax entirely dark, but tubercles more or less brown. Abdomen brown to fuscous, without pale markings. Legs brown or fuscous; apex of front femora, anterior side of front tibiae, and small mark on middle tibiae, pale yellow. Antennae brown, flagellum more yellowish beneath, scape clear pale yellow except above. Tegulae and wings as in female, except subcosta and stigma more or less yellowish.

Head much enlarged, quadrate, broader than long; cheeks broader than eyes and subdentate anteriorly. Disk of clypeus small, about twice as broad as high; lateral extensions strongly reflexed on inner half and less so at outer ends, so that disk becomes pointed at outer ends and narrowed about one-half above. Labrum small, a little broader at apex than at base, about twice as broad as long, and a little less broad than space between outer margins of subantennal plates. Mandibles broadly and roundly expanded at base on outer margin and with slight expansion on inner margin between middle and acute apex, but as seen from above or beneath tapering evenly from base to apex. Facial foveae small, rather faint, about twice as long as wide. Flanks of pronotum moderately to deeply impressed; posterior corners of disk rounded and more or less prominent. Sculpture and pubescence about as in female, except hair of mesonotum fine, moderately short, and not mosslike. Tergite 7 narrowed evenly to subacuate apex. Subgenital plate about one and one-half times as long as wide, truncato-emarginate at broad apex, and with short dense erect hair on disk. Caulis of aedeagus short, very broad, and depressed; dorsal lobes very broad at base and narrowed toward rounded apex, but tapering and acute in lateral view; volsellae well exposed, dorsal pair longer than inner ventral pair; parameral lobes long, straplike, only slightly bowed inward, appearing acute at apex in lateral view; sagittae widely divergent (in specimen examined) for protrusion of large, amorphous sac, each rod tapering very slightly to rounded apex and each with a large, deep, rounded emargination on outer margin just beyond middle and nearly opposite apex of parameral lobes, emargination cutting more than halfway to opposite margin of rod, in lateral view sagittae moderately fusiform with emargination appearing angular and on ventral edge. Length: 4-5 mm.; anterior wing, 3.5-3.7 mm.

Material examined.—NEW MEXICO. Otero Co.: 2 females, 8 males, Alamogordo, April 25 and 29, May 1, 3, 10, and 13, 1902 (H. L. Viereck).

Perdita ventralis Fox

(Figs. 759, 760, 858)

Perdita ventralis Fox, 1893, Proc. Calif. Acad. Sci. (2)4:17, ♂ (nec ♀); Fox, 1894, t.c.:116, ♀; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:55.

Fox described the male of *ventralis* from Santa Margarita Island, off the west coast of Baja California, and a year later described the female from neighboring Magdalena Island. This species, known only from Baja California, is rather similar to the species allied to *mentzeliae* but has distinctive differences in color and structure. Like some of the species discussed later it probably collects pollen from flowers of Compositae, as a large series has been taken at flowers of *Aplopappus*.

Female.—Head and thorax dark blue green; labrum and clypeus black; middle of disk of mesoscutum blackish. Face and thorax without light markings. Abdomen fuscous above, basal tergite entirely dark with a greenish luster; venter yellow. Tergites 2 to 5 each with a yellow band not reaching lateral margins; on tergite 2, band narrow, basal, and interrupted medially, on others very broad, more or less notched in middle behind (especially on tergite 3), more or less delimited by a suffused, more or less faint, subapical infuscated band, and with apical depression yellowish. Legs fuscous or blackish, anterior side of front tibiae and tarsi yellow. Antennae blackish, flagellum more brownish and narrowly yellowish beneath. Mandibles testaceous or yellowish, becoming dark red at apex. Proboscis dark. Tegulae subhyaline, base brownish. Wings hyaline, nervures testaceous, subcosta and margins of stigma fuscous.

Head as broad as long; clypeus large, moderately convex, disk about as broad as high, lateral extensions strongly reflexed and hardly visible in frontal aspect. Mandibles reaching far margin of proboscoidal fossa and with a small but distinct inner tooth. Proboscis moderately long, galeae almost reaching base of stipites when folded in repose. Facial foveae about as wide as space between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma about four times as long as wide, about four-fifths as wide as first submarginal cell; marginal cell not much shorter than the stigma, with parts beneath and beyond stigma equal. Pygidial plate somewhat longer than wide as base, its sides converging to the moderately narrow and rounded apex. Head and thorax shining, with distinct fine tessellation on frons, vertex, and basal area of propodeum; other parts more or less highly polished. Puncturation extremely fine; sparse on clypeus, posterior disk of mesoscutum, and scutellum; close on anterior part of mesoscutum and on face between foveae. Pubescence white, moderately short, erect, and thin on face and mesonotum, longer on cheeks and underparts of thorax, and rather dense on cheeks. Length: 4.5–5 mm.; anterior wing, 3.4–3.6 mm.

Male.—Head and thorax blue-green, thorax entirely dark. Mandibles except red tips, labrum, clypeus except a fuscous spot more or less developed on each side of upper border of disk, small triangular lateral marks, and subantennal marks, yellow. Lateral marks generally little higher than wide, but often thinly extended to level of antennae. Supraclypeal area dark, but sometimes with narrow yellowish lateral margins. Abdomen fuscous or black, with a greenish luster at base; venter yellow; a narrow, enclosed yellow band at base of tergites 2 to 5, sometimes concealed by preceding segment, and (at least on tergite 2) usually with a narrow interruption medially. Legs blackish; front pair except coxae and moderately wide streak on posterior side of femora and tibiae, middle trochanters and anterior side of middle femora and tibiae, hind trochanters and anterior side of hind femora and streak beneath, yellow; middle and hind tarsi testaceous with underside more brownish. Antennae blackish, scape broadly yellow beneath, pedicel and flagellum clay yellow beneath. Proboscis brownish fuscous. Tegulae and wings as in female.

Head as broad as long, more or less quadrate; cheeks broad, more or less strongly and bluntly dentate anteriorly. Occiput rather deeply and broadly concave. Disk of clypeus somewhat broader than high, with lateral extensions partly visible in frontal aspect of head. Mandibles very long, tapering, acute, and each reaching to base of other. Facial foveae rather faint and about twice

as long as wide. Flanks of pronotum strongly impressed in macrocephalous specimens, posterior corners of disk prominent but rounded. Venation, sculpture, and pubescence about as in female. Tergite 7 narrowed to a moderately wide and ogival median lobe. Subgenital plate about twice as long as wide, sides moderately converging to rounded apex, disk with short and very fine pubescence. Caulis of aedeagus as broad as long, with short, blunt dorsal lobes appearing acute in lateral view; volsellae partly exposed, outer superior pair somewhat shorter than inferior pair; parameral lobes strongly bowed, appearing cylindrical as seen from above, rather narrow and tapering to subacute apex in lateral view; sagittae fusiform, widest and thickest at middle in both dorsal and lateral views, and rather narrowly rounded at apex. Length: 3-4 mm.; anterior wing, 2.5-3 mm.

Material examined.—MEXICO. Baja California: Twenty females, 61 males, 10 miles east of San Quintin, on *Aplopappus*, Sept. 10, 1955 (P. H. Arnaud); 1 male, same data (F. X. Williams); 8 females, 10 males, same data (G. E. Bohart); and 1 male, same locality, on *Euphorbia*, Sept. 9 (Williams).

Perdita semicrocea Cockerell

(Figs. 761, 762, 859)

Perdita semicrocea Cockerell, 1895, Proc. Acad. Sci., Phila., 47:13, ♀; Cockerell, 1936, Proc. Acad. Sci., Phila., 48:92, ♂; Cockerell, 1896, Jour. New York Ent. Soc., 4:204; Cockerell, 1899, Psyche, 8:323.

P. semicrocea is a small, almost shining, black species with an orange-yellow abdomen. Some males have a very large head with broad but rounded and unarmed cheeks and white face marks, in which it differs from allied species. The male genitalia (figs. 761, 762) are also very distinctive, particularly the peculiar sagittae. Cockerell has recorded this bee from the vicinity of Las Cruces and from "the White Sands near Whitewater" (evidently not Whitewater in Grant County), New Mexico, at flowers of *Solidago*, *Gutierrezia*, *Aplopappus*, and *Aster*. The type was collected on the campus of the New Mexico Agricultural College.

Female.—Head and thorax bluish green; clypeus, supraclypeal area, most of frons, disk of mesoscutum, and scutellum, black. Face entirely dark, but tubercles and collar of pronotum white, and sometimes a white streak on each side of posterior border of disk of pronotum. Abdomen orange yellow; tergite 1 usually fuscous; tergite 2 sometimes dark with a basal yellow band, or almost all yellow except for lateral margins and a dark spot on each side of apex; tergites 3 and 4 either unmarked or with a small fuscous spot on basal corners and a subapical spot on each side. Venter orange yellow without markings. Legs black; apex of femora, tibiae, and tarsi of front and middle legs, pale yellow. Antennae brown to fuscous, flagellum brownish yellow beneath. Mandibles white on basal half and red at apex. Proboscis and labrum dark. Tegulae hyaline, with base pale yellow. Wings whitish hyaline, nervures pallid, subcosta and margins of stigma pale yellowish.

Head broader than long; clypeus only moderately produced and strongly convex. Facial foveae well impressed, short and broad, about four times as long as wide, very narrowly separated from eyes and placed slightly above level of antennal sockets. Mandibles reaching far margin of proboscoidal fossa, tapering and with a small inner tooth. Proboscis rather short, apex of galeae in repose not reaching base of stipites. Pterostigma large but not quite equaling width of submarginal cells, part of marginal cell beneath it about as long as part beyond. Pygidial plate plane, with sides converging to narrow and slightly rounded apex. Head and thorax polished and shining; but vertex, anterior border of mesoscutum, and propodeum, more or less distinctly but very minutely tessellate. Frons and mesonotum almost impunctate; but face below antennae with sparse minute punctures, most distinct on clypeus. Face below antennae, vertex, and anterior border of mesonotum with sparse short white hairs; frons and disk of mesoscutum nude; cheeks and underparts of thorax with rather dense long hair. Length: about 3.45-4.5 mm.; anterior wing, 2.7-3 mm.

Male.—Head and thorax colored as in female, but with mandibles except red tips, labrum, and face below level of antennae, white. Lateral face marks ending truncately at level of antennae, but leaving outer margin of antennal sockets dark; margins of subantennal plates sometimes very narrowly dark. Tubercles, collar of pronotum, and an interrupted band on hind margin of disk, white. Abdomen colored as in female; legs much the same, but all trochanters, apex of hind femora, more or less of under margin of hind tibiae and hind tarsi, pale yellow. In one male (Petrified Forest, Arizona), legs mainly yellow, with dark parts of femora and hind tibiae reduced and pale brown. Scape of antennae yellowish white; a spot on apex of scape above, pedicel, and flagellum above, brown; flagellum brownish yellow beneath. Tegulae and wings as in female, except margins of stigma pale brownish.

Head rotund, barely wider than long, or in macrocephalous examples quadrate, with the cheeks very broad, but rounded and simple. Mandibles tapering to acute apex and reaching far margin of proboscoidal fossa, but becoming slightly dilated on outer margin at base in macrocephalous specimens. Occiput shallowly and not broadly concave. Facial foveae almost obsolete. Flanks of pronotum not impressed even in macrocephalous specimens. Sculpture and pubescence about as in female. Tergite 7 narrowed from base to rather narrow rounded apex. Subgenital plate about twice as long as wide, with nearly parallel sides and rounded apex; disk slightly ridged and with very short fine hair on apical part. Caulis of aedeagus quadrate, moderately longer than wide, about one and one-half times as broad as deep; dorsal lobes with blunt, slightly inturned points at apex; volsellae mainly concealed and subequal; parameral lobes slender and tapering; sagittae remarkably expanded on apical half both laterally and dorsoventrally, with apex divided into two divergent prongs by a very large, broad, and deep emargination, and expanded part as seen from side very high and rounded. Length: about 3–3.25 mm.; anterior wing, 2.3–2.7 mm.

Material examined.—NEW MEXICO. Dona Ana Co.: 2 females, Las Cruces, one on *Solidago* (Cockerell, Nos. 4784 and 5099); 3 females, Las Cruces, Sept. 25, 1895 (Cockerell); 1 female, Mesilla, Aug. 23 (Cockerell). San Miguel Co.: 6 females, near Correo, on *Gutierrezia sarothrae*, Sept. 4, 1930 (Timberlake). ARIZONA. Navajo Co.: 2 females, 1 male, southern entrance of Petrified Forest, on *G. sarothrae*, Aug. 27, 1931 (Timberlake). Cochise Co.: 6 females, 2 males, 2.5 miles south of Willcox, Aug. 17, 1956 (E. Ordway).

Another female from Las Cruces (Cockerell, No. 4745) has been examined at Washington, as well as the type female (Cockerell, No. 2500) at Philadelphia.

Perdita exilis, n. sp.

(Figs. 763, 764, 860)

P. exilis resembles *austini* in many ways, but the male has much more yellow on the head and thorax, the legs almost entirely yellow, and the abdomen orange yellow. The female's head and thorax are entirely dark and shining, and the abdomen ferruginous. This species lives in the deserts of southern California and collects pollen from the flowers of *Petalonyx thurberi*.

Female.—Head and thorax bluish green, without light markings; clypeus, anterior corners of face, supraclpeal area, disk of mesoscutum, and scutellum, almost black. Abdomen reddish ferruginous, base of tergite 1 more or less infuscated, apical part of tergites 3 or 4 and 5 a little dusky, pygidial plate concolorous. Legs blackish or tinged with brown, front tibiae and tarsi yellow. Antennae fuscous, flagellum more brownish beneath, scape testaceous at base. Labrum and proboscis brown, galeae and glossa testaceous. Mandibles ferruginous, a little dusky at base and red at apex. Base of tegulae fuscous, outer margin broadly subhyaline. Wings clear hyaline, nervures pale testaceous, subcosta and margins of stigma brown.

Form slender. Head barely longer than wide; clypeus strongly projecting, convex, prominent, and apex of disk truncate. Facial foveae well impressed, about their own width from margin of eyes and reaching from level of upper margin of antennal sockets about two-thirds of distance

to level of anterior ocellus. Mandibles rather stout, acute at apex, with a small inner tooth, and reaching approximately to far margin of proboscival fossa. Proboscis of moderate length, apex of galeae falling slightly short of base of stipites when folded in repose. Pterostigma about three times as long as wide and about three-fourths as wide as first submarginal cell; marginal cell shorter than stigma, with part beneath stigma generally longer than part beyond, and apical truncation equaling or slightly greater than the metacarpus. Pygidial plate longer than wide, with moderately wide rounded apex. Head and thorax impunctate, shining, very weakly tessellate, with tessellation almost obsolete on disk of mesoscutum and scutellum. Face, mesonotum, metanotum, and propodeum, nude; sides of thorax almost nude; cheeks with sparse, short, erect whitish hair; front coxae and mesopectus with comparatively long dense hair. Length: about 3.6-4.2 mm.; anterior wing, 2.8-2.9 mm.

Male.—Head and thorax bluish green. Anterior half of underside of head, cheeks generally to above middle of eyes, mouth-parts except red tips of mandibles, labrum, and face to level of foveae, clear lemon yellow. Upper margins of yellow on face usually bisecting foveae but uneven and notching the green in median line, with the green forming a broad lobe on each side of middle and sometimes sending a narrow streak to antennal sockets. Prothorax, including sternum, yellow; but notum with a dark band from flank to flank. A broad-limbed, yellow τ -mark on mesosternum, with outer ends of arms narrowed and somewhat deflected backward. Lower margins of flanks of propodeum sometimes broadly yellow, or with two yellow spots. Abdomen orange yellow, basal half of tergite 1 more or less dusky or infuscated. Legs yellow, outer margins of hind tibiae and tarsi tinged with brown. Antennae yellow, pedicel and flagellum pale brown above. Tegulae and wings as in female, except base of tegulae definitely yellow.

Head usually rather small, a little longer than wide, with cheeks rounded beneath; but sometimes enlarged and quadrate, with broad cheeks obtusely angled anteriorly. Clypeus rather small with disk somewhat broader than high, moderately convex with lateral extension not greatly reflexed and visible in frontal aspect. Mandibles with a subquadrate expansion on outer margin at base, tapering and acute at apex, and reaching slightly beyond far margin of proboscival fossa. Facial foveae oval, about twice as long as wide. Occiput shallowly concave, with width of concavity distinctly less than width of space between summit of eyes. Flanks of pronotum only moderately impressed even in the most macrocephalous examples. Sculpture about as in female, but tessellation on frons and mesonotum slightly more evident. Undersurface of head, front coxae, and mesosternum with thin, rather short, white hair; cheeks, mesopleura, and anterior part of mesoscutum with very sparse short hair; head and thorax otherwise virtually nude. Sides of tergite 7 converging to moderately narrow and rounded apical lobe. Subgenital plate about twice as long as wide, moderately tapering to rounded apex, and with fine short hair on apical part of disk. Caulis of aedeagus as broad as long; dorsal lobes somewhat divergent, obtusely angled at apex in dorsal view and rounded in lateral view; volsellae very unequal, inner or ventral pair slightly surpassing dorsal lobes of caulis; parameral lobes slender as seen from above and clavate in lateral view; sagittae elongate fusiform, widest about one-fourth of length from apex, thickest dorsoventrally near middle, and with apex very acute in both dorsal and lateral views. Length: 2.5-3 mm.; anterior wing, 2.3-2.5 mm.

Holotype male, allotype, and paratypes.—Two males, 2 females, Victorville, San Bernardino Co., California, Aug. 14-15, 1927 (J. C. Bradley). *Additional paratypes*.—Riverside Co.: 29 males, 2 females, June 25, and 15 males, June 28, 1941, on *Petalonyx thurberi*, 4 miles north of Palm Springs; 13 males, 4 miles south of Palm Springs, on same flower. May 6, 1946; 8 males, 15 females, same locality and flower, June 24, 1952; and 1 female, 4 miles north of Palm Springs, on *Petalonyx*, June 11, 1954 (Timberlake); 8 males, 19 females (W. E. La Berge), 15 females (R. H. Beamer) and 1 female (Beamers, C. Weiner, A. Wolf, C. Liang and La Berge), 4 miles south of Palm Springs, on *Petalonyx*, June 24, 1952; 3 females, Palms to Pines Highway, 1,000 feet, on *Petalonyx*, May 24, 1940 (C. D. Michener); 4 males, Magnesia Canyon, June 24, 1958 (A. D. Telford); and 3 males, Magnesia Canyon, June 22, 1959 (E. I. Schlinger).

Types in collection of Cornell University, Ithaca; paratypes in collections of the University of California at Riverside, Berkeley, and Davis, and the University of Kansas.

Perdita crandalli, n. sp.

Only the female of this species is known, but it is so similar to *exilis* in structure and habits that there is no doubt that it is closely allied. The female is slender and entirely ferruginous yellow—almost exactly the same color as the male of *P. minima* Cockerell.

Female.—Head, thorax, and abdomen, dark orange yellow; foveae of face and second tergite black. Legs and antennae concolorous, flagellum pale fuscous above, mouthparts concolorous, apex of mandibles red. Eyes gray to blackish in dry specimens. Tegulae pale testaceous at base and subhyaline on outer margin. Wings clear hyaline, nervures pale testaceous, subcosta and stigma yellowish.

Form unusually slender. Head distinctly longer than wide; face strongly convex; clypeus strongly projecting, prominent, and with apex of disk truncate. Cheeks broad posteriorly, but becoming obsolete opposite anterior end of eyes. Occipital concavity very small and shallow. Lateral ocelli nearly as distant from occipital margin as from summit of nearest eye. Eyes unusually narrow, much more than twice as long as wide. Facial foveae linear, hardly more than half as wide as interval between them and margin of eyes, and reaching from level of middle antennal sockets about halfway to level of anterior ocellus. Antennae a little longer than usual, middle joints of flagellum distinctly longer than thick. Mandibles moderately stout, abruptly narrowed on inner margin before the acute apex. Proboscis rather long, but not surpassing the elongate fossa, the tip of galeae almost reaching base of stipites in repose. Pterostigma short and broad, about twice as long as wide, and as wide as first submarginal cell. Second submarginal cell narrowed one-half above. Marginal cell short, no longer than stigma; part beyond stigma broader and shorter than part beneath. Sides of pygidial plate converging to narrowly rounded apex. Head and thorax shining, impunctate, with very faint tessellation on frons and mesonotum. Undersurface of head and sternum of thorax with thin, short, erect, whitish hair, becoming longer and denser on front coxae; head and thorax otherwise virtually nude, except very sparse and short hair on clypeus and anterior part of mesoscutum. Length: about 3.4 mm.; anterior wing, 2–2.3 mm.

Holotype female and paratypes.—Seven females and two damaged specimens, Tucson, Pima Co., Arizona, June 14, 24, and 25, 1938 (R. H. Crandall). *Additional paratypes*.—14 females, 10 miles west of Stanfield, Pinal Co., Arizona, on *Petalonyx thurberi*, June 14, 1955 (G. D. Butler).

Type and three paratypes in collection of the Citrus Experiment Station, Riverside; paratypes in collection of the University of Arizona and Cornell University.

Perdita glabrescens, n. sp.

(Figs. 765, 766, 861)

This species is known only from specimens taken in Mazourka Canyon, Inyo Mountains, California, which are without a flower record and have been reddened by cyanide (the color of the light parts is hypothetical but is assumed to be yellow). There is rather close relationship to *exilis*, but there are distinctive differences in the markings of both sexes and in the genitalia.

Female.—Head and thorax dark green; sides of thorax and propodeum bluer; disk of mesoscutum, scutellum, and metanotum, black. Mandibles except red tips, proboscis, labrum, clypeus, lateral marks, and usually a supraclypeal mark, yellow. Lateral marks triangular, somewhat higher than wide and reaching level of antennae. Thorax entirely dark. Abdomen yellow, with basal half of first tergite more or less infuscated. Legs brown to blackish; anterior side of front tibiae, and front tarsi, yellow. Antennae blackish, flagellum very slightly lighter beneath. Tegulae subhyaline, base brownish. Wings whitish hyaline, nervures pale testaceous, stigma testaceous yellow, subcosta pale brown except at base.

Head slightly longer than wide; clypeus produced, convex, and prominent, its disk about as high as wide, broadly rounded above, and truncate anteriorly. Facial foveae about equaling width of space between them and eyes, and reaching from level of middle of antennal sockets not more than halfway to level of anterior ocellus. Proboscis moderate in length and not surpassing the fossa. Mandibles rather stout, strongly curved, and abruptly contracted on inner margin before subacute apex. Antennae slender, joints of flagellum distinctly longer than thick. Pterostigma three times as long as wide and about three-fourths as wide as first submarginal cell; marginal cell shorter than stigma, with part beneath it longer than part beyond. Pygidial plate longer than wide, with sides converging to rather narrowly rounded apex. Head and thorax minutely tessellate and shining, tessellation most distinct on frons and vertex, disk of mesoscutum and scutellum almost polished. Pubescence whitish, thin and short on frons, disk of mesoscutum and propodeum mostly nude, hair longer and denser on cheeks, front coxae, and mesosternum. Length: about 3.5-4 mm.; anterior wing, 2.8-2.9 mm.

Male.—Head and thorax dark or bluish green; mesonotum not blackened on disk. Anterior half of gular region, anterior third of cheeks, mandibles except red tips, proboscis, labrum, and face below level of antennae, yellow. Lateral face marks only moderately narrowed above and ending at level of foveae. Collar of pronotum, a narrow band slightly interrupted on hind margin of disk, and tubercles, yellow. Abdomen yellow, with basal half, or more, of tergite 1 infuscated. Legs yellow; front and middle femora with a brown streak behind; hind femora usually more extensively brown above except at apex; hind tibiae and tarsi brown. Antennae yellow, pedicel and flagellum slightly brownish. Tegulae and wings as in female, except base of tegulae yellow.

Head small to moderately enlarged; cheeks in the more macrocephalous examples broader than eyes, moderately receding, and rounded beneath. Occiput shallowly concave, width of concavity less than width of space between summit of eyes. Clypeus convex, lateral extension strongly reflexed and only partly visible in frontal aspect, disk somewhat broader than high and not dentate at sides of labrum. Facial foveae punctiform. Mandibles stout for a male, reaching slightly beyond far margin of proboscis fossa, somewhat dilated at base on outer margin, and only apical fifth of shaft narrowed gradually on inner margin to acute apex. Flanks of pronotum weakly impressed. Venation, sculpture, and pubescence about as in female, but mesonotum with delicate tessellation. Tergite 7 narrowed into an apical lobe as long as wide and rounded at apex. Subgenital plate with sides slightly converging, nearly twice as long as width of apical half, apex rounded, and apical part of disk with very fine short hair. Aedeagus similar to that of *exilis*, but dorsal lobes of caulis a little more divergent, parameral lobes fringed with longer hair, and sagittae widest near apical fourth of length in dorsal view and more thickly fusiform at middle in lateral view; apex of sagittae thinly acute in both species. Length: 2.7-3.5 mm.; anterior wing, 2.3-2.5 mm.

Holotype female, allotype, and paratypes.—Twelve females, 25 males, Mazourka Canyon, Inyo Mts., Inyo Co., California, July 2, 1953 (J. W. MacSwain).

Types in collections of the University of California at Riverside and Berkeley.

Perdita dimidiata, n. sp.

(Figs. 767, 768, 862)

The male of *dimidiata* is similar to *exilis* but is dark above and almost entirely yellow beneath, with the yellow of the head almost reaching the summit of the eyes. The cheeks are armed anteriorly with a small conical process and the undersurface of the head is covered with short, dense, plumose, white hair, although the insect is otherwise only slightly hairy. The female is unknown.

Male.—Vertex and occiput of head and dorsum of thorax shining black with a bluish luster; luster most distinct on anterior part of mesoscutum and propodeum, faint on head. Face and undersurface of head almost to level of summit of eyes, bright yellow; black of vertex extending forward about halfway between level of anterior ocellus and foveae, with a very short median lobe (either broad, or small and angular). Small spot on anterior corners of mesoscutum, and

prothorax including sternum, yellow; but disk of pronotum black except collar and narrow posterior border. Thorax otherwise yellow beneath and on sides, including flanks of propodeum, except for a dark oblique band with a bluish tinge extending from beneath tegulae to middle coxae. Abdomen yellow, with a broad fuscous band on each segment above, but with lateral margins of tergites 1 to 5 (more broadly on basal corners) and narrow intersegmental bands remaining yellow. Legs yellow; hind tibiae slightly, hind tarsi more strongly, dusky on outer side. Antennae yellow, pedicel and flagellum above pale brown. Mouthparts yellow, apex of mandibles red. Tegulae yellow at base, broadly subhyaline on outer margin. Wings hyaline, nervures pale testaceous, subcosta and margins of stigma brown.

Head moderately enlarged, distinctly broader than long; cheeks broad but receding and armed anteriorly with a small conical process. Lateral plates of face somewhat broader than space between them. Clypeus much broader than high, obtusely dentate on each side of base of labrum, and with lateral extension strongly reflexed and only partly visible in frontal aspect. Occipital concavity shallow but as broad as space between summit of eyes. Facial foveae ovally punctiform. Mandibles tapering from broad base, acute at apex, and reaching a short distance beyond far margin of proboscoidal fossa. Proboscis of moderate length, tip of galeae almost reaching base of stipites. Flanks of pronotum only moderately impressed. Pterostigma about three times as long as wide and not quite as wide as submarginal cells; marginal cell about as long as stigma, part beneath stigma longer than part beyond, which narrows somewhat toward apex. Head and thorax polished and impunctate. Vertex, meso- and metanotum with sparse, short, erect hair; face nude except for a few hairs on margin of disk of clypeus; cheeks with sparse microscopis hairs; undersurface of head with dense, plumose, white hair. Tergite 7 narrowed to a short, rounded, median lobe. Subgenital plate a little longer than wide, sides nearly straight to rounded apex, and apical part of disk more evidently hairy than in some of allied species. Aedeagus somewhat similar to that of *austini*, but dorsal lobes of caulis separated and slightly divergent, blunt at apex in dorsal view but ending acutely as seen from side, and sagittae blunt at opposed tips. Length: 3 mm.; anterior wing, 2.2 mm.

Holotype male.—Eloy, Pinal Co., Arizona, on *Sesuvium verrucosum*, Aug. 13, 1955 (Timberlake). *Paratype*.—Male, Canipole, Baja California, Mexico, Oct. 2, 1941 (Ross and Bohart).

Type in collection of the Citrus Experiment Station, Riverside; paratype in collection of the California Academy of Sciences.

Perdita austini Cockerell

(Figs. 769, 770, 863)

Perdita austini Cockerell, 1895, Proc. Acad. Sci., Phila., 47:13, ♂; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:85.

Only the male of this little bee, a visitor of Compositae in New Mexico, is known, and it has been recorded only from Las Cruces, the type locality, and from Albuquerque, at flowers of *Gutierrezia* and *Aplopappus*. It is distinguished from others of its group by the restriction of yellow face marks, as described below.

Male.—Head and thorax dark green; propodeum bluish; disk of mesonotum and scutellum black. Mandibles except reddish tips, labrum, clypeus, lateral marks, and sometimes anterior end of gular region and of cheeks, yellow. Pair of dots on clypeus small and usually faint. Lateral face marks broad at anterior end, tapering gradually to a blunt point that touches foveae (in one small-headed specimen ending at level of antennae). Thorax entirely dark. Abdomen pale fuscous or brownish above, yellow beneath, and with a broad, nubilous, yellow band at base of tergites 2 to 4 or 5, that on tergite 2 enclosed. Front and middle legs yellow, with femora fuscous on posterior side except at apex; hind legs fuscous, with trochanters and apex of femora yellow, tarsi brownish. Antennae fuscous above, becoming more brownish toward apex; scape clear yellow; flagellum brownish yellow beneath. Tegulae yellow at base, broadly hyaline on outer margin. Wings milky hyaline, nervures pallid, subcosta and margin of stigma pale yellowish.

Head small and rotund to moderately enlarged and quadrate; cheeks broad but strongly receding and obtusely angled anteriorly in the more macrocephalous examples. Occipital concavity moderately deep, but not as wide as space between summit of eyes in small-headed specimens. Proboscis moderately long, slightly exceeding the fossa in repose. Mandibles long, slender, tapering, very acute at apex, and each reaching almost to base of the other in more-macrocephalous examples. Facial foveae faint and punctiform. Face below level of antennae strongly convex from side to side; disk of clypeus about as high as wide; lateral extensions moderately reflexed and visible in frontal aspect. Flanks of pronotum sometimes deeply impressed, posterior corners of disk prominent and rounded. Pterostigma hardly more than one-half as broad as first submarginal cell; part of marginal cell beneath it longer than part beyond. Head and thorax shining, impunctate; mesoscutum and scutellum polished, or margins of scutum faintly tessellate; frons and vertex with moderately strong and minute tessellation. Pubescence white, sparse, moderately long, and erect on face, vertex, cheek, and anterior border of mesoscutum, comparatively long and dense on undersurface of head and thorax. Tergite 7 with a moderately narrow and rounded apex. Subgenital plate somewhat more than twice as long as wide at truncate apex, broadening toward base, and minutely pubescent on disk. Caulis of aedeagus as long as wide, with dorsal lobes meeting and ending acutely in median line as seen from above and rather strongly obtuse at apex in lateral view; volsellae well exposed; parameral lobes moderately long, incurved, and tapering to rather acute apex; sagittae slenderly fusiform, the rods separated but hardly divergent, each slender and nearly uniform in width. Length: about 3-4 mm., anterior wing, 2.5-2.7 mm.

Material examined.—NEW MEXICO. Valencia Co.: 4 males, near Correo, on *Gutierrezia sarothrae*, Sept. 4, 1930 (Timberlake). The type male at Philadelphia has also been examined.

Perdita brevihirta, n. sp.

(Figs. 771, 772, 864)

P. brevihirta is known only from Maricopa County, Arizona, where it has been taken at flowers of *Pectis papposa*. It is closely related to *austini*, but the male has the face entirely yellow below level of antennae, the disk of clypeus more strongly dentate on each side of base of labrum, and the subgenital plate and genitalia distinctive.

Female.—Head and thorax dark green, without light markings; disk of mesoscutum, scutellum, and metanotum, black; labrum and clypeus, black or brownish. Abdomen dark, more or less tinged with brown, with a narrow pale-yellow or creamy-white band at base of tergites 2 to 5, not reaching lateral margins; pygidial plate ferruginous; venter brown. Legs brown; apex of femora, tibiae and tarsi of front legs, extreme apex of middle femora, and underside of middle tibiae and middle tarsi, pale yellow. Antennae blackish, flagellum yellowish beneath. Mandibles pale yellow, becoming red on apical fourth. Proboscis dark. Tegulae pale yellow at base, broadly hyaline on outer margin. Wings milky hyaline, nervures pallid, disk of stigma whitish.

Head about as broad as long; disk of clypeus large, slightly broader than high, and obscurely dentate on each side of base of labrum. Facial foveae short, broad, oval, more than twice as wide as narrow space between them and eyes, and reaching from a little above level of antennal sockets less than halfway to level of anterior ocellus. Mandibles gently curved, moderately slender, with a small inner tooth, and reaching far margin of proboscis fossa. Proboscis moderately long, tip of galeae not quite reaching base of stipites in repose. Pterostigma large, four times as long as wide, and nearly as broad as first submarginal cell; part of marginal cell beneath stigma about twice as long as part beyond. Tarsal claw small, inner tooth minute. Pygidial plate longer than wide and evenly narrowed to moderately wide and truncate apex. Head and thorax shining, faintly tessellate; face below antennae, disk of mesoscutum, and scutellum, polished; face opposite antennae and anterior border of mesoscutum with extremely minute and sparse punctures. Pubescence short and white on lower sides of face; short, coarse,

and erect on anterior border of mesoscutum; longer and denser on cheeks; long and finer on front coxae and mesopectus. Length: about 4 mm.; anterior wing, 3 mm.

Male.—Head and thorax blue green, becoming black on posterior half of mesoscutum and on scutellum. Anterior half of gular region, mandibles except red tips, labrum, face below level of antennae, yellow, with lateral marks extending broadly to foveae. Thorax dark, except for yellow tubercles. Abdomen brown or pale fuscous; venter and band at base of tergites 2 to 3 or 4, yellow. Legs yellow; a blotch on posterior side of front and middle femora, middle and hind coxae, hind femora except broadly beneath and at apex, and outer side of hind tibiae, fuscous. Antennae yellow, pedicel and flagellum brown above. Tegulae and wings as in female, except subcosta and margins of stigma more or less pale brownish.

Head a little broader than long; cheeks more or less broad but strongly receding, and narrowed and unarmed anteriorly. Occipital concavity rather shallow and about as broad as space between summit of eyes. Disk of clypeus convex, broader than high, and with a small acute process on each side of base of labrum; lateral extensions strongly reflexed and thus only about one-half visible in frontal aspect. Flanks of pronotum moderately impressed. Venation, sculpture, and pubescence about as in female. Tergite 7 narrowed to a moderately wide median lobe rounded at apex. Subgenital plate nearly twice as long as wide, somewhat narrowed to slightly rounded apex and with rather dense minute hairs on disk. Aedeagus similar to that of *exilis*, but dorsal lobes of caulis somewhat divergent, with area on each side roundly and deeply excised to base of parameral lobes; parameral lobes rather short, somewhat tapering, and simple; volsellae small and not surpassing dorsal lobes; sagittae rather short, with the rods spread apart, and thinly fusiform in lateral view. Length: about 2.5–3.5 mm.; anterior wing, 2–2.3 mm.

Holotype female, allotype, and paratypes.—Five females, 11 males, Gila Bend, Maricopa Co., Arizona, on *Pectis papposa*, Aug. 12, 1954 (Bohart and Butler). *Additional paratypes*.—Two females, Phoenix, Oct. 26, 1934 (R. H. Crandall).

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

Perdita erythrogya, n. sp.

(Figs. 773, 774, 865)

This species and *fulvicauda* differ from others of the group in having the face depressed, the frons and mesonotum closely punctured and unusually hairy, and the mesonotum entirely green and polished. The female of *erythrogya* collects pollen from *Dalea*.

Female.—Head and thorax dark green; labrum and clypeus blackish. Usually a small spot at anterior end of lateral plates of face adjacent to clypeus, rarely a short median streak on upper part of clypeus, and basal half of mandibles, white; mandibles shading into red at apex. Thorax entirely dark. Abdomen, including venter, dark fuscous or blackish; apex of tergite 6, tergite 7, and last two segments of venter, reddish ferruginous; a rather narrow enclosed white band at base of tergites 2 to 4, often medially notched or slightly interrupted. Legs black, or tinged with brown; middle tibiae brown; anterior side of front tibiae yellow; sometimes middle tibiae more or less, and front tarsi, yellowish tinged above with brown. Antennae blackish, flagellum brownish beneath. Proboscis dark. Tegulae subhyaline, with a basal brown mark margined with yellowish white. Wings hyaline, nervures testaceous, subcosta and margins of stigma brown.

Head as broad as long; face unusually depressed, especially above level of antennae. Clypeus moderately convex, disk much broader than high, and broadly truncate apically, the lateral extensions strongly reflexed. Facial foveae twice as wide as space between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Proboscis moderately long, apex of galeae reaching base of stipites in repose. Mandibles moderately stout, with a well-developed inner tooth, and reaching far margin of proboscis fossa. Pterostigma about three times as long as wide, three-fourths as wide as first submarginal cell; parts of marginal cell beneath and beyond it about equal. Inner tooth of

tarsal claws about half as long as outer tooth. Pygidial plate as broad as long and broadly rounded at apex. Head and thorax polished, with frons and vertex tessellate and somewhat dullish, base of propodeum weakly tessellate. Puncturation strong but fine, rather dense on frons, moderately close on face below antennae and on mesonotum. Pubescence white, short, erect, and rather dense on frons, sparser on mesonotum, considerably longer on cheeks, front coxae, mesopectus, and ridges of propodeum. Length: 5-6 mm.; anterior wing, 3-3.6 mm.

Male.—Head and thorax dark green. Narrow line on posterior orbits nearly reaching middle of eye, mandibles except red tips, labrum, and most of face below level of antennae, yellow. Lateral marks of face much narrowed above and going somewhat above level of antennae; the green of frons descending on each side in a sharp point to middle of outer margin of subantennal plates. Upper middle of disk of clypeus sometimes with two fuscous marks. Tergites 1 to 4 blackish (sometimes with a distinct greenish luster) and with whitish or testaceous apical depressions; an interrupted yellow band often present on tergites 2 to 4, or only on 2; venter and tergites 5 to 7 fulvous, tergite 5 sometimes more or less infuscated. Legs fuscous, anterior side of front and middle legs except middle coxae, underside of hind tibiae, and small spot on anterior side of hind femora at apex, yellow. Antennae brown above, becoming darker toward base, scape broadly clear yellow, flagellum brownish yellow beneath. Tegulae and wings as in female, except subcosta and margins of stigma darker brown.

Head as broad as long, rotund and not enlarged; cheeks as broad as eyes. Disk of clypeus somewhat less than twice as broad as high, and lateral extensions broad and moderately reflexed. Facial foveae faint, close to margin of eyes, and about three times as long as high. Mandibles tapering from base to acute apex and reaching far margin of proboscival fossa. Antennae about normal length, but rather incrassate, with joints of flagellum except first and last broader than long. Flanks of pronotum normal. Tarsal claws much larger than in female; inner tooth almost as long as outer tooth, becoming wider toward its base. Sculpture and pubescence about as in female. Tergite 7 produced apically into a broad ogival lobe, convex above. Subgenital plate distinctively quadrate at base with long acuminate median lobe, pubescence of disk extremely fine and short. Aedeagus rather large, with dorsal lobes of caulis divergent, rather short and obtuse at apex in both dorsal and lateral views; volsellae large, well exposed, and armed with numerous fine tubercles, those on inferior pair running in several rows on outer surface of plate, instead of on dorsal margin, and some bearing an extremely fine short seta; parameral lobes almost hairless, about as long as caulis, slenderly subfusiform as seen from above and tapering in lateral view; sagittae stout, expanding in apical half, where the rods spread apart, apex of rods acute in both dorsal and lateral views. Length: 3.5-5 mm.; anterior wing, 2.9-3.6 mm.

Holotype female, allotype, and paratypes.—Two females, 10 males, near highway bridge, 5 miles north of Palm Springs, Riverside Co., California, on *Isomeris arborea*, not collecting pollen, April 23, 1933 (Timberlake). *Additional paratypes* (all from Riverside Co.).—6 females, 11 males, 4 miles north of Palm Springs, on *Dalea californica*, May 10, 1941; 7 females, 1 male, 4 miles north of Palm Springs, on *D. emoryi*, June 11, 1954; 1 male, 6.5 miles north of Palm Springs, on *D. californica*, April 28, 1948; 1 female, 6 miles north of Palm Springs, on *D. californica*, June 24, 1955; 1 female, 2 miles east of Edom (now called Thousand Palms), on *Larrea divaricata*, March 28, 1936; 1 male, Edom, on *Cryptantha angustifolia*, April 17, 1952 (Timberlake); and 1 male, Whitewater, May 20, 1951 (E. I. Schlinger).

Types in collection of the Citrus Experiment Station, Riverside; one paratype in collection of the University of California at Davis.

Perdita fulvicauda, n. sp.

(Figs. 775, 776, 866)

This species is very similar to *erythropyga* but has more extensive white and yellow markings, the pubescence of the mesonotum rather denser and more moss-like, and the wings more whitish hyaline with paler nervures. Possibly it would be better to call *erythropyga* and *fulvicauda* forms of one species, but both occur in the Palm Springs region without evident intergradation.

Female.—Agreeing with *erythropgya* in most characters. Face marks whitish, or sometimes yellow; when most developed, clypeus light except for two broad submedian stripes and usual part of dots, and lateral marks broadly transverse but with a slender orbital extension to level of antennae; or sometimes the pale color of clypeus reduced to a narrow line on lateral margins and a median stripe, or entirely lacking. Abdomen with a broad, entire yellowish-white (or yellow) band at base of tergites 2 to 4 not quite reaching lateral margins, and generally with two small marks close together at summit of basal declivity of tergite 1; these marks sometimes moderately enlarged, almost contiguous, and enclosing a dark spot on their outer half. Venter and two apical tergites fulvous; venter more yellowish toward base. Tubercles sometimes slightly yellowish on dorsal margin before apex. Extreme apex of middle femora and anterior side of middle tibiae yellow, like front legs (middle tibiae in *erythropgya* often dark or with much less yellow on anterior side than front tibiae). Scape of antennae more or less whitish beneath, at least on basal half. Wings whitish hyaline, nervures pale testaceous, subcosta and margins of stigma pale brownish.

Structurally like *erythropgya*, but pygidial plate sometimes slightly less broadly rounded, and pubescence of mesonotum coarser and more mosslike. Length: 4–5.5 mm.; anterior wing, 3–3.4 mm.

Male.—Resembles male of *erythropgya*, but face below antenna usually all or nearly all yellow except for usual pair of clypeal dots. Tergites 1 to 3 or 4 dark, with an interrupted pale-yellow band on 2 and 3, or 2 to 4; but sometimes tergite 1 slightly yellow just before apical depression, and dark area on following segments more or less reduced, so that in extreme cases only basal margin, broad lateral margin on basal half of segments, and a suffused roundish spot on each side subapically remain dark on tergites 2 and 3. Legs yellow; front and middle legs fuscous or brownish on posterior side of femora, and with a narrow dark streak on tibiae; hind coxae dark on basal half, hind femora dark except narrowly beneath and at apex, hind tibiae pale fuscous except on anterior side, and hind tarsi pale brownish except apical joint. Wings whitish hyaline, with rather pallid nervures as in the female.

Structurally like *erythropgya*, but with slightly coarser pubescence on mesonotum, and pubescence on disk of subgenital plate longer and more evident. Aedeagus very similar, but volsellae shorter and less exposed, reaching to, or just beyond, middle of parameral lobes, with tubercles of inferior pair restricted to dorsal margin. Length: 3.5–4.5 mm.; anterior wing, 3–3.1 mm.

Holotype female, allotype, and paratypes.—Eight females, 12 males, 24 miles south of Indio, just north of the Travertine Rocks, Riverside Co., California, on *Dalea mollis*, March 25, 1933 (Timberlake). *Additional paratypes*.—CALIFORNIA. Riverside Co.: 1 female, 5 males, Palm Springs, on *Phacelia distans*, March 26, 1932 (Timberlake); 1 male, near Palm Springs, April 10, 1937 (G. C. Varley); 3 females, 6 males, 6 miles northwest of Indio, on *Melilotus*, April 30, 1949 (Linsley, MacSwain and R. F. Smith); 4 females, 18 miles west of Blythe, on *Dalea mollis*, April 30, 1952, and 3 females, 1 male, on *Nama hispidum*, April 13, 15 and 17, 1958 (Timberlake); 3 females, 1 male, same locality, April 29, 1952 (J. G. Rozen); 2 females, 1 male, same locality, the females apparently collecting pollen from *Baileya pleniradiata*, the male on *Coldenia plicata*, April 16, 1958 (P. D. Hurd, Jr.); 1 female, Thousand Palms, April 7, 1955 (W. R. Richards); 1 female, Willis Palms, April 9, 1955 (W. R. M. Mason). San Diego Co.: 1 female, 3 males, Borego, the female on *Larrea divaricata*, April 2, 1953 (Hurd); 1 male, sand dunes, Borego, April 18, 1957 (E. I. Schlinger) and 1 female, April 20 (R. W. Bushing); 1 male, Coyote Creek, Borego, March 26, 1957 (R. M. Bohart). Imperial Co.: 1 female, Fish Creek Mts., April 1, 1955, and 1 female, 3 males, same locality, elevation 300 feet, April 20 (Mason and Richards); 1 female, 14 males, 3.4 miles southwest of Palo Verde, on *Dalea mollis*, April 3, 1960 (Timberlake). MEXICO. Baja California: 1 female, 20 miles west of Mexicali, on *Prosopis juliflora*, April, 1939 (C. D. Michener).

Types in collection of the Citrus Experiment Station, Riverside; paratypes in collections of the University of California at Berkeley and Davis, the California Academy of Sciences, and the Canadian Department of Agriculture, Ottawa.

SUBFASCIATA SECTION

This section of the *ventralis* group takes its name from the first-described species, which unfortunately is rare in collections and has been rediscovered only recently.

For this reason *P. rhois* and *P. dasyliirii*, both of Cockerell and both abundant species of the southwest, may be used as representatives of the section. The species belonging here are distinguished by the unusually broad pterostigma and the accompanying oblique or tilted marginal cell. Some of the species are markedly polylectic and go to many diverse flowers, and perhaps for this reason are unusually successful and common. At any rate the polylectic species of this group are often found in much larger numbers than most other species of *Perdita*, except some of those frequenting *Prosopis*. Three of the species (*subfasciata*, *snellingi*, and *colei*), however, are found only at flowers of Compositae belonging to the genera *Chrysothamnus*, *Gutierrezia*, *Solidago*, and *Lepidospartum*.

Female.—Usually minutely tessellate and moderately dullish, with mostly generalized characters, except those of venation. Pterostigma large and broad, as wide as first submarginal cell and nearly as long, and much rounded on inner margin. Marginal cell oblique to wing margin, with part beyond stigma usually about as broad as long and broadly truncate at apex. Mouthparts ordinary; proboscis of moderate length; mandibles with a small inner tooth, but convexly chisel-shaped in species visiting Compositae. Facial foveae close to margin of eyes and generally not exceeding half the space between base of antennae and anterior ocellus. Tarsal claws with a small but generally distinct inner tooth. Pygidial plate plane, triangular, acute to narrowly obtuse or truncate at apex. Face marks generally restricted to clypeus and small lateral marks; sometimes absent. Abdomen usually with yellow band at base of tergites, but sometimes entirely dark or predominantly yellow.

Male.—Head usually not enlarged, or but little enlarged; cheeks narrow or moderately broad, generally unarmed; but in one species (*rehni*) head sometimes greatly enlarged, with very broad cheeks having a large conical process. Mandibles always acute at apex, usually slender and moderately long, but sometimes much broadened at base on outer margin, and sometimes extremely long, each reaching beyond base of other. Flanks of pronotum usually unmodified or but little modified, except in macrocephalous examples of *rehni* in which they are deeply grooved. Tergite 7 narrowed gradually to a median lobe which is narrowly truncate at apex. Aedeagus similar to those of members of *ventralis* subgroup, but dorsal lobes of caulis acute and fimbriate beneath except in *rehni*. In sculpture similar to female. Head yellow except on posterior third or fourth above and beneath; flanks of pronotum and sides and undersurface of thorax usually with much yellow; legs often mostly or entirely yellow, and the yellow frequently predominant on abdomen.

Perdita subfasciata Cockerell

(Figs. 779, 780, 868)

Perdita subfasciata Cockerell, 1897, Ann. Mag. Nat. Hist., (6)20:512, ♀.

Cockerell described this species from a single female collected from flowers of *Chrysothamnus* at Embudo, New Mexico, in September, 1897. This female has an enclosed yellow band at base of tergites 3 to 5. Of two females collected at Eureka, Utah, one has a band at base of tergites 2 to 5, and the other a band at base of tergites 3 and 4 and a trace of band on tergite 5. A single female collected near Camp Verde, Arizona, has only a much abbreviated and interrupted band (or two transverse marks) at base of tergite 4. Males collected in Utah, Arizona, and Nevada show no variation in markings.

Female.—Head and thorax dark green or bluish green; posterior half of mesoscutum and scutellum more or less blackish; labrum and clypeus brown or black. No light markings except a narrow yellow band on collar of pronotum. Mandibles dark rufotestaceous, sometimes with a yellowish spot. Abdomen fuscous or black, with an abbreviated enclosed yellow band at base of tergites 2 or 3 to 4 or 5, or sometimes only on tergite 4; these bands end far from lateral margins

and cover about one-fourth to one-third of length of segments. Pygidial plate pale ferruginous. Legs blackish; front knees, anterior side of front tibiae, front and middle tarsi, and sometimes small joints of hind tarsi, yellowish. Antennae dark brown or fuscous, flagellum paler beneath, radicle joint of scape yellowish. Tegulae hyaline, with a yellow mark at base. Wings whitish hyaline, nervures pallid, margins of stigma and subcosta testaceous or brownish.

Head as broad as long, with inner orbits parallel. Clypeus large, convex, and broadly rounded on upper margin. Facial foveae will impressed and reaching about halfway from upper level of antennal sockets to level of anterior ocellus. Proboscis of moderate length: galeae equaling stipites, maxillary palpi with six long joints. Mandibles convex on outer side, concave within, strongly curved, obliquely truncate at apex, and width about one-fourth of length of inner margin. Pterostigma about equaling width of first submarginal cell; part of marginal cell beneath stigma generally longer than part beyond, the latter part as broad as long. Pygidial plate about as long as broad at base and narrowed evenly to moderately narrow ogival or obtuse apex. Head and thorax more or less weakly tessellate and moderately shining, frons nearly impunctate, mesoscutum with sparse weak punctures. Pubescence whitish, thin, short, and erect (more squamiform on mesonotum in Arizona specimen); longer and denser on cheeks and underparts of thorax. Length: about 4-5 mm.; anterior wing, 2.9-3.3 mm.

Male.—Head and thorax dark green; undersurface of head, anterior three-fourths of cheeks, and face to level of foveae, bright yellow. Pronotum except triangular mark on disk, prosternum, broad median part of mesospectus, and nearly anterior half of mesopleura, yellow. Abdomen yellow, with tergite 1 fuscous, and a dark band at junction of following segments, those at junction of tergites 3-4 and 4-5 abbreviated or evanescent. Legs and antennae entirely bright yellow. Proboscis and mandibles yellow, latter briefly red at apex. Tegulae and wings as in female, except subcosta, margins of stigma, and nervures enclosing marginal cell, more brownish.

Head as broad as long, nearly rotund, and slightly broader than thorax. Cheeks strongly receding, somewhat broader than eyes and rounded beneath. Face below antennae strongly convex from side to side, lateral extensions of clypeus partly exposed to view in frontal aspect of head and tapering to outer ends. Mandibles broad at base, tapering to finely pointed tips and reaching well beyond far margin of proboscis fossa. Antennae rather short, flagellum clavate, scape obconical and not quite reaching the nearer eye margin. Face and foveae punctiform. Head and thorax faintly tessellate, impunctate, and more shining than in female; face, disk of mesoscutum, and scutellum almost polished. Pubescence sparser than in female: face and disk of mesoscutum and scutellum nearly nude, but hair of cheeks and underparts of thorax rather dense. Tergite 7 narrowed to a median lobe about as long as wide and truncate at apex. Subgenital plate about as long as wide, with sides moderately converging to rounded apex, apical part of disk with very fine and short pubescence. Dorsal lobes of caulis very acute and about reaching level of middle of parameral lobes; latter rather slender and with fine sparse pubescence at apex; volsellae well exposed beyond apex of dorsal lobes; sagittae strongly fusiform in apical part, widest near beginning of last fourth of the length, then narrowing to obtuse apex as seen from above, thickest in lateral view near middle, and subacute at apex. Length: about 3 mm.; anterior wing, 2.3 mm.

Material examined.—ARIZONA. Yavapai Co.: 1 female, 4 males, 4.2 miles southeast of Camp Verde, on *Gutierrezia*, Sept. 18, 1953 (Timberlake). NEVADA. White Pine Co.: 2 males, 22 miles west of Ely, July 20, 1958 (Linsley and MacSwain). UTAH. Juab Co.: 2 females, 1 male, Eureka, on *Chrysothamnus*, Aug. 6, 1958 (G. E. Bohart). NEW MEXICO. Rio Arriba Co.: The type female, Embudo, on *Chrysothamnus*, Sept. 25, 1897 (Cockerell), in U. S. National Museum.

Perdita snellingi, n. sp.

(Figs. 781, 782, 869)

This species and *coliei* are closely related to *subfasciata* but the tubercles and bases of mandibles are conspicuously light and the abdomen has four yellow bands. The mandibles of the female are broader and more strongly chisel-shaped than those of *subfasciata*.

Female.—Head and thorax dark green; clypeus and disk of mesoscutum blackish. Mandibles yellow on basal half and red at apex. Collar of pronotum and tubercles pale yellow. Abdomen blackish; a broad, even yellow band on tergites 2 to 5 nearly covering basal half of each segment, not reaching the lateral margins, and slightly notched medially behind. Apical depression of tergite 5 and pygidium, testaceous yellow. Legs blackish; apex of front and middle femora, front tibiae, anterior side of middle tibiae, and front and middle tarsi, yellow. Antennae blackish; flagellum more brownish, becoming paler toward apex and brownish yellow beneath; scape and pedicel narrowly pale yellow beneath. Tegulae nearly clear hyaline, with a yellow base. Wings whitish hyaline, nervures and stigma pale yellowish.

Head as broad as long, clypeus rather prominent with disk somewhat broader than long. Facial foveae elongate oval, nearly twice as wide as space between them and eyes, and reaching from slightly above level of antennal sockets nearly halfway to level of anterior ocellus. Mandibles shaped as in *subfasciata* but considerably broader, strongly concave within, and strongly curved on outer margin. Proboscis when folded in repose barely exceeding fossa. Pterostigma widest beyond middle, where it is as wide as first submarginal cell; part of marginal cell beneath stigma considerably longer than part beyond it. Pygidial plate somewhat longer than wide at base, with sides converging to moderately narrow and rounded apex. Head and thorax tessellate, but only slightly dullish, clypeus almost polished; punctures of face and mesonotum minute and moderately close, most distinct on the clypeus, but disappearing on median line of clypeus and posterior middle of mesoscutum. Pubescence white, moderately abundant on cheeks and underparts of thorax, thin and short on face, short, sparse, and erect on mesonotum. Length: about 4.5–4.8 mm.; anterior wing, 3.2–3.3 mm.

Male.—Head and thorax dark green; underside of head, anterior third to nearly half of cheeks, labrum, and face below level of antennae, bright yellow. Yellow of face ascending on frons nearly halfway to level of anterior ocellus both at sides and in middle, but the green extending downward on each side and usually reaching antennal sockets; median lobe of yellow on frons more or less narrowed anteriorly and its apex trilobed, tectiform, or broadly rounded. Collar of pronotum, narrow mark on posterior corners of disk, more or less of lower part of flanks, tubercles, a large part of prosternum, and broad T-mark on mesopectus, yellow. Antennae and legs entirely yellow. Abdomen yellow; first tergite and a rather broad preapical band on tergites 2 to 5 and a narrow band on tergite 6, brown; yellow at base of tergite 2 often enclosed. Tegulae and wings nearly as in female, but stigma more yellow, and margins of stigma and subcosta, pale brownish.

Head somewhat broader than long, sometimes subquadrate; face convex below antennae. Cheeks a little broader than eyes, and with a small conical process subanteriorly except in smaller examples. Mandibles slender except for a broad quadrate expansion on outer side at base, tapering, very acute at apex, and each nearly reaching base of other. Antennae strongly clavate, joints of flagellum mostly much broader than long. Facial foveae punctiform. Head and thorax shining, weakly tessellate, mesonotum almost polished; puncturation on frons and mesonotum extremely fine and sparse. Pubescence white and erect: longer and less coarse on mesonotum than in female, and considerably thinner except on underside of head. Tergite 7 narrowed from base to moderately wide and truncate apex. Subgenital plate a little longer than wide, well rounded at apex, and with very fine and short pubescence on apical border of disk. Aedeagus similar to that of *subfasciata*, but dorsal lobes of caulis not reaching beyond basal third of parameral lobes; sagittae very broad and subangulate at middle, thence tapering evenly toward apex. Length: 3–3.5 mm.; anterior wing, 2.8–2.9 mm.

Holotype female and paratype.—One female, 1 male, Red Rock Canyon, Kern Co., Calif., Sept. 26, 1957 (J. C. Hall). *Allotype male and paratypes*.—One female, 4 males, Red Rock Canyon, 2,800–2,900 feet, 1 male on *Euphorbia albomarginata*, Aug. 22, 1954 (R. R. Snelling). *Additional paratypes*.—One female, Red Rock Canyon, on *Chrysothamnus*, Oct. 25, 1955 (M. Wasbauer); 1 female, 1 male, Red Rock Canyon, Sept. 2, 1957 (E. I. Schlinger); 1 male, Red Rock Canyon, Sept. 26, 1957 (E. I. Schlinger); 1 female, Red Rock Canyon, on *Gutierrezia lucida*, Oct. 8, 1957 (Timberlake); 1 female, 1 male, Red Rock Canyon, on *Chrysothamnus*,

Oct. 14, 1958 (J. A. Chemsak and R. W. Thorp); 1 male, 11.4 miles south of Big Pine, Inyo Co., on *Chrysothamnus nauseosus*, Oct. 1, 1956 (Timberlake).

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

***Perdita colei*, n. sp.**

(Figs. 783, 784, 870)

This species is similar to *snellingi*, but the head and thorax of the female are polished and the yellow on the face of the male extends straight across on the frons above the antennae.

Female.—Head and thorax dark green; clypeus, disk of mesoscutum, and scutellum, black. Mandibles except red tips, collar of pronotum, and tubercles, yellow. Abdomen blackish with a broad, even, and enclosed, pale-yellow band at base of tergites 2 to 5, with that on tergite 2 abbreviated. Legs fuscous; front and middle knees, front tibiae, anterior side of middle tibiae, and all tarsi, yellow. Antennae fuscous above, more tinged with brown toward apex, clear yellow beneath on scape and pedicel, and yellow tinged with brown beneath on flagellum. Tegulae nearly clear hyaline, with yellow base. Wings slightly whitish hyaline, nervures pallid, margins of stigma and subcosta pale brownish.

Head about as broad as long, with a large, convex, prominent clypeus as in *snellingi*. Mandibles strongly convex on outer side, concave within, and oblique at apex. Proboscis not exceeding fossa in repose. Facial foveae somewhat wider than interval between them and eyes and reaching from upper level of antennal sockets halfway to level of anterior ocellus. Pterostigma almost evenly rounded beneath and about as wide as first submarginal cell; part of marginal cell beneath stigma longer than part beyond it, its apical truncation subequal to, or somewhat longer than, the metacarpus. Pygidial plate about as in *snellingi*, but with apex a little more definitely truncate. Head and thorax shining, clypeus, disk of mesoscutum, and scutellum polished, and other parts weakly tessellate; puncturation very fine and sparse on each side of clypeus and on anterior part of mesoscutum, and moderately close on anterior half of frons. Pubescence white, erect, and about as in *snellingi*; hair of mesonotum rather short and coarse. Length: about 4.5–5 mm.; anterior wing, 3.1–3.3 mm.

Male.—Head and thorax dark green; undersurface of head, anterior half of cheeks, mandibles except red tips, face to level of middle of frons, pronotum except a broad dark band on disk (with a short spur in crease of flanks), prosternum, middle of mesopectus, and anterior margin of mesosternum broadly to level of tubercles, bright yellow. Antennae and legs entirely yellow. Abdomen yellow; tergite 1 and broad preapical band on four following segments brown; band on tergite 2 reaching lateral margins and nearly enclosing the yellow, other bands more abbreviated. Tegulae and wings as in female, except subcosta and margins of stigma considerably darker; wings but slightly dusky in comparison with *snellingi*.

Head broader than long and a little wider than thorax. Cheeks evenly rounded beneath and not equalling width of eyes. Face below antennae strongly convex, disk of clypeus about twice as broad as long. Mandibles tapering to acute apex from moderately large basal expansion (the latter smaller and less quadrate than in *snellingi*), and reaching a little beyond far margin of proboscidal fossa. Antennae strongly clavate, with most joints of flagellum much broader than long. Facial foveae punctiform. Head and thorax polished and almost impunctate. Pubescence whitish, thin except on cheeks, face almost nude, sparse hair of mesonotum longer and much finer than in female. Tergite 7 narrowed to the truncate apex as in *snellingi*. Subgenital plate barely longer than wide, sides slightly incurved, apex rounded; pubescence short, thin, and mostly restricted to apical margin of disk. Aedeagus more as in *subfasciata* than as in *snellingi*, with dorsal lobes of caulis reaching level of middle of parameral lobes, and sagittae less broadened and less angulate at broadest part as seen from above. Length: 3–3.5 mm.; anterior wing, 2.4–2.5 mm.

Holotype female and paratypes.—Three females, Redlands, San Bernardino Co.: California, without further data, except that they are known to have been collected in 1913 (F. R. Cole).

Additional paratypes and allotype.—San Bernardino Co.: 4 females, 1 male (allotype), Oro Grande, on *Chrysothamnus nauseosus*, Oct. 28, 1934 (Timberlake); 18 females, 152 males, Cushenbury Springs, on *Lepidospartum squamatum*, except 3 males on *Gutierrezia lucida*, Sept. 1, 1936; 1 male, Box S Springs, on *Solidago confinis*, Sept. 1, 1936; 1 male, Cactus Flat, 6,000 feet, San Bernardino Mts., on *G. lucida*, Sept. 1, 1936; 10 females, 15 males, near Desert Springs (23 miles east of Little Rock), on *G. lucida*, Sept. 13, 1950; 1 female, summit between Morongo and Yuca valleys, on *G. lucida*, Sept. 28, 1944 (Timberlake); 1 female, 1 male, Desert Springs, Aug. 16, 1956 (P. D. Hurd, Jr.). Riverside Co.: 10 males, Whitewater Conyon, on *L. squamatum*, Oct. 14, 1951 (Timberlake and Oscar Clarke).

Type in collection of the U. S. National Museum (Cat. No. 43,390); allotype and paratypes in collection of the Citrus Experiment Station; paratypes in collection of the University of California at Berkeley.

Perdita keiferi Timberlake

(Figs. 785, 786, 871)

Perdita keiferi Timberlake, 1928, Pan-Pac. Ent., 5:28, ♂, ♀.

This species is known only from Cedros Island, Baja California, where it was collected by H. H. Keifer and G. D. Hanna. I treat here only the special male characters not considered in the original description.

Male.—Subgenital plate very nearly as in *colei* but a little more rounded at apex and with short fine pubescence apparently confined to apical part. Dorsal lobes of caulis acute, coinciding at apex with apices of superior lobes of volsellae, and falling short of middle of parameral lobes; the latter moderately wide and same length as caulis; sagittae in dorsal view robustly swollen and subangulate at widest part (about one-fourth of total length from apex) and thence narrowed one-half to apex, and moderately swollen in lateral view and thickest at about one-third of length from apex.

Perdita inornata, n. sp.

(Figs. 787, 788, 872)

The female of *inornata* is dark without markings and has been collected at flowers of *Cowania*, *Agave*, and *Eriodictyon*. The male is similar to other males of this group with much yellow on the head and underside of the thorax, its cheeks are very broad with a small anterior process, and its mandibles are long, tapering, and acute.

Female.—Head and thorax dark green; labrum, clypeus, and supraclypeal area, black. Abdomen blackish, without markings except in some specimens from the South Rim of the Grand Canyon, Arizona, which have an abbreviated and narrow yellow band as base of tergites 2 and 3. Legs blackish, tarsi more brownish, extreme apex of front femora and anterior side of front tibiae pale yellow. Antennae blackish, yellowish only at extreme base. Mandibles pale yellow on basal half, or less, shading into red at apex. Tegulae testaceous hyaline, with yellowish base. Wings whitish hyaline, nervures nearly colorless, stigma pale yellow, its margins and subcosta tinged with pale brown.

Head rotund, as broad as long; face below antennae evenly convex from side to side. Proboscis moderately short; tip of galeae falling considerably short of base of stipites in repose. Mandibles with a small, blunt inner tooth, and reaching far margin of proboscival fossa. Facial foveae separated from eye margin by somewhat less than their own width and reaching from level of upper margin of antennal sockets halfway to level of anterior ocellus. Pterostigma large, nearly as wide as first submarginal cell and widest beyond its middle; part of marginal cell beneath stigma somewhat longer than part beyond, with its truncation about as long as metacarpus. Pygidial plate about as long as its basal width, with sides converging to moderately narrow and rounded apex, which is generally only part exposed. Head and thorax tessellate and

moderately dull, with minute, moderately close, and rather obscure punctures; clypeus shining and distinctly but sparsely punctured. Pubescence whitish, thin, and erect, denser on cheeks and underside of thorax, rather short and moderately coarse on mesonotum. Length: 4.5–5 mm.; anterior wing 3.5–4 mm.

Male.—Head and thorax dark green or blue-green. Undersurface of head and cheeks except posterior third, proboscis, mandibles except red tips, labrum, and face to level of foveae, bright yellow. Collar of pronotum more testaceous than yellow; posterior corners of disk, flanks of pronotum except dark line in crease of upper half, prosternum, mesosternum except upper border of episternum and a rounded mark (sometimes nearly obsolete) on pectus in front of middle coxae, and more or less broad lower border of flanks of propodeum, yellow. Abdomen fuscous or brownish fuscous above; venter and band at base of tergites 2 to 4 (or even to 6) yellow, but bands usually more or less narrow and often more or less concealed. Legs yellow, a streak on outer side of front and middle tibiae, upper margin of hind femora, hind tibiae except beneath, hind tarsi, and sometimes a streak on apical part of middle femora and spot on hind coxae, fuscous or brownish. Antennae yellow, outer side of pedicel brownish fuscous, and two to four of following joints brownish above. Tegulae and wings similar to those of female, but nervures more testaceous and margins of stigma and subcosta brown.

Head subquadrate, somewhat broader than long; inner orbits parallel. Cheeks much broader than eyes, broadest at middle, sharply margined behind above middle and with small conical tubercle on margin anteriorly. Clypeus transverse, disk much broader than long, lateral extensions fully visible in frontal view, broad within, and ending bluntly next to base of mandibles. Lateral plates of face each nearly as wide as space between them. Subantennal plates almost as broad as long. Occipital cavity very broad and deep and nearly as wide as space between eyes at their summit. Mandibles tapering from base, very acute at apex, and each reaching nearly to base of other. Flanks of pronotum moderately deeply impressed, with posterior corners of disk subacute. Head and thorax minutely tessellate, with vertex and mesonotum slightly dullish; face impunctate; mesoscutum with widely spaced weak punctures. Pubescence whitish, erect, sparse on face and mesonotum and moderately dense on undersurface of head and thorax. Tergite 7 with narrow and truncate apex. Subgenital plate about one and one-half times as long as wide, sides nearly straight to rounded apex, and minutely pubescent across apical part of disk. Aedeagus similar to that of *keiferi*, but more elongate, parameral lobes more slender, and caulis more depressed. Length: 3.5–4 mm.; anterior wing, 3.1–3.4 mm.

Holotype female, allotype, and paratypes.—Nineteen females, 30 males, Wild Rose Canyon, 7,500–8,000 feet, Panamint Mts., Inyo Co., California, on *Cowania stansburiana*, June 18 and 19, 1937 (C. D. Michener). *Additional paratypes*.—CALIFORNIA, San Bernardino Co.: 19 females, Clark Mt., about 6,500 feet, on *Agave nevadensis*, July 8, 1938 (Timberlake). NEVADA, Clark Co.: 61 females, 77 males, Willow Creek Camp, Charleston Mts., on *Eriodictyon*, July 1, 1954 (J. W. MacSwain), and 1 male, same data (E. I. Schlinger). ARIZONA, Coconino Co.: 4 females, 14 males, South Rim of the Grand Canyon, July 26, 1934 (H. E. and M. A. Evans); 1 male Grand Canyon, July 28, 1949 (W. H. Lange).

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

Perdita rehni rehni Cockerell

(Figs. 789, 790, 873)

Perdita dasyliirii Cockerell, 1907, Ann. Mag. Nat. Hist., (7)19:539, ♂ (actually the second male described, with the name restricted to the so-called female, which is also a male).

Perdita rehni Cockerell, 1907, Ann. Mag. Nat. Hist., (7)20:13, ♀.

P. rehni is an anomalous species, for although it is undoubtedly allied to *dasyliirii* and *rhois* it is very distinctive in both sexes. The face marks of the female are restricted to small L-shaped marks, with a narrow line on the orbits and a short thick anterior arm. In extreme macrocephalous male specimens the cheeks are

very broad and armed with a large anterior process, the mandibles are extremely long, with each reaching slightly beyond the base of the other, and the flanks of the pronotum are extraordinarily excavated on the posterior side, with the dorsal disk becoming longer than wide and narrowed toward the broad collar. The genitalia (figs. 789 and 790) are very peculiar and distinctive. The type locality of *rehni* is Alamogordo, New Mexico, where it was taken by Viereck, June 6-9, 1902, at flowers of *Dasylyrion wheeleri*.

Female.—Head and thorax dark green; labrum, clypeus, and supraclypeal area, brown to blackish. Basal half of mandibles, narrow orbital line to middle or a little above middle of eyes, oblique or often rectangular short arm to sides of clypeus, and sometimes a narrow band across dorsal border of clypeus including more rarely entire lateral extensions of clypeus, yellowish white. Apex of mandibles reddened. Collar of pronotum and its hind border from tubercle to tubercle, yellowish white. Abdomen fuscous or brownish, with a yellow band, usually enclosed, on tergites 1 to 4, abbreviated on tergite 1, basal on others; venter, lateral margins of tergites 2 to 4, and tergite 5, yellow or testaceous yellow, the pygidial plate rufotestaceous. Legs yellow; sometimes a patch on posterior side of front femora or line on posterior side of front and middle tibiae, apical half of hind femora on dorsal side, and hind tibiae and tarsi, brown or fuscous. Antennae dark brown, scape and pedicel yellowish white beneath, flagellum narrowly brownish yellow beneath. Tegulae pale yellow at base and nearly clear hyaline exteriorly. Wings somewhat whitish hyaline, nervures pale testaceous, margins of stigma and subcosta pale brown.

Head as broad as long. Proboscis moderately long, included within fossa in repose, galeae somewhat shorter than stipites. Mandibles with a small blunt inner tooth. Clypeus large, convex, and strongly rounded above. Facial foveae linear, about half as wide as interval between them and eyes and reaching from above level of upper margin of antennal sockets about halfway to level of anterior ocellus. Pterostigma large and slightly broader than first submarginal cell; part of marginal cell beneath stigma much longer and considerably narrower than part beyond. Pygidial plate longer than wide at base, with sides converging to acute apex. Head and thorax finely tessellate and dullish, face below antennae more shining; clypeus with sparse minute punctures and mesoscutum with widely separated obscure punctures. Pubescence whitish, short, and thin, but longer, and denser on cheeks, undersurface of head and thorax, and front coxae; somewhat squamiform on mesonotum. Length: 4-5 mm.; anterior wing, 2.9-3.4 mm.

Male.—Head and thorax green or blue-green, more shining than in female. Undersurface of head, anterior half of cheeks, proboscis, mandibles except red tips, labrum, face to level of foveae, prothorax except band across disk of notum, broad middle of mesopectus, and anterior half of mesepisternum, bright yellow. Abdomen yellow, tergite 1 except for enclosed oval or quadrate mark, and moderately broad band at apex of tergites 2 to 4 or 5, brown. Legs yellow; a mark at apex of hind femora above, outer side of hind tibiae, and hind tarsi, brown or fuscous. Antennae yellow, a spot at apex of scape, pedicel, and flagellum narrowly above, brownish, color fading toward apex of flagellum. Tegulae and wings similar to those of female.

Head little wider than long. In extreme macrocephalous examples, cheeks broad and angulate anteriorly, with large conical process; head also more quadrate, with inner orbits diverging anteriorly; and mandibles extremely long, tapering, slender, falcate, each reaching a little beyond base of other. Facial foveae punctiform. In small-headed examples, flanks of pronotum moderately impressed and dorsal disk transverse as usual: in extreme macrocephalous specimens pronotum greatly enlarged, as much as three-fourths as long as mesoscutum, disk longer than wide and narrowed nearly one-half toward collar; flanks deeply impressed with fundus beneath posterior margin and surface anterior to impression broadly exposed and roundly ridged close to anterior border. Head and thorax weakly tessellate, shining, and virtually impunctate; scutellum and metanotum duller than other parts. Pubescence whitish: moderately abundant on underparts of head and thorax; face nude; vertex, cheeks, and mesonotum with short sparse hair, becoming slightly coarser on scutum. Tergite 7 with a pygidium-like median lobe slightly longer than wide and distinctly notched at apex. Subgenital plate about twice as long as wide, widest just before middle and thence narrowing to blunt apex. Dorsal lobes of caulis strap-shaped, rounded at apex,

curved outward, reaching near end of basal fourth of parameral lobes, and not fimbriate beneath; parameral lobes a little longer than caulis, appearing slender and acute in dorsal view and strap-like and angulated in lateral view; volsellae mainly beneath dorsal lobes as seen from above, superior pair small and inferior pair broad and broadly notched at apex as seen from side; sagittae large, stout, fused at middle, expanding on apical part, and dividing into a forcipate structure as seen from above, with inner angles of forceps very sharp, and as seen from side ovally and thickly fusiform, but narrowed at apex. Length: about 3-4 mm.; anterior wing, 2.4-2.9 mm.

Material examined.—NEW MEXICO. Otero Co.: 1 female, 1 male, Alamogordo, June 6, 1902 (Viereck), the female a cotype of *rehni*, the male determined by Cockerell as *dasyliirii*. TEXAS. El Paso Co.: 1 male, 10-20 miles east of El Paso, on Highway 62, June 21, 1942 (H. A. Scullen); Hudspeth Co.: 10 females, Sierra Blanca, July 4, 1921 (Carl D. Duncan); Brewster Co.: 1 female, Chisos Mts., June 10-12, 1908 (Mitchell and Cushman); Culberson Co.: 4 males, Boracho, June 22, 1947 (C. D. Michener). MEXICO. Chihuahua: 17 females, 17 males, 92 kilometers south of Chihuahua, on *Nolina*, June 30, 1947 (Michener); 58 females, 54 males, Santa Clara Canyon, 5 miles west of Parrita, on *Nolina*, June 21, 1956 (J. W. MacSwain).

Perdita rehni *extensa*, n. subsp.

Female.—Like typical *rehni* except for more extensive markings of face. Lateral marks, labrum, clypeus except two abbreviated dark stripes on disk, and two spots or transverse mark on supraclypeal area, pale yellow, or yellowish white. Yellow bands of abdomen broad and not enclosed, except on tergite 2, but light mark on tergite 1 more or less small and roundish, or sometimes divided by a dark line in median crease. Length: 4-4.5 mm.; anterior wing, 2.9-3.2 mm.

Male.—Not appreciably different from typical *rehni*. Length: 3-3.5 mm.; anterior wing, 2.4-2.8 mm.

Holotype female, allotype, and paratypes.—Nineteen females, 28 males, 15 miles north of Saltillo, Coahuila, Mexico, May 24, 1952 (M. Cazier, W. Gertsch, and R. Schrammel).

Types in collection of the American Museum of Natural History, New York City; eight paratypes in collection of the Citrus Experiment Station, Riverside.

Perdita melanura, n. sp.

This species is known from only one female and when better known it may possibly prove to be a race of *rhois*. It differs from *rhois* in having the abdomen entirely dark and the pygidial plate acute at apex. The difference in structure of this plate probably has specific value.

Female.—Head and thorax dark blue-green. Mandibles except red tips, and clypeus, creamy white; disk of clypeus with two broad brown stripes widening and becoming confluent above. Labrum testaceous. Thorax dark, except for creamy white collar of pronotum and tubercles. Abdomen whitish, pygidial plate testaceous. Legs whitish; apex of front femora, spot at apex of middle femora on posterior side, front tibiae and tarsi on anterior side, middle tibiae and basitarsi beneath and on posterior sides, creamy white or whitish. Antennae almost entirely dark and blackish. Tegulae testaceous hyaline, with white spot at base. Wings hyaline, nervures testaceous, subcosta and margins of stigma slightly brownish.

Head somewhat broader than long; inner orbits of eyes subparallel. Proboscis moderately short, apex of galeae falling a little short of base of stipites in repose. Mandibles normal, with a small inner tooth. Facial foveae slender, about their own width from margin of eyes and extending from upper level of antennal sockets but little more than halfway to level of anterior ocellus. Venation of wings much as in *rhois*, but marginal cell more rounded at apex and part beneath stigma much longer than part beyond, but less so than in *rhois*. Pygidial plate somewhat longer than wide at base and acute at apex. Head and thorax distinctly but rather delicately tessellate and moderately shining, and without distinct puncturation except on sides of lower face and on clypeus, where punctures are sparse. Pubescence whitish, thin, and short: hair of

mesonotum fine and erect, that of underside of head and thorax longer and denser. Length: 4.6 mm.; anterior wing, 3.3 mm.

Holotype female.—Grand Canyon, Arizona, June 16, 1931 (Frank E. Lutz), in collection of the American Museum of Natural History.

Perdita rhois rhois Cockerell

(Figs. 791, 792, 874)

Perdita rhois Cockerell, 1901, *Canad. Ent.*, 33:282, ♀.

Perdita hypoxantha Cockerell, 1914, *Ann. Mag. Nat. Hist.*, (8)13:424, ♂.

P. rhois is the commonest species of the genus in the cismontane region of southern California, and it is strongly polylectic in habits. I have taken it at flowers of twelve native and five introduced plants, shrubs, or trees. The type locality of *rhois* is San Diego, California, where it was taken by Cockerell on *Rhus laurina*, Aug. 4, 1901.

Female.—Head and thorax dark green; mandibles except red tips, labrum except often more or less dark at base, clypeus, small and transversely triangular lateral marks, collar of pronotum narrowly, and tubercles, pale yellow. Abdomen fuscous; venter yellow; rather broad, straight yellow band at base of tergites 2 to 5, that on tergite 2 enclosed, others often open at basal corners of segments. In extreme light examples basal half of tergite 1 also yellow. Legs fuscous or brownish; apex of front femora, front tibiae except a more or less broad stripe on posterior side, front tarsi, apex of middle femora, anterior side of middle tibiae, and sometimes trochanters of all legs, yellow. Antennae brownish fuscous, scape pale yellow beneath, flagellum brownish yellow beneath. Tegulae hyaline, with yellow base. Wings milky hyaline, nervures pale yellowish, margins of stigma and subcosta slightly brownish.

Head somewhat broader than long. Mandibles with a small inner tooth. Proboscis rather short, galeae in repose reaching hardly more than halfway to base of stipites. Facial foveae about their own width from margin of eyes and reaching from upper level of antennal sockets about halfway, or a little more, to level of anterior ocellus. Pterostigma large, broadly rounded beneath, widest a little behind middle, and somewhat wider than first submarginal cell; part of marginal cell beyond stigma as broad as long and shorter than part beneath. Pygidial plate about as long as wide at base, with sides converging to narrow and rounded apex. Head and mesonotum tessellate, but rather shiny; face with moderately close minute punctures, mesonotum with sparse punctures. Pubescence whitish, fine and erect, short and moderately thin on face and mesonotum, longer and denser on cheeks and underside of thorax. Length: 4.5–5 mm.; anterior wing, 3.1–3.5 mm.

Male.—Head and thorax dark green or blue-green; underside of head, cheeks except posterior third, proboscis, mandibles except red tips, labrum, face to level of foveae, pronotum except a broad dark band on disk and a short dark line in crease of upper part of flanks, prosternum, mesosternum except a rather narrow oblique band on episternum from tegula to middle coxa, lower half or more of flanks of propodeum, and often a small spot on anterior corners of mesoscutum, yellow. Abdomen yellow; tergite 1 and a more or less broad band at apex of tergites 2 to 6, fuscous. Legs yellow, apex of hind femora above, outer side of hind tibiae, and hind tarsi, brown or fuscous; sometimes a dark spot on middle femora and a line on middle tibiae. Antennae yellow, with a fuscous spot on outer side of pedicel, and several following joints often slightly brownish above. Tegulae and wings as in female.

Head somewhat broader than long; inner orbits slightly diverging above. Cheeks somewhat broader than eyes, well rounded beneath, and rather rarely with a minute tubercle anteriorly. Facial foveae punctiform. Mandibles tapering from base and reaching somewhat beyond far margin of proboscis fossa. Flanks of pronotum about normally impressed. Head and thorax finely tessellate and shining, dark vertex more strongly tessellate and somewhat duller than mesonotum; punctures of mesonotum very sparse and fine, those of face also sparse and hardly visible except by strongly oblique light. Pubescence whitish, and about as in female. Tergite 7

with a short and truncate medio-apical lobe. Subgenital plate hardly longer than wide and rounded at apex; discal pubescence very fine and slightly fringing the margin on each side of apex. Dorsal lobes of caulis acute and reaching to middle of parameral lobes; the latter much longer than caulis, slender and acute as seen from above, and rather wide at middle in lateral view; sagittae fusiform, widest about two-thirds of length from base, and thence narrowed one-half to blunt apex, and in lateral view thickest at middle. Length: about 3.5-4 mm.; anterior wing, 2.7-2.9 mm.

*Material examined.*²—CALIFORNIA. San Diego Co.: San Diego, on *Rhus laurina*, Aug. 4, 1901 (Cockerell), cotype; on *Rhus* and *Photinia arbutifolia*, July 19-24, 1925 (Timberlake); Grossmont (C. H. Richardson); La Mesa, on *Rhus*, May 30, 1953 (F. X. Williams); Alpine, July 9, 1929 (R. H. Beamer and Paul W. Oman); July 19, 1941 (Burt Hodgden); on *Rhus* and *Eriogonum fasciculatum*, July 28, 1948 (R. A. Flock); San Ysidro, on *Rhus*, July 29, 1948 (Flock); Fairmont Canyon, on *Eriogonum*, May 28, 1959 (J. Powell); 4 miles south of Fallbrook, on *Rhus*, June 24, 1935 (Timberlake); Warner Springs, June 9, 1956 (E. I. Schlinger), and July 3, 1956 (H. Ruckes, Jr., and B. J. Adelson); 2 miles north of Warner Springs, July 4, 1956 (A. Menke, Jr., and R. C. Bechtel); 8 miles south of Warner Springs, Aug. 16, 1958 (Schlinger); La Jolla, July 13, 1941 (E. L. Todd); Cuyamaca Lake, July 6, 1929 (Oman); county record only, July 7, 1929 (Oman); Oak Grove, on *Adenostoma fasciculatum*, June 6, 1940 (C. D. Michener); 7.5 miles south of Oak Grove, on *A. sparsifolium*, Aug. 8, 1951 (Timberlake); San Felipe Creek, on *Acacia greggii*, June 5, 1936 (Timberlake). Riverside Co.: Idyllwild, on *Eriogonum fasciculatum* var. *polifolium*, June 27, 1956 (M. Wasbauer), and July, 1936 (E. S. Ross); below Idyllwild, on *Adenostoma fasciculatum*, July 14, 1912, and about 4,500 feet, on same flower June 9, 1940 (Timberlake); Pine Meadow, San Jacinto Mts., about 4,000 feet, on *A. sparsifolium*, Sept. 9, 1951 (Timberlake); Ribbonwood, on *A. fasciculatum*, May 28, 1940, and on *Eriogonum fasciculatum*, May 21, 1940 (Michener); on *E. fasciculatum*, July 2, 1936 and on *A. sparsifolium*, July 27, 1950 (Timberlake); Piñon Flat, May 27, 1939 (Ross), on *Eriogonum*, May 28, 1940 (Michener and R. Husbands), on *Eriogonum*, May 30, 1939 (E. G. Linsley), on *Nolina parryi*, June 4, 1939 (Linsley), on *Eriogonum* and *Nolina*, June 4, 1939 (Timberlake), on *Agave deserti*, July 2, 1936 (Timberlake), and June 14 and 18, 1941 (E. C. Van Dyke); Vandevanter Flat, on *Prunus ilicifolia*, June 4, 1940 (Michener); Winchester, on *Heliotropium oculatum*, July 25, 1946 (J. W. MacSwain); Corona, June, 1911 (collector not known); Riverside, June 27, 1957 (J. C. Hall), Aug. 10, 1957 (Schlinger), and on *Eriogonum fasciculatum*, *E. gracile*, *Photinia arbutifolia*, *Alyssum maritimum*, *Baccharis emoryi*, *B. viminea*, Shasta daisy and feverfew (*Chrysanthemum* spp.), *Polygonum lapathifolium*, *Mentha spicata*, *Schinus molle*, *Melaleuca styphelioides*, and at nests in ground, May 17 to Oct. 30, from 1925 to 1959 (Timberlake). San Bernardino Co.: 12 miles east of Mentone, San Bernardino Mts., July 11, 1956 (G. I. Stage); Mill Creek, 6,000 feet, San Bernardino Mts., on *Ehammus californica*, July 3, 1949 (Timberlake). Los Angeles Co.: Monrovia, July 27, 1935 (Beamer); Claremont, on *Rhus laurina* (C. F. Baker); Whittier, on *Rhus* and *Eriogonum*, June 24, 1928 (Timberlake); Pasadena, June 14, 1931 (F. E. Lutz), and on *Photinia*, June 25, 1934 (Michener); Altadena, on *Rhus*, June 28, 1935 (Timberlake); Glendale, July, 1941 (Schlinger); Malibu and near Solromar, on *Rhus*, June 28, 1958 (P. H. Arnaud, Jr.). MEXICO. Baja California: 32 miles south of Tijuana, on *Rhus*, July 31, 1934, and 12 miles north of Enseñada, on *Rhus*, Aug. 2 (Timberlake); 10 miles north of Domingo Landing, June 22, 1938 (Michelbacher and Ross).

Perdita rhois reducta Cockerell

Perdita rhois mut. *reducta* Cockerell, 1901, Canad. Ent. 33:282, ♀.

Perdita rhois reducta Michener, 1951, U. S. Dept. Agric., Monogr. 2:1094.

The form *reducta* occurs as a dark variety throughout the range of the typical subspecies, except possibly in some localities at higher elevation in San Diego and Riverside counties. In the San Gabriel Mountains and northward along the coast

² Because of the abundance of material, the sex and number of specimens are omitted in the records of *rhois* and the subspecies *rhois reducta*.

of California the species is almost uniformly dark and *reducta* becomes a subspecies.

Female.—Like typical *rhois*, but with two dark marks or stripes more or less developed on disk of clypeus; lateral face marks small or absent; tubercles, trochanters, and tergite 1, dark; and yellow bands on tergites 2 to 5 enclosed, or those on tergites 3 or 4 to 5 sometimes absent, or narrowed enough to be concealed when segments retracted.

Male.—Apparently not distinguishable from typical *rhois*.

Material examined.—CALIFORNIA. Los Angeles Co.: Tanbark Flat, San Gabriel Mts., June 25 and July 4, 1950 (F. X. Williams), on *Eriogonum*, June 23–25, 1950 (H. F. Robinson), June 24, and on *Photinia*, July 3, 1950 (P. D. Hurd, Jr.), July 4, 1950 (E. G. Linsley), on *Eriogonum*, July 10, 1950 (C. D. Michener), July 14, 1950 (W. C. Bentinck); on *Eriogonum*, June 23 to July 13, 1952 (A. T. McClay), June 25, 1952 (H. L. Mathis), July 12, 1952 (D. S. Thompson); July 13, 1952 (S. Miyagawa), on *Ehus*, July 13, 1952 (W. V. Garner), June 24, 1956 (R. C. Bechtel), July 13, 1956 (B. M. Bartosh); July 14–15, 1956 (E. I. Schlinger), June 25 to July 19, 1956, including one at nest in ground (R. M. Bohart). San Bernardino Co.: Lytle Creek, June 6–8, 1928 (E. C. Van Dyke); Camp Baldy, July 11, 1950 (K. S. Whitesell); Lone Pine Canyon, on *Adenostoma*, July 2, 1934 (Timberlake); Cajon Pass, 3,700 feet, on *Eriodictyon parryi*, Aug. 2, 1944 (Timberlake); Cajon, on *Eriogonum*, July 19, 1956 (Bechtel); Cajon Junction, June 7, 1953 (J. C. Hall); 11 miles north of Crestline, San Bernardino Mts., on *Eriogonum*, June 27, 1952 (R. H. and L. D. Beamer, W. La Berge, and Cheng Liang). Santa Barbara Co.: Bluff Camp, San Rafael Mts., June 29, 1959 (A. E. Menke); San Marcos Ranch, Santa Inez Mts., on *Photinia*, July 5, 1956 (Hurd). Monterey Co.: Hastings Natural History Reservation, Santa Lucia Mts., 1,900–2,700 feet, on *Adenostoma*, June 4–14, 1938 (Michener). San Benito Co.: West side of Pinnacles, on *Eriogonum*, July 2, 1956 (Hurd).

Two males, Bakersfield, Kern Co., June 22, 1939 (Ray F. Smith) presumably belong here. Likewise one male, 22 miles west of Ely, White Pine Co., Nevada (Linsley and MacSwain) seems certainly to be *rhois* and may belong with *reducta*, but it greatly extends the range of *rhois* and more material is needed.

Perdita dasyilirii Cockerell

(Figs. 793, 794, 875)

Perdita dasyilirii Cockerell, 1907, Ann. Mag. Nat. Hist., (7)14:539, ♂ (as ♀ and excluding second ♂); Timberlake, 1928, Pan-Pac. Ent., 5:26; Timberlake, 1928, Amer. Mus. Novitates, 321:11. *Perdita nolinae* Cockerell, 1922, Amer. Mus. Novitates, 33:11, ♀.

In 1928 I remarked that *dasyilirii* is the more strongly marked and the more easily recognized of the two species described by Cockerell under the same name. At that time I knew nothing about *rehni* and did not recognize the second male as belonging with it; now it is clear that although *dasyilirii* is a well-marked and easily recognized species, it is far less distinctive than *rehni*.

The type locality of *dasyilirii* is Alamogordo, New Mexico, and *nolinae* was described from the Sabino Basin, Santa Catalina Mountains, Arizona.

Female.—Head and thorax dark green or blue-green, becoming more or less distinctly blackish on disk of mesoscutum and scutellum. Mandibles except broadly red at apex, labrum (but sometimes more or less dark at base), clypeus, and tubercles, pale yellow. Lateral face marks absent or represented by dots or a transverse mark between clypeus and anterior end of eye. Clypeus with usual dots and sometimes two submedian brownish stripes more or less evident. Collar of pronotum pale yellow, and a yellow dot sometimes present on posterior corners of disk. Abdomen fuscous, venter, and a rather narrow even band at base of tergites 2 to 5, yellow; bands on tergites 2 and 3 enclosed, but yellow extension on pregradular area of tergites 4 and 5 confluent

with the yellow on reflexed parts of sclerites; tergite 5 also narrowly yellow on lateral and apical margins. Pygidium rufotestaceous. Legs yellow; front femora except more or less broadly at apex (sometimes also except dorsal margin), mark at base of middle femora in front, mark at apex of hind femora above, outer posterior edge of middle tibiae, and hind tibiae and tarsi, brown or fuscous (sometimes front femora dark except narrowly at apex, middle femora dark also on dorsal margin except at apex, hind femora entirely dark, and front tibiae clouded behind). Antennae fuscous, but broadly yellow beneath on scape and brownish yellow on flagellum. Tegulae subhyaline, with yellow base. Wings whitish hyaline, nervures pale yellowish, margin of stigma and subcosta slightly brownish.

Head as broad as long and about as broad as thorax. Proboscis not exceeding fossa at rest, with apex of galeae falling a little short of base of stipites. Mandibles rather stout, strongly curved, reaching far margin of proboscoidal fossa, and with a small inner tooth. Facial foveae somewhat more than their own width from margin of eyes and reaching from upper level of antennal sockets slightly more than halfway to level of anterior ocellus. Antennae rather long, weakly clavate; middle joints of flagellum as long as wide. Venation as in *rhois*; stigma somewhat more than one-third as wide as long. Pygidial plate longer than wide at base, sides converging straight to the narrowly rounded apex, disk plane. Head and thorax minutely and rather weakly tessellate and shining, middle of mesoscutum and scutellum sometimes almost polished; punctures of face minute, moderately close between foveae and antennal sockets but otherwise sparse, moderately sparse on mesoscutum. Pubescence whitish, short and thin: longer and denser on cheeks and underside of thorax; hair of mesonotum very short, erect, and slightly squamiform. Length, 4.5–5.5 mm.; anterior wing, 3.3–3.6 mm.

Male.—Vertex and upper part of occiput of head and notum of thorax, dark green; dark area on vertex more or less narrowed toward summit of eyes. Undersurface of head, cheeks almost to summit of eyes, mouthparts except red tips of mandibles, labrum, face to slightly above level of foveae, clear yellow. Prothorax except an enclosed quadrate mark on disk of notum, anterior corner of mesoscutum, entire sides and undersurface of thorax, and flanks of propodeum, yellow; generally a dark spot or streak on upper margin of the mesepisternum close to base of wings. Abdomen yellow, tergite 1 and a rather broad even band at apex of tergites 2 to 5, fuscous; band on tergite 5 preapical and sometimes very narrow, often two more or less large and orbicular yellow marks on basal half of tergite 1, and more rarely yellow band on tergite 2 enclosed. Legs yellow, sometimes entirely, but more usually hind tibiae and tarsi except, beneath, and sometimes a small spot at apex of hind femora, brown or fuscous. Antennae entirely yellow, or sometimes a pale brown dot on pedicel. Tegulae and wings as in female, but subcosta and margins of stigma generally more brownish.

Head somewhat broader than long, more or less quadrate, with very broad cheeks, broadest a little above middle of eyes, narrowed anteriorly, and sometimes with a small conical tubercle. Mandibles tapering from broad but not dilated base, very acute at apex and reaching well beyond far margin of proboscoidal fossa. Facial foveae minute and punctiform. Antennae slightly clavate; joints of flagellum broader than long. Flanks of pronotum moderately impressed. Head and thorax weakly tessellate and shining, disk of mesoscutum and scutellum almost polished, puncturation obsolete. Pubescence whitish, similar to that of female, but sparser: face nude; hair of cheeks very thin, fine, and appressed; on mesonotum somewhat coarser, sparse, and erect; on undersurface of head and thorax and on ridges of propodeum moderately long and abundant. Apical lobe of tergite 7 about as long as wide and truncate at apex. Subgenital plate about as long as wide and subtruncate at apex, similar to that of *rhois*, but less rounded apically and with a more definite but sparse apical fringe. Genitalia much as in *rhois*, but parameral lobes more strap-shaped, with inner margin at apex not ridged or carinate and nearly uniform in width as seen from side, and sagittae more rounded at apex in dorsal view. Length: 3–4.5 mm.; anterior wing, 2.5–2.9 mm.

Material examined.—TEXAS. El Paso Co.: 4 females, 5 males, El Paso, June 29 and July 1, 1921 (Carl D. Duncan). NEW MEXICO. Otero Co.: 2 males, Alamogordo, June 7, 1902 (Viereck), one a cotype. Lincoln Co.: 39 females, 22 males, Carrizozo, on *Dasyllirion wheeleri*, *Asclepias galioides*, and *Mertensia franciscana*, June 9, 1950 (L. D. Beamer). Dona Ana Co.: 1 male, 17 miles west of Las Cruces, 4,400 feet, June 26, 1956 (H. A. Scullen). Hidalgo Co.: 1 female, 1

male, 10 miles northwest of Lordsburg, 4,500–4,800 feet, June 17, 1942 (Scullen); 3 females, 4 males, 8 miles southeast of Rodeo, June 25, 1955 (M. Statham). ARIZONA. Pima Co.: 6 females, Sabino Basin, about 3,800 feet, Santa Catalina Mts., some on *Agave palmeri*, and one, a cotype of *nolinae*, on *Nolina microcarpa*, July 8–20, 1916 (Lutz and Rehn); 71 females, 37 males, Sabino Canyon, Santa Catalina Mts., June 6, 1952 (M. Cazier, W. Gertsch and R. Schrammel); 10 females, Sabino Canyon, July 9, 1952 (R. H. and L. D. Beamer, W. La Berge, A. Wolf, C. Liang, and C. Weiner); 2 females, Sabino Canyon, 3,000 feet, July 25, 1946 (Scullen); 19 females, 7 males, Santa Catalina Mts., on *Rudbeckia laciniata*, and 12 females, 8 males on *Nolina microcarpa*, July 16, 1950 (R. H. Beamer); 19 females, 35 males, Molino Camp, Santa Catalina Mts., June 22, 1953 (R. S. Beal); 9 females, 10 males, Molino Basin, Santa Catalina Mts., June 9–10, 1958 (C. D. and G. F. MacNeill); 1 male, Tucson, on *Acacia*, April 24, 1954 (F. G. Werner); 3 females, 12 males, Santa Rita Mts., 5,000–8,000 feet, June (F. H. Snow); 85 females, 10 males, Santa Rita Mts., on *Dasyilirion*, July 10, 1952 (R. H. and L. D. Beamer, W. La Berge, A. Wolf, C. Liang, and C. Weiner); 1 female, Baboquivari Mts., Aug. 20, 1924 (O. C. Poling). Cochise Co.: 1 female, Douglas, July 12, 1944 (W. W. Jones); 3 males, Bisbee, June 10, 1933 (R. H. Beamer); 3 females, 19 males, Ramsey Canyon, Huachuca Mts., May 29, 1953 (Beal); 1 female, Mule Mts., on *Sapindus saponaria*, July 11, 1955 (Butler and Werner); 7 females, Chiricahua Mts., July 3, 1947 (L. D. Beamer); 2 males, Chiricahua Mts., July 20, 1950 (J. G. Rozen); 15 females, 2 males, 5 miles west of Portal, 5,400 feet, Chiricahua Mts., June 20, 1956 (E. Ordway). Pinal Co.: 7 females, 1 male, Superior, July 27, 1952 (Cazier, Gertsch and Schrammel). Graham Co.: 1 female, 1 male, Fort Grant, Pinaleno Mts., July 15, 1917; 1 female, Stockton Pass, Pinaleno Mts., on *Nolina*, June 24, 1954 (G. D. Butler); 13 females, 8 males, Graham Mts., 6,500 feet, on *Nolina*, and 1 female, 2 males, 6,000–7,000 feet, on *Ceanothus*, July 8, 1955 (Butler and Werner). Santa Cruz Co.: 1 female, Nogales, on *Salix taxifolia*, July 16, 1958 (Butler and Werner); 1 female, Sonorita, July 10, 1952 (R. H. and L. D. Beamer, W. La Berge and C. Liang). Gila Co.: 1 female, Pinal Mts., July 15, 1932; 13 females, 37 males, 18 miles southeast of Globe, June 16, 1950 (L. D. Beamer); 1 female, 1 male, 20 miles northeast of Globe, June 16, 1950 (R. H. Beamer); 8 females, 49 males, 38 miles northeast of Globe, on *Nolina*, June 16, 1950 (Beamer); 5 females, 45 males, Salt River Canyon, June 16, 1950 (Beamer). Apache Co.: 13 females, 5 males, White Mts., on *Amorpha fruticosa*, June 19, 1950 (Beamer). Navajo Co.: 2 females, Carrizo Creek, on *Euphorbia albomarginata*, June 16, 1950 (Beamer). Yavapai Co.: 36 females, 3 males, Granite Dells, on *Nolina*, July 5, 1950 (Rozen), and 36 females, 12 males (H. Wright); 8 females, Prescott (R. E. Kunze), Baker No. 2122. Coconino Co.: 1 female, Grand Canyon, June 11, 1931 (F. E. Lutz).

Perdita polytropica, n. sp.

This species is closely allied to *dasyilirii* and the males of the two species are rather difficult to distinguish, but the female of *polytropica* has the mesonotum uniformly dark green and tessellate, and duller than in *dasyilirii*. The male has the mesonotum also duller and clothed with coarser, more conspicuous, but sparse white hair. The two species fly together in some localities in Arizona and both have been taken on the same day in Sabino Canyon, Santa Catalina Mountains, where they were probably visiting the same flowers. I have divided *polytropica* into two subspecies: the light markings of face and abdomen are distinct in the typical form, but are usually absent or more or less evanescent in *obsoleta*.

Perdita polytropica polytropica, n. subsp.

(Figs. 795, 796, 876)

Female.—Head and thorax dark green, supraclypeal area blackish. Mandibles and clypeus yellowish white; mandibles shading into red at apex, clypeus with two brown or blackish stripes more or less developed on disk. Labrum testaceous, but more or less infuscated at base. Collar of pronotum and tubercles, pale yellow. Abdomen brownish fuscous; pale yellow band at base of

tergites 2 to 4 or 5, and sometimes a quadrate mark at summit of basal declivity of tergite 1; lateral margins of basal half of tergite 1, lateral margins (except basal corners) of tergites 3 to 5, and venter, including reflexed ventral part of tergites, pale yellow. Legs yellow; streak on posterior side of front femora and middle tibiae, extreme apex of hind femora, and hind tibiae and tarsi, brown. Antennae brownish fuscous; scape pale yellow beneath, flagellum more brownish yellow beneath. Tegulae hyaline, with yellow base. Wings whitish hyaline, nervures pale testaceous, subcosta and margins of stigma slightly brownish.

Head orbicular, as wide as long; inner orbits nearly parallel. Proboscis moderately short, apex of galeae reaching about halfway to base of stipites in repose. Mandibles rather narrow and curved, with a well-developed inner tooth and blunt apex. Facial foveae about their own width from margin of eyes and reaching from level of upper margin of antennal sockets less than halfway to level of anterior ocellus. Pterostigma as broad as first submarginal cell, hardly more than two and one-half times as long as broad; part of marginal cell beneath it much longer than part beyond. Pygidial plate about as long as wide at base, sides converging to rather narrow and rounded apex. Head and thorax nearly uniformly and finely tessellate and moderately dullish, with fine and moderately close punctures on face, becoming sparser on clypeus; numerous but well-separated fine setigerous punctures on mesonotum. Pubescence white, thin and short, that on mesonotum coarse, erect, and somewhat squamiform, and on undersurface of head and thorax longer and denser. Length: 4-4.5 mm.; anterior wing, 3.2-3.5 mm.

Male.—Head and thorax yellow; vertex and middle of occiput, transverse mark on disk of pronotum, mesoscutum except lateral margins, scutellum, metanotum, and propodeum except the flanks, dark blue-green. Yellow of face almost reaching level of anterior ocellus; dark band across vertex narrowed toward summit of eyes and less narrowed toward occiput. Abdomen yellow; tergite 1 except a mark at summit of basal declivity deeply notched in front, and a rather narrow even band at apex of tergites 2 to 5 (more or less arcuate on tergite 2), brown or fuscous, a faint subapical band on tergite 6. Legs yellow; apex of hind femora above, hind tibiae except beneath, and hind tarsi, brown or fuscous, often a narrow dark streak on middle tibiae. Antennae yellow; a fuscous spot on pedicel and on several following joints of flagellum. Tegulae and wings as in female, but nervures less pallid.

Head orbicular, slightly broader than long; cheeks broad, but receding, widest opposite posterior half of eyes, and unarmed. Mandibles tapering from broad base and reaching well beyond far margin of proboscis fossa. Facial foveae punctiform. Flanks of pronotum about normally impressed. Head and thorax finely and delicately tessellate, and slightly dullish; face impunctate, and setigerous punctures of mesonotum sparser than in female. Pubescence thin and white: face and cheeks nude; hair on underside of head dense but rather short, lengthening only slightly toward occiput; hair of vertico-occipital border of head and of mesonotum distinctly squamiform, longer than in female and more depressed on mesoscutum. Tergite 7 narrowed to rather broadly truncate apex. Subgenital plate quadrate, about one and one-half times as long as wide, truncate at apex, and with hair on apical part of disk short and very fine. Genitalia much as in allied species, but volsellae well exposed in dorsal view, dorsal lobes of caulis short, and fused apical part of sagittae as seen from above much more nearly uniform in width than in *rhois* or *dasylirii*. Length: 3.5-4.5 mm.; anterior wing, 2.4-2.9 mm.

Holotype female and allotype.—La Quinta, Riverside Co., California, on *Larrea divaricata*, March 2, 1934 (Timberlake). *Paratypes*.—Riverside Co.: 4 females, 35 males, with types on *Larrea* and 4 females, 10 males, on *Asclepias subulata*, La Quinta, March 2, 1934; 7 females, 8 males, Box Canyon, on *Acacia greggii*, and 7 females, 35 males, on *Olneya tesota*, April 13, 1934; 1 female, 6 males, Andreas Canyon, near Palm Springs, on *Prosopis juliflora*, May 11, 1935 and April 11, 1936 (Timberlake), and 2 females, on *Prosopis*, April 10, 1936 (C. D. Michener); 2 males, Andreas Canyon, April 11 and 26, 1955 (W. R. M. Mason); 1 female, Palm Desert, on *Dalea spinosa*, April 25, 1956 (R. M. Bohart); 14 females, 4 males, 4 miles south of Palm Springs, on *D. spinosa*, June 24, 1952 (Timberlake) and 10 females, 2 males (R. H. and L. D. Beamer, W. La Berge, A. Wolf, C. Liang and C. Weiner); 4 males, Palm Canyon, on *A. greggii*, April 15, 1938 (R. M. and G. E. Bohart); 1 female, Tahquitz Canyon, on *Larrea*, April 16, 1938 (the Boharts); 1 female, Shavers Well, April 18, 1934 (R. M. Bohart). Imperial

Co.: 2 males, 12.7 miles south of Palo Verde, on *Opuntia*, April 30, 1952 (Timberlake) and 6 males (P. D. Hurd, Jr.). San Diego Co.: 5 females, 11 males, Borego, on *Agave deserti*, April 29, 1954, and 1 male, on *Croton californicus*, April 27 (Timberlake), 2 females, 25 males, on *Agave*, April 26 (Hurd); 2 females, Borego, April 24, 1955 (R. Schuster), and 3 males, April 18, 1957 (E. I. Schlinger).

Additional material examined.—CALIFORNIA. Inyo Co.: 3 females, 3 males, Surprise Canyon, Panamint Mts., on *Eriogonum inflatum*, April 22, 1957; 1 female on *Eriogonum*, and 2 males on *Prosopis*, April 25 (Timberlake); 1 female, 13 males, on *Larrea*, 2 females, 1 male on *Eriogonum*, and 1 male on *Encelia farinosa*, April 24, 1957 (Hurd); and 4 males, May 8, 1958 (R. M. Bohart and M. A. Stange). ARIZONA. Yuma Co.: 3 females, 7 males, Gunsight, on *Carnegiea gigantea*, April 24, 1950, and 1 female, 30 miles northeast of Yuma, on *Dalea spinosa*, June, 1950 (R. C. Dickson); 1 male, Castle Dome Mts., March 31, 1959 (Menke and Stange). Maricopa Co.: 1 female, South Mountain Park, Phoenix, June 11, 1942 (H. A. Scullen); 1 female, Crater Range, south of Gila Bend, March 22, 1926 (Michener). Coconino Co.: 6 males, 52 miles below Lee's Ferry, Colorado River, Grand Canyon, on *Acacia*, June 6, 1953, and 18 females, 2 males, 179.2 miles below Lee's Ferry, on barrel cactus, June 11 (G. D. Butler). Gila Co.: 1 female, Salt River Canyon, June 16, 1950 (R. H. Beamer). Cochise Co.: 1 female, 5 miles west of Portal, 5,400 feet, Chiricahua Mts., June 27, 1956 (Scullen). MEXICO. Baja California: 1 female, 7 males, El Mayor, April, 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 Kansas, and of George E. Bohart.

One female, Surprise Canyon, Panamint Mountains, California, has the labrum, clypeus, and supraclypeal area blackish, and the yellow bands on tergites 3 and 4 interrupted. Two other females from the same locality are typical. Females from Gila Bend, Arizona, and eastward have the clypeus more or less dark except for a yellow streak on middle of disk, and the yellow bands of abdomen narrow and usually restricted to tergites 2 and 3. Females from the Grand Canyon, Arizona, have an entirely yellow clypeus and small lateral face marks.

Perdita polytropica obsoleta, n. subsp.

Female.—Distinguished from typical *polytropica* by having the face and abdomen often entirely dark. Clypeus often brownish, sometimes with a small median yellowish spot or streak, and abdomen rarely at type locality with a more or less narrow abbreviated, or interrupted, yellow band at base of tergites 2 to 4. Mandibles except red tips, collar of pronotum and tubercles, basal corners of tergites 3 and 4, and reflexed ventral part of these and other tergites, normally pale yellow or whitish. Legs mainly dark; trochanters of all legs, apex of front femora, front tibiae except sometimes a streak on posterior margin, front tarsi, apex or sometimes a large part of middle femora, and anterior side of middle tibiae, pale yellow. Antennae dark, scape not yellow beneath as in *polytropica*. Pygidial plate rufotestaceous. Length: about 4–4.5 mm.; anterior wing, 3.3–3.5 mm.

Male.—Not differing materially from typical *polytropica*.

Holotype female and allotype.—Sabino Canyon, Santa Catalina Mts., Pima Co., Arizona, June 6, 1952 (M. Cozier, W. Gertsch and R. Schrammel). *Paratypes.*—Pima Co.: 405 females, 220 males, taken with the types; 32 females, 7 males, Sabino Canyon, July 9, 1952 (R. H. and L. D. Beamer, W. La Berge, A. Wolf, C. Liang, and C. Weiner); 2 females, Tanque Verde, on *Prosopis*, May 16, 1954 (G. G. Werner); 3 females, 5 males, Tucson, on *Acacia*, April 24, 1954 (Werner). Maricopa Co.: 2 females, 10 males, Gila Bend, on *Echinocactus*, April 11, 1955 (Butler and Werner); 2 females, east of Gila Bend, on palo verde, April 11, 1955 (Butler and Werner); 16 males, 10.6 miles east of Gila Bend, on *Carnegiea gigantea*, May 15, 1955 (R. A. Flock). Pinal Co.: 1 male, Ray, May 15, 1954 (G. A. Butler).

Types in collection of the American Museum of Natural History, New York; paratypes in collections of the Citrus Experiment Station, the University of Kansas, and the University of Arizona.

***Perdita michelbacheri*, n. sp.**

(Figs. 797, 798, 877)

This species and *acaciae* are the two lightest members of the *subfasciata* group. The light markings of *michelbacheri* are more creamy white than yellow, and include a large part of the head and thorax of the male. In the female the abdomen is light with dark bands, although in *michelbacheri* the bands are so broad and the white intervals on the lateral margins of segments so constricted that the abdomen may appear mainly dark above when much contracted.

Female.—Head and thorax dark green. Mandibles except red tips, clypeus, and small lateral marks between clypeus and anterior end of eyes, creamy white or pale testaceous; disk of clypeus often with two more or less faint brown stripes not reaching dorsal margin. Collar of pronotum and tubercles, white. Abdomen creamy white, with a broad blackish band on tergites 1 to 5, bands on tergites 2 to 4 curving forward on lateral margins and so constricting the white that light bands may appear enclosed when segments are retracted. Legs pale yellow, hind tibiae and tarsi, fuscous. Antennae blackish, scape white except at apex above, flagellum narrowly whitish beneath. Tegulae hyaline, becoming white at base. Wings whitish hyaline, nervures pallid testaceous, margins of stigma and apex of subcosta slightly brownish.

Head as wide as long; inner orbits subparallel. Proboscis moderately long, included within fossa in repose, with apex of galeae reaching base of stipites. Mandibles, reaching about to middle of each other, with a well-developed inner tooth. Facial foveae a little wider than interval between them and eyes and reaching from slightly above level of antennal sockets somewhat more than halfway to level of anterior ocellus. Pterostigma broad and rounded beneath; part of marginal cell beneath stigma nearly one and one-half times as long as part beyond, with metacarpus longer than apical truncation. Pygidial plate somewhat longer than wide at base and narrowed moderately to rounded apex. Head and thorax rather strongly tessellate and moderately dull; punctures fine and rather distinct, sparse on clypeus, rather close-set on sides of face opposite antennae and on mesonotum. Pubescence white, moderately abundant: fine and short on face, rather close-set and subsquamiform on mesonotum, longer and denser on cheeks and underparts of thorax. Length: 4.5–5 mm.; anterior wing, 3.5–3.7 mm.

Male.—Head and thorax creamy white or somewhat tinged with yellow. A large mark across vertex more or less narrowed to summit of eyes and toward occiput, transversely quadrate mark on disk of pronotum, mesoscutum except lateral margins, scutellum, metanotum, dorsal part of propodeum, and orbicular mark on each side of posterior part of mesopectus, dark green. Abdomen whitish; a brownish or fuscous band at apex of tergites 1 to 5 or 6 either abbreviated or reaching lateral margins (on tergite 1 sometimes covering most of dorsal surface of segment). Legs yellowish white, a spot at apex of hind femora, outer margin of hind tibiae and basitarsi, and four apical joints of hind tarsi, brown or pale fuscous; sometimes a dark line on middle tibiae. Tegulae and wings much as in female, but subcosta and margins of stigma more brownish.

Head as broad as long; cheeks very broad and widest opposite middle of eyes. Mandibles tapering, very acute at apex, and reaching for margin of proboscis fossa or beyond. Facial foveae oval, twice as long as wide. Face below antennae strongly convex from side to side; subantennal plates small and oblique. Antennae rather short; scape oviform, about twice as long as wide and narrowed toward base; flagellum nodose beneath, with joints, except apical four, slightly wider than long. Pronotum normal, flanks only slightly impressed. Head and thorax finely tessellate, slightly dullish, almost impunctate; tessellation distinct only on green parts. Pubescence whitish, thinner than in female but subsquamiform on mesonotum; face nude, cheeks nearly nude, but underside of head with dense hair increasing gradually in length posteriorly. Tergite 7 with apical lobe truncate and wider than long. Subgenital plate somewhat longer than wide, sides slightly converging to rounded apex, apical half of disk with very fine

pubescence. Dorsal lobes of caulis very acute, with volsellae well exposed in dorsal view; parameral lobes more dilated toward apex than in allied species and with a long but thin fringe of hair; sagittae with fused apical part very broad but longer than wide as seen from above, somewhat narrowed to apex, and in lateral view moderately thick and fusiform. Length: 3.5–4.5 mm.; anterior wing, 2.8–3.2 mm.

Holotype female, allotype, and paratypes.—Two females, 10 males, Venancio, Baja California, Mexico, July 17, 1931 (Michelbacher and Ross). *Additional paratypes*.—MEXICO. Baja California: 1 female, 6 males, 10 miles south of Punta Prieta, June 21, 1938; 1 female, 10 miles north of Domingo Landing, June 22, 1938; and 2 females, 5 males, 10 miles east of Mesquital, June 23, 1938 (Michelbacher and Ross); 1 male, 10 miles north of San Ignacio, Sept. 29, 1941; and 1 male, 10 miles northwest of La Paz, Oct. 6, 1941 (Ross and Bohart). ARIZONA. Maricopa Co.: 1 female, Salt River Mts., 1,300 feet, May 9, 1926 (A. A. Nichol); 3 females, 10 miles east of Gila Bend, June 15, 1955 (G. D. Butler); 6 males, 10.6 miles east of Gila Bend (Highway 84), on *Carnegiea gigantea*, May 15, 1955 (R. A. Flock). Pinal Co.: 6 females, 1 male, 10 miles west of Stanfield, on *Acacia*, June 14, 1955 (Butler).

Types in collection of the California Academy of Sciences, San Francisco; paratypes in collections of the Citrus Experiment Station and the University of Arizona.

Perdita acaciae, n. sp.

(Figs. 799, 800, 878)

P. acaciae differs from *michelbacheri* in having the light parts more definitely yellow, the abdomen of the female yellow with comparatively narrow dark bands, the hair of the mesonotum in both sexes more strongly squamiform, and the wings whiter.

Female.—Head and thorax dark green, with a golden or brassy luster in some lights. Mandibles except red tips, labrum, clypeus, and lateral marks, yellow; disk of clypeus with two more or less faint brown stripes, or broadly suffused with brown except down the middle; or clypeus and labrum sometimes more uniformly suffused with brown. Lateral marks quadrate, moderately transverse between clypeus and anterior corners of eyes. Collar of pronotum and large mark on tubercles, pale yellow. Abdomen pale yellow; a moderately narrow brownish or fuscous band at apex of tergites 1 to 4 curving forward at outer ends on tergites 2 to 4 but not enclosing the yellow; a narrow or abbreviated dark band sometimes present across the middle of tergite 5. Legs yellow, front coxae dark, and hind tibiae and tarsi pale fuscous or brownish. Antennae blackish, scape yellow beneath and on basal half above, and flagellum narrowly dull yellowish beneath. Tegulae testaceous hyaline, with base pale yellow. Wings milky hyaline, nervures pale yellowish or white.

Head rotund, as broad as long; inner orbits subparallel. Clypeus large, convex, nearly reaching level of antennae; subantennal plates small, triangular, and much longer than wide at base. Proboscis moderately long, slightly exceeding fossa, but galeae not reaching base of stipes in repose. Mandibles rather long, and tapering only slightly before the large inner tooth. Facial foveae well impressed, wider than interval between them and eyes, and reaching from level of upper margin of antennal sockets slightly more than halfway to level of anterior ocellus. Pterostigma broad and rounded beneath, rather less than three times as long as wide; marginal cell oblique, with part below stigma much narrower and distinctly longer than part beyond. Pygidial plate usually about as long as wide at base, with sides arcuately converging to moderately narrow and rounded apex. Head and thorax distinctly tessellate and moderately dull; minute punctures moderately close on sides of face opposite antennae and on mesonotum. Pubescence white, moderately abundant, short and more or less erect on sides of face; sparse on clypeus and vertex; longer and denser on cheeks and underparts of thorax; and short, subdepressed, and distinctly squamiform on mesonotum. Length: 4.5–5.5 mm.; anterior wing, 3.6–3.9 mm.

Male.—Head and thorax pale yellow, becoming more or less whitish on lower face and on

sides of thorax. Large dark-green quadrate mark on vertex, wider than long, extending from anterior margin of median ocellus to occiput, and with a narrow lobe on each side behind or nearly behind level of posterior ocelli to summit of eyes (dark area sometimes excavated on each side anteriorly and somewhat bowl-shaped). Small quadrate mark on disk of pronotum, mesoscutum except yellow lateral margins much broader in front, scutellum, metanotum, dorsal part of propodeum (sometimes greatly narrowed on posterior face), and circular mark on each side of posterior part of mesopectus, dark green. Yellow of face often reaching level of anterior ocellus, or level of posterior ocelli on each side. Facial foveae conspicuously dark. Abdomen pale yellow; a narrow brownish fuscous band close to apex on tergites 1 to 5 not reaching lateral margins; band on tergite 1 usually broader than others and more or less confluent with a dark streak in median crease of basal declivity, and sometimes this streak expanded into a more or less quadrate mark at base of segment (connecting streak varying from long and slender to short and broad, with whole dark marking on tergite 1 becoming thickly anchor-shaped). Legs pale yellow, a spot at apex of hind femora, hind tibiae except beneath, and hind tarsi, fuscous. Antennae sometimes entirely yellow, or pedicel and sometimes first joint of flagellum with a fuscous dot above. Tegulae much as in female, but wings less whitened; subcosta and margins of stigma sometimes conspicuously brown.

Head broader than long; cheeks at least twice as broad as eyes, rounded behind, widest a little above middle of eyes, unarmed anteriorly but meeting undersurface of head at almost a right angle. Disk of clypeus about twice as broad as high, truncate above, lateral extensions mostly visible in frontal aspect. Subantennal plates very small. Facial foveae oval, oblique, and rather large. Mandibles tapering from thick base to acute apex and embracing about three-fourths of each other when closed. Antennae rather short; scape about twice as long as wide, first joint of flagellum much shorter and narrower than following joints, these being broader than long and nodose beneath. Flanks of pronotum not much impressed. Head and thorax delicately and minutely tessellate and shining; head impunctate, mesonotum with rather sparse minute punctures becoming remote on scutellum. Pubescence white, moderately long, erect, and coarse on vertex and mesonotum, almost squamiform on mesonotum; but face nude; hair of undersurface of head rather dense and depressed, becoming longer and erect on anterior part of occipital region. Tergite 7 narrowed to moderately narrow truncate apex. Subgenital plate somewhat longer than wide; rounded at apex, about as in *michelbacheri*, but much more hair on apical part of disk. Aedeagus nearly as in *michelbacheri*, but dorsal lobes of caulis reaching apex of superior pair of volsellae, and parameral lobes a little less dilated at apex. Length: 3.5-4.5 mm.; anterior wing, 2.6-3.1 mm.

Holotype female and allotype.—San Felipe Creek, near Scissors Crossing, San Diego Co., California, on *Acacia greggii*, June 5, 1936 (Timberlake). *Paratypes*.—CALIFORNIA. San Diego Co.: 12 females, 25 males taken with the types on *Acacia*, and 8 females, 25 males on *Agave deserti*, June 25, 1936 (Timberlake); 2 females, Scissors Crossing, July 4, 1956 (G. I. Stage and R. W. Bushing); 5 females, 1 male, Jacumba Valley, 2,500 feet, on *Agave*, July 29, 1917 (W. D. Pierce). Riverside Co.: 2 males, Piñon Flat, San Jacinto Mts., on *Agave*, July 2, 1936 (Timberlake); 2 females, Palms to Pines Highway, 2,500-2,900 feet, on *Agave*, June 19, 1940 (C. D. Michener); 1 female, Magnesia Canyon, June 28, 1952 (A. T. McClay).

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

CLAYPOLEI SECTION

This section comprises five known species that inhabit California, Oregon, Nevada, and Arizona, all of which are oligolectic on species of *Eriogonum*. The species are of medium size, with a narrow pterostigma, in marked contrast to species of the *subfasciata* section. The face of the female is entirely dark, and white and depressed below level of the antennae in the male.

Female.—Head usually somewhat broader than long; inner orbits of eyes sometimes slightly convergent anteriorly. Proboscis short, galeae not reaching base of stipites in repose. Mandibles

either tapering, with a small inner tooth, or simple and rather bluntly rounded at apex. Facial foveae well impressed; generally as wide as, or somewhat wider than, the interval between them and eyes; moderate in length. Pterostigma slender and sometimes approaching a lanceolate shape. Pygidial plate about as long as wide at base; sides converging to narrow, or moderately narrow, apex. Tarsal claws with a minute tooth near middle of inner margin: tooth most distinct in *yosemitensis* and *claypolei*, more or less indistinct or vestigial in *jucunda*, *timberlakei*, and *lucens*. Face usually more or less tessellate, sometimes rather dull, and usually distinctly punctured; mesonotum smoother, more shining, and sometimes polished. Pubescence white, moderately long and erect; scopal hairs of hind tibiae long, sparse, and strongly curved. Coloration usually dark blue-green or blue, with face entirely dark except in *lucens*, and abdomen often with a yellow band on tergites 2 to 4.

Male.—Similarly colored, but abdomen less banded, and face white below level of antennae, with a median lobe intruding more or less between antennae and sometimes extending slightly on the frons. Lateral plates of face depressed and sometimes slightly concave. Antennae appearing only 12-jointed, as first joint of flagellum is small and indistinct. Tarsal claws minutely bifid at apex. Tergite 7 narrowed to narrowly truncate tip. Subgenital plate usually rounded at apex; discal pubescence often long enough to fringe margin and sometimes strongly curled, especially in *claypolei*. Aedeagus similar to that in species of *subfasciata* group; fused part of sagittae usually dilated and more or less blunt or truncate at apex, although ovally expanded and acute at apex in *yosemitensis* and *jucunda*; dorsal lobes of caulis well developed and finely fimbriate beneath in lateral view.

Perdita yosemitensis, n. sp.

(Figs. 801, 802, 879)

The female of this species is distinguished from its closest allies by its entirely dark head, thorax, and abdomen, and by its unusually narrow pterostigma; the male by the scape of its antennae, which is about three times as long as wide.

Female.—Head and thorax dark blue; anterior corners of face, clypeus, supraclypeal area, disk of mesoscutum, and scutellum, black. Mandibles testaceous yellow, becoming red at apex. Abdomen dark fuscous or blackish; pygidial plate testaceous brown. Legs blackish; apex of front femora and anterior side of front tibiae, yellow. Antennae fuscous; flagellum brownish beneath. Tegulae testaceous subhyaline, becoming opaque and dark at base. Wings dusky hyaline, nervures brown, subcosta and margins of stigma fuscous.

Head distinctly broader than long; inner orbits slightly converging below. Proboscis rather short, with galeae two-thirds as long as stipites. Mandibles with a small inner tooth. Facial foveae about their own width from margin of eyes and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Pterostigma slender, between four and five times as long as wide, and about half as wide as first submarginal cell; marginal cell about as long as stigma, with parts beyond and beneath stigma equal in length and longer than wide; second submarginal cell narrowed one-half above and receiving both recurrent nervures. Pygidial plate with apex narrowly blunt or subacute. Head rather weakly tessellate and shining; face closely and minutely punctured, punctures becoming sparser and coarser on clypeus. Thorax mostly polished, except basal area of propodeum, with minute sparse punctures on mesonotum. Pubescence thin, whitish and erect, becoming denser on underside of head and longer and denser on undersurface of thorax. Length: 4.5–5 mm.; anterior wing, 3.2 mm.

Male.—Head and thorax blue-green. Mandibles except red tips, labrum, and all (or nearly all) of face below level of antennae, ivory-white; a narrow line on posterior orbits, nearly to middle of eyes, sometimes expanding at base of mandibles, also more or less distinctly whitish. Lateral face marks extending broadly above level of antennae, obliquely truncate, and ending on orbits close to foveae. Supraclypeal mark with a broad intrusion between antennae and ending acutely on frons somewhat below level of upper end of lateral marks. Dark color of frons reaching antennal socket on each side and sometimes intruding between socket and lateral mark to upper end of subantennal plate. Collar of pronotum, large triangular mark on posterior

corners of disk, and large mark on tubercles, pale yellow. Abdomen fuscous, more or less tinged with brown, and with a yellow band at base of tergites 2 to 4; band on tergite 2 generally broader than others and that of tergite 5 generally narrow and sometimes obsolete; sometimes a transverse yellow mark on disk of tergite 1. Legs brownish fuscous, apex of femora, front and middle tibiae, front tarsi, middle basitarsi, and underside of hind tibiae, yellow. Antennae fuscous above, more or less brownish toward apex; flagellum broadly yellow or brownish yellow beneath; scape pale yellow or whitish beneath at base, or sometimes with pale color extending entire length. Tegulae and wings as in female.

Head considerably broader than long, with cheeks narrower than eyes; but sometimes greatly enlarged with cheeks very broad and rounded, widest somewhat above middle of eyes. Lateral plates of face in macrocephalous specimens wider than space between them, but in ordinary specimens hardly more than half as wide as space. Disk of clypeus much broader than high, lateral extensions weakly inflexed; in macrocephalous specimens clypeus very strongly transverse. Face below antennae weakly convex from side to side; in macrocephalous specimens nearly evenly depressed except for more prominent supra-clypeal area. Facial foveae punctiform but rather large and becoming oval in macrocephalous specimens. Mandibles tapering from base to acute apex and reaching far margin of proboscis fossa. Antennae moderately long, scape nearly three times as long as thick and somewhat tapering toward base. Flanks of pronotum rather strongly impressed in macrocephalous examples, with posterior corners of disk moderately prominent. Head and thorax polished and shining, except for frons being minutely tessellate and slightly dullish; punctures on frons extremely minute and indistinct but close, on mesonotum more distinct but sparse. Pubescence thinner than in female but otherwise similar except for hair of face being very short and inconspicuous. Tergite 7 with very narrow and truncate apical lobe. Subgenital plate about twice as long as wide; sides moderately convergent to slightly rounded apex; disk minutely hairy on apical half and on lateral margins. Dorsal lobes of caulis acute, falling short of apex of volsellae, and minutely fimbriate beneath as seen from side; parameral lobes slender in dorsal view and almost hairless; fused part of sagittae thickly fusiform, elongate oval and acute at apex as seen from above, and with tip turned slightly upward in lateral view. Length: 3.5-4.5 mm.; anterior wing, 2.8-3 mm.

Holotype male, allotype, and paratypes.—Twelve males, 9 females, Yosemite Valley, Mariposa Co., California, on *Eriogonum nudum*, June 24-28, 1926 (Timberlake). *Additional paratypes.*—Ten males, 39 females, Yosemite Valley, Aug. 10, 1899 (A. P. Morse), Baker No. 2353; 5 males, 4 females, Mineral King, Tulare Co., July 31, 1935 (G. E. Bohart); 1 male, 8 females, Shaver Lake, Fresno Co., Aug. 8, 1956 (R. O. Schuster); 2 males, Tonopah Valley, Sequoia National Park, Tulare Co., on *Eriogonum wrightii*, Aug. 21, 1933 (C. D. Michener); and 1 female, Lake Tahoe, probably in Placer Co., Aug. 20, 1916 (L. Bruner).

Types in collection of the U. S. National Museum (No. 43,392); paratypes in collections of the Citrus Experiment Station, the University of California at Berkeley, the University of Kansas, the University of Nebraska, and of G. E. Bohart.

Perdita jucunda, n. sp.

(Figs. 803, 804, 880)

The male of *jucunda* is distinguished easily from *yosemitensis* by the much shorter and thicker scape of its antennae, and by the greater amount of yellow on its antennae and legs. The typical female differs in having the tubercles white and the abdomen more or less pale-ferruginous or dull-yellow with dark apical bands, but in some localities (Llano and Mammoth Lake in California, and the Painted Desert in Arizona) the females are entirely dark, and I have found no certain way of distinguishing them from *yosemitensis* except by the associated males.

Female.—Head and thorax dark blue; mesonotum less definitely blackish than in *yosemitensis*. Sometimes entirely dark except mandibles and legs, and then not clearly distinguishable from *yosemitensis*. In typical specimens, tubercles white, abdomen with a pale ferruginous or brownish

yellow band at base of tergites 2 and 3 or 4, and a similar pale mark covering most of basal declivity of tergite 1: sometimes most of surface of all tergites pale, with apical margins and a mark on each side of posterior part of basal declivity of tergite 1 remaining dark; dark bands at apical margins either very broad and widening at lateral margins of segments or (less often) narrow and more or less faint. Legs dark; apex of front femora, front tibiae except more or less brownish behind, and front tarsi, yellow. Antennae fuscous or more or less brownish, especially on underside of flagellum. Mandibles testaceous yellow, becoming red at apex. Tegulae testaceous hyaline, becoming dark at base. Wings dusky hyaline, nervures brownish, subcosta fuscous.

Structural characters, including sculpture and pubescence, essentially as in *yosemitensis*, with pterostigma generally just perceptibly less lanceolate. Length: 4-5 mm.; anterior wing, 2.7-2.9 mm.

Male.—Head and thorax dark blue. Anterior part of inferior orbits very narrowly, mandibles except red tips, labrum and face below level of antennae, yellowish white. White of face going above antennae in a broad rounded lobe on each side as far as foveae and in a small quadrate or triangular lobe in middle. Pronotum white with dark band across disk and in furrow of flanks, usually with a spur toward tubercles; but in some localities (Painted Desert) pronotum dark except for tubercles, large mark on posterior corners of disk, and collar. Abdomen pale ferruginous or orange-yellow, with a narrow pale-brown band at apex of tergites and two brown marks on basal declivity of tergite 1, but abdomen sometimes dark with yellowish suffusion at base of tergites 2 and 3. Legs yellow; outer margins of hind tibiae pale brownish or fuscous; hind tarsi more or less darkened above. Antennae yellow; flagellum more orange-yellow, pedicel and three following joints with a fuscous spot above. Tegulae and wings much as in female but tegulae more definitely yellowish at base.

Head broader than long; cheeks narrower than eyes, except in more-macrocephalous examples where they are about as broad as eyes. Face below level of antennae somewhat prominent across subantennal plates and supraalpeal area, otherwise plane. Facial foveae punctiform. Mandibles tapering from base and reaching slightly beyond far margin of proboscis fossa. Flanks of pronotum slightly to moderately impressed. Face minutely tessellate and very slightly dullish, tessellation sometimes extending to vertex; cheeks and thorax polished; puncturation extremely minute, distinct only on vertex and mesonotum (but sparse). Pubescence whitish, thin, erect, and moderately long on vertex, cheeks, and mesonotum; face nude. Tergite 7 narrowed almost to a point apically, as in *yosemitensis*. Subgenital plate similar to that of *yosemitensis*, but with sides less convergent to rounded apex. Genitalia nearly as in *yosemitensis*, but sagittae less thickly fusiform in lateral view, with tip less thin and less recurved. Length: 3-3.5 mm.; anterior wing, 2.2-2.3 mm.

Holotype female and allotype.—One and a half miles west of Perris, Riverside Co., California, on *Eriogonum fasciculatum*, June 2, 1938 (Timberlake). *Paratypes*.—Riverside Co.: 47 females, 60 males, on same flower at type locality, June 2, 13, and 21, 1938, May 8, 1939, and May 29, 1946; 2 males, Riverside, on same flower, May 10, 1936 (Timberlake); 1 female, Anza, June 29, 1938 (Jean Russell); 1 female, Corona, May, 1911 (collector unknown); 29 females, 15 males, Idyllwild, San Jacinto Mts., on *E. nudum*, Aug. 12, 14 and 15, 1934 (C. D. Michener); 3 females, Herkey Creek, San Jacinto Mts., on *Chorizanthe stictoides*, June 14, 1940 (Michener). Los Angeles Co.: 1 female, Altadena, on *Eriogonum*, July 31, 1933 (Michener); 3 females, 1 male, La Crescenta, on *E. fasciculatum*, June 26, 1934 (Michener); 2 females, 2 males, Llano, on *E. molestum* var. *davidsonii*, June 16, 1953 (Timberlake); 1 male, 3 miles southwest of Lancaster, on *E. inflatum*, Aug. 17, 1954 (R. R. Snelling); 1 male, Acton, Aug. 25, 1958 (E. I. Schlinger). San Bernardino Co.: 2 females, 6 males, 4 miles southwest of Victorville, on *E. fasciculatum*, June 4, 1938; 5 females, 5 males, Tetley Park, San Bernardino Mts., on *E. gracile*, Aug. 17, 1947 (Timberlake); and 1 female, 11 miles north of Crestline, on *E. fasciculatum*, June 27, 1953 (R. E. and L. D. Beamer, W. La Berge and C. Liang).

Additional material examined.—CALIFORNIA. Kern Co.: 1 male, Frazier Park, July 14, 1946 (collector unknown). Mono Co.: 7 females, 3 males, Mammoth Lakes, Aug. 7, 1936 (R. M. Bohart). Inyo Co.: 6 females, 2 males, Big Pine, Sept. 4, 1956 (Bohart). Santa Barbara Co.: 1 female, Bluff Camp, San Rafael Mts., June 29, 1959 (Bohart). NEVADA. Churchill Co.: 2

females, 25 miles northeast of Fernley, Aug. 29, 1956 (T. R. Haig). ARIZONA. Apache Co.: 2 females, 9 males, Painted Desert, on *E. aureum*, Aug. 18, 1958 (G. I. Stage).

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, and of Mr. Snelling.

Perdita claypolei Cockerell

The type locality of *claypolei* is Mount Lowe, Los Angeles County, California, where Cockerell collected three specimens on *Eriogonum fasciculatum* var. *polifolium*, Aug. 12, 1901. The description was published less than two months later! If I have been correct in identifying the forms *australior* and *limatula* as subspecies of *claypolei*, the species extends on the Pacific Coast from southern California into Oregon. These forms are apparently in an active stage of evolution, and are too variable and too intergradient to be separated as species.

Perdita claypolei claypolei Cockerell

(Figs. 805, 806, 881)

Perdita claypolei Cockerell, 1901, *Canad. Ent.* 33:281, ♀; Cockerell, 1925, *Proc. Calif. Acad. Sci.* (4)14:193.

The typical form of *claypolei* has the mesonotum more or less dullish from a fine tessellation and well-developed light bands on the abdomen in the female. Out of about forty females of *claypolei* only two have the abdominal markings evanescent, and none lack them.

Female.—Head and thorax dark green or blue-green; labrum and clypeus black or blackish; collar of pronotum and tubercles white, Abdomen fuscous; a pale-yellow band at base of tergites 2 to 4 slightly notched medially behind; band on tergite 5 sometimes slightly interrupted, and all ending close to lateral margins; rarely a slight indication of a band at base of tergite 5. Legs fuscous, front knees and anterior side of front tibiae, yellow. Antennae blackish, flagellum brown, especially toward apex and beneath. Mandibles testaceous brown, a little darker or redder at apex. Tegulae pale testaceous, outer margin broadly more hyaline. Wings nearly clear hyaline, nervures testaceous, margins of stigma a little darker, and subcosta fuscous.

Head considerably broader than long; inner orbits somewhat convergent below. Proboscis rather short, galeae reaching but little more than halfway to base of stipes when folded in repose. Mandibles stout, not tapering much beyond middle, and bluntly rounded at apex. Facial foveae well impressed, usually much broader than interval between them and eyes and reaching from a little above level of upper margin of antennal sockets about halfway to level of anterior ocellus. Pterostigma moderately large and broad, between three and four times as long as wide; part of marginal cell beneath stigma about as long as part beyond it. Pygidial plate longer than wide, with sides converging to narrowly truncate or obtuse apex. Frons minutely tessellate, rather dull and sparsely punctured; face below antennae shining and more distinctly punctured; punctures on clypeus moderately close and slightly stronger than elsewhere. Mesoscutum tessellate but shining in specimens from San Gabriel Mountains; more strongly tessellate and dullish in specimens from San Bernardino Mountains and Riverside. Pubescence whitish, rather short, thin, and erect: lower half of face more hairy than frons, and hair on front coxae and mesopectus longer than elsewhere on head and thorax. Length: about 3.6–4.8 mm.; anterior wing, 2.6–2.9 mm.

Male.—Head and thorax dark green; margin of anterior end of cheeks, mandibles except red tips, labrum, and face below level of antennae, white. Lateral marks of face obliquely truncate from about level of middle of antennal sockets to orbits at level of foveae. Supraclypeal mark ending at level of middle of antennal sockets. Tubercles usually white; sometimes a white spot

on posterior corners of disk of pronotum. Abdomen fuscous or tinged with brown, without markings. Legs fuscous; anterior side of front and middle femora and tibiae and their tarsi pale yellow; front tibiae sometimes almost all yellow, but usually with a narrow dark streak behind; hind tarsi dilute fuscous or pale testaceous brown. Scape of antennae dark fuscous above, white beneath, but more tinged with yellow than white of face; flagellum brown above, broadly dull yellowish beneath. Tegulae and wings as in female.

Head subquadrate, a little broader than long, and at most only moderately enlarged. Cheeks usually much narrower than eyes, but as broad as eyes and evenly rounded beneath in macrocephalous examples with head distinctly broader than long. Mandibles tapering from broad base to very acute tip and reaching far margin of proboscis fossa. Clypeus transverse; lateral extensions fully visible in frontal aspect of head, and about as long as width of small disk in macrocephalous specimens. Face below antennae nearly plane; lateral plates slightly concave. Antennae short and thick; scape (minus bulla) about twice as long as thick and tapering moderately toward base; pedicel partly recessed in broad oblique apex of scape; flagellum stout, with most joints distinctly broader than long, and first small and indistinct. Antennal sockets large and broadly oval, converging above, with the distance between their upper ends about equal to their width. Facial foveae indistinct or vestigial. Flanks of pronotum rather deeply impressed in macrocephalous examples. Tergite 7 narrowly truncate at apex. Subgenital plate about one and one-half times as long as wide, slightly narrowed toward base and broadly rounded at apex; disk more evidently hairy than in allied forms, with hairs strongly curled. Dorsal lobes of caulis acute, fimbriate beneath, reaching beyond middle of elongate volsellae; parameral lobes slender and acute at apex; sagittae widest at beginning of apical third of total length, thence moderately narrowed to subtruncate apex. Length: 2.5-3.6 mm.; anterior wing, 2-2.6 mm.

Material examined.—CALIFORNIA. Los Angeles Co.: 1 female, Mt. Lowe (T. D. A. Cockerell), cotype: 1 female, Mt. Wilson trail, Aug. 10, 1915 (Branigan); 1 male, Tanbark Flat, San Gabriel Mts., June 21, 1950 (J. C. Hall); 2 females, Tanbark Flat, June 22 and July 10, 1950, and 2 females on *Eriogonum*, June 23 and 25 (R. O. Schuster); 1 female, 1 male, Tanbark Flat, on *Eriogonum*, July 25, 1950 (P. D. Hurd, Jr.); 1 male, Tanbark Flat, July 10, 1950 (B. J. Adelson); 1 female, Tanbark Flat, July 10, and 5 males, July 13, 1950 (A. T. McClay); 1 female, 2 males, Tanbark Flat, on *Eriogonum fasciculatum*, July 10, 1950 (C. D. Michener); 2 females, 1 male, Tanbark Flat, June 25, July 3 and 8, 1950 (F. X. Williams); 1 female, Tanbark Flat, July 2, 1956 (R. M. Bohart); 1 female, Tanbark Flat, July 12, 1956 (R. C. Bechtel); 2 females, 2 males, Tanbark Flat, July 11-15, 1956 (E. I. Schlinger); 2 females, Tanbark Flat, on *E. fasciculatum*, July 14, 1956 (Timberlake). San Bernardino Co.: 25 females, 21 males, Camp Baldy, San Gabriel Mts., on *E. fasciculatum*, Aug. 18 and 21, 1929 (Timberlake); 1 female, Camp Baldy, July 11, 1950 (Hurd); 1 female, 1 male, Snow Crest Camp, San Gabriel Mts., July 17, 1952 (McClay); 2 females, 1 male, on *E. fasciculatum*, July 4, 1928; 1 female, Baldy Mesa, about 4,500 feet, on *E. umbellatum*, Aug. 2, 1944; 1 female, 1 male, Lone Pine Canyon, 6,000 feet, on *E. fasciculatum*, July 21, 1936 (Timberlake); 2 females, 1 male, Cajon Junction, Aug. 25, 1953 (Hall); 11 females, 1 mile east of Cajon Junction, Aug. 11, 1956 (Schlinger and Hall); 1 female, 2 males, Cajon Canyon, 2,700 feet, on *E. fasciculatum*, July 21, 1936 (Timberlake); 1 female, mouth of Deep Creek, Aug. 11, 1956 (Schlinger); 1 female, Tetley Park, San Bernardino Mts., on *E. elongatum*, Aug. 19, 1947; 1 male, Seven Oaks, San Bernardino Mts., on *E. gracile*, Aug. 30, 1942; 2 females, Santa Ana River, 5,700 feet, San Bernardino Mts., on *E. fasciculatum*, Aug. 30, 1949; 1 female, 1 male, South Fork Camp, Santa Ana River, 6,200 feet, on *E. wrightii* var. *subscaposum*, Sept. 9, 1947 and Aug. 23, 1952 (Timberlake); 1 female, Santa Ana River, 6,000 feet, Sept. 10, 1948 (Grace H. and John L. Sperry); 3 females, Sugar Loaf Mt., 6,000 feet, San Bernardino Mts., Sept. 21, 1954 (Hall); 2 females, 2 males, Mill Creek, 3,500 feet, San Bernardino Mts., on *E. elongatum*, and 1 female, 1 male on *E. gracile*, Oct. 1, 1958; 2 females, 2 males, Forest Home, Mill Creek, on *E. fasciculatum*, July 5, 1936; 4 males, Mill Creek, 6,000 feet, on *E. wrightii* var. *subscaposum*, Sept. 6 to Oct. 2 in different years (Timberlake); 2 females, 1 male, Mill Creek, Aug. 22, 1953 (Hall); 2 females, Mill Creek, 12 miles east of Mentone, July 11, 1956 (Bechtel and Stage); 7 females, 6 males, Mountain Home Creek, 4,300-4,500 feet, San Bernardino Mts., on *E. elongatum*, Aug.

14, 1934 and Aug. 24, 1944, 1 male on *E. gracile*, Aug. 19, 1934, and 5 females, 7 males on *E. fasciculatum*, Aug. 24, 1944 and Aug. 6-7, 1949 (Timberlake); 1 female, 1 male, Mountain Home Creek, Sept. 12, 1953 (Schlinger); 1 male, Rialto, Aug. 3, 1956 (Hall). Riverside Co.: 34 females, 55 males, Riverside, on *E. fasciculatum*, May 10 to Aug. 18, in different years; 4 females, 1 male, Riverside, on *E. gracile*, July 8 to Nov. 2; 1 female, Riverside, on *Eriastrum virgatum*, June 24, 1945; 2 males, The Gavilan, on *Eriogonum fasciculatum*, May 21, 1937 and May 28, 1952, and 1 female, 2 males, on *E. gracile*, Oct. 1, 1952 (Timberlake); 1 male, 2 miles west of Beaumont, Aug. 19, 1950 (H. M. Graham); 3 females, 1 male, Piñon Flat, San Jacinto Mts., on *E. fasciculatum*, July 13, 1940; 2 females, Ribbonwood, San Jacinto Mts., on *E. fasciculatum*, July 2, 1936 (Timberlake). San Diego Co.: 2 males, Green Valley, 5 miles south of Cuyamaca, on *E. fasciculatum*, Aug. 8, 1951 (Timberlake); 4 females, 1 male, 8 miles south of Warner Springs, July 4, 1956 (G. I. Stage).

Perdita claypolei australior, n. subsp.

Female.—Like typical *claypolei* except yellow bands of abdomen obsolescent or usually lacking, and frons and mesonotum generally more strongly tessellate and dull. Length: 4-4.5 mm.; anterior wing, 2.7-2.9 mm.

Male.—Not appreciably different from typical *claypolei*. Length: 2.75-3.25 mm.; anterior wing, about 2 mm.

Holotype female, allotype, and paratypes.—Three females, 2 males, Balboa Park, San Diego, California, on *Eriogonum fasciculatum*, July 24-25, 1925 (Timberlake).

Additional paratypes.—San Diego Co.: 1 female, July 4, 1929 (R. H. Beamer); 3 females, Grossmont (C. H. Richardson); 2 females, Alpine, on *Eriogonum*, July 28, 1948 (R. A. Flock). Los Angeles Co.: 1 female, Westwood Hills, Aug. 11, 1935 (E. G. Linsley).

Types in collection of the U. S. National Museum (No. 43,393); paratypes in collections of the Citrus Experiment Station, the University of California at Berkeley, and the University of Kansas.

Perdita claypolei limatula, n. subsp.

Specimens of *claypolei* from the Tehachapi Mountains northward into Oregon exhibit a great deal of variation, but the variants are too inconstant to permit further subdivision. At various times I have attempted to distinguish some of the local variants noted below but have been led to abandon this course after the examination of much additional material.

Female.—Similar to *claypolei*, but form more robust and mesonotum polished. Head and thorax green, blue-green, or blue; tubercles and collar of pronotum, pale yellow. Abdomen typically with distinct blue or bluish luster; pygidial plate brownish; base of tergites 2 to 4 with a moderately wide yellow band not quite reaching lateral margins. Sometimes tergite 1 yellow at base or with a yellow mark at summit of basal declivity. Antennae and legs dark; scape slightly yellowish beneath or at base; front and middle knees and front tibiae, yellow. Length: about 4-5 mm.; anterior wing, 2.5-3 mm.

Male.—Like *claypolei*, but mesonotum polished. White of face generally with short acute extension on median line above antennae forming a median lobe much smaller than lateral lobes of white above level of antennae. Tubercles, and small spot on posterior corners of disk of pronotum, white. Abdomen dark; base of tergites 2 and 3 (or 2 to 4) with a more or less distinct yellow band. Front and middle legs yellow; coxae and posterior side of the femora fuscous; hind legs dark; tarsi and anterior side of tibiae, pale brownish to yellowish. Subgenital plate and aedeagus essentially as in *claypolei*, but parameral lobes tending to be wider and more concave on inner surface, with inner margin toward apex more or less carinately elevated. Length: about 3-4 mm.; anterior wing, 2.3-2.6 mm.

Holotype female, allotype, and paratypes.³—One female, 3 males, Yosemite Valley, California,

³ As listed, but under another name, in an earlier, unpublished manuscript.

on *Eriogonum nudum*, June 24 and 28, 1926 (Timberlake); 1 female (paratype), Yosemite Valley, Aug. 2, 1897 (A. P. Morse), Baker No. 2,353; 3 females (paratypes), Mokelumne Hill, Calaveras Co., September (F. E. Blaisdell); 15 females (paratypes), Mosier, Wasco Co., Oregon, 600 feet, on *E. elatum*, July 17, 1929 (H. A. Scullen); and 49 females, 1 male (paratype), 36 miles east of Baker, Baker Co., 2,400 feet, on same flower, July 31, 1929 (Scullen). *Additional paratypes*.—CALIFORNIA. Tuolumne Co.: 7 females, 7 males, near Groveland, Aug. 8, 1954 (R. H. Goodwin); 1 female, Long Barn, Aug. 19, 1957 (E. I. Schlinger). Shasta Co.: 13 females, 7 males, Hat Creek, on *Eriogonum*, July 18, 1955 (J. W. MacSwain); 4 females, 17 males, Cassel, on *Eriogonum*, July 5, 1955 (MacSwain); 3 females, 6 males, Cassel, July 15, 1955 (R. C. Bechtel and Schlinger); 1 female, 10 miles east of Burney, July 8, 1946 (P. D. Hurd, Jr. and R. F. Smith); 1 female, 19 males, 41 miles northeast of Redding (Highway 299), 4,000 feet, on *Eriogonum*, July 26, 1941 (Scullen); 1 female, 25 miles north of Redding, June 10, 1931 (Scullen). Butte Co.: 74 females, 5 males, Pulga, on *E. gracile*, Aug. 19, 1939 (C. D. Michener). Sierra Co.: 1 female, 1 male, Sierraville, Aug. 20, 1953 (Schlinger), and 1 female, July 14, 1958 (R. M. Bohart). Amador Co.: 8 females, 9 males, Buckthorn, July 25, 1955 (Schlinger). Eldorado Co.: 12 females, 1 male, Pollock Pines, Aug. 17, 1953 (Schlinger); 1 male, Haws, Aug. 11, 1936 (Bohart). Plumas Co.: 1 female, Blairsden, Aug. 23, 1952 (Bohart); 2 males, Keddie, June 26, 1949 (Claude I. Smith). Tehama Co.: 1 female, Menton, July 12, 1955 (Bohart). Modoc Co.: 2 females, Lake City, Aug. 1, 1922 (C. L. Fox). Trinity Co.: 3 males, Eagle Creek, July 13, 1949 (A. T. McClay); 1 male, Scott Mt., 5,358 feet, July 15, 1955 (Bohart); 1 female, East Fork of Trinity River, July 13, 1955 (Bohart). NEVADA. Douglas Co.: 1 female, Minden, Aug. 24, 1952 (Bohart); and 3 females, 1 male, 3 miles south of Genoa, Aug. 23, 1955 (Bohart).

Additional material examined.—CALIFORNIA. Kern Co.: 4 females, 9 males, Tehachapi, Aug. 2, 1897 (A. P. Morse), Baker No. 2,365; 6 females, 1 male, Kernville, Aug. 10, 1952 (T. R. Haig). Ventura Co.: 5 females, 10 miles west of Frazier Park, on *E. inflatum* (R. A. Flock); 2 females, 12 miles west of Lebec, on *E. wrightii* var. *subscaposum*, Sept. 16, 1949 (R. C. Dickson); 2 females, 1 male, 13 miles west of Lebec, on *Eriogonum*, Sept. 1, 1949 (Dickson). Santa Barbara Co.: 11 females, 12 males, 14 miles east of Santa Maria, on *Cirsium* (but females had been collecting pollen from *Eriogonum*), June 20, 1952 (R. H. and L. D. Beamer, C. Liang and W. La Berge); 7 females, 6 males, 22 miles east of Santa Maria, June 20, 1952 (Beamers, C. Weiner, A. Wolf, La Berge, and C. Liang); 1 male, Bluff Camp, San Rafael Mts., June 29, 1959 (A. E. Menke); 1 female, Los Prietos, on *Brickellia*, Aug. 24, 1948 (R. A. Flock). Monterey Co.: 20 females, 3 males, Hastings Natural History Reservation, Santa Lucia Mts., Aug. 13, 1938 (Michener); 1 female, Jamesburg, Aug. 11, 1938 (Jean Russell); 1 female, Arroyo Seco River, Aug. 8, 1938 (R. I. Sailer); 2 females, Paraiso Springs, June 16 and July 16, 1933 (L. S. Slevin); 33 females, 40 males, 15 miles east of San Lucas, 330 feet, Aug. 26, 1946 (Scullen); 12 females, 14 males, San Lucas, on *E. gracile*, Aug. 20, 1935 (Timberlake). Fresno Co.: 1 male, Coalinga, June 1-3, 1907 (J. C. Bradley); 9 females, 2 males, Coalinga Mineral Springs, on *E. fasciculatum*, Aug. 4 and 8, 1956 (M. D. and G. I. Stage and R. R. Snelling). San Benito Co.: 1 male, Idria (gem mine), on *Achillea millefolium*, July 5, 1954 (Linsley and R. F. Smith); 6 females, 5 males, west side of Pinnacles, on *E. fasciculatum*, July 2, 1956 (Hurd); 8 females, 3 males, 10 miles north of Idria, on *E. inflatum*, July 12, 1959 (M. Wasbauer). Santa Clara Co.: 1 male, Stevens Creek, Aug. 8, 1928 (Carl D. Duncan); 11 females, 2 males, San Antonio Valley, on *E. vimineum*, July 22, 1955 (C. D. MacNeill). Stanislaus Co.: 8 females, 1 male, Del Puerto Canyon, Oct. 3, 1952 (Snelling). Contra Costa Co.: 1 male, Antioch, Aug. 12, 1942 (W. F. Barr). Placer Co.: 19 females, 6 males, Auburn, Aug. 10, 1918 (L. Bruner). Mendocino Co.: 2 males, Hopland, July 15, 1957 (S. M. Fidel). Lake Co.: 38 females, 7 males, Kelseyville, Sept. 1, 1953 (Schlinger). Siskiyou Co.: 6 males, Mt. Shasta City, on *E. nudum*, July 19, 1958 (J. Powell). OREGON. Klamath Co.: 2 females, 10 miles east of Bly, 5,000 feet, on *Eriogonum*, July 12, 1940; 1 female, 1 male, Bly Mountain Pass, 5,087 feet, on *Eriogonum*, July 12, 1940, and 1 female, 1 male, Modoc Point, Aug. 1, 1941 (Scullen). Wasco Co.: 1 male, Biggs Junction, July 10, 1941 (Scullen). Baker Co.: 1 female, Unity, 5,800 feet, July 21, 1940 (Scullen). Also 1 female, Dixie, July 8, 1931 (R. H. Beamer), the county uncertain as there is a Dixie in Baker, Grant, Klamath,

and Washington counties. IDAHO. Elmore Co.: 2 females, Dixie, on *Eriogonum*, July 31, 1952 (Barr).

Variants with the ground color of the abdomen fuscous or brownish, or only occasionally bluish, occur in all localities except Yosemite Valley and Groveland. In these the base of tergites 1 to 5 is more or less broadly yellow (at Auburn, Kelseyville, and 10 miles west of Frazier Park), and sometimes so broadly yellow that the yellow and dark bands are of about equal width, at least on the basal segments (at Coalinga Mineral Springs and east of San Lucas). Such specimens either have the scape of the antennae and the middle tibiae mainly or entirely dark (Auburn and Kelseyville), or mainly yellow (Coalinga Mineral Springs and east of San Lucas), or the scapes yellow only beneath (10 miles west of Frazier Park). A variant from Kernville has yellow at the base of tergites 2 to 5, but little or no yellow on tergite 1. A form from Tehachapi has somewhat stronger and closer punctures on the frons, three or four yellow bands on the abdomen, lateral margins of tergite 1 also yellow, the scape yellow beneath, and the clypeus in at least one specimen with a yellow median streak. Specimens from east of Santa Maria and San Antonio Valley approximate the Tehachapi specimens in puncturation, but differ in the markings. Specimens from Oregon have the head and thorax blue, the scape of the antennae and middle tibiae dark, and the yellow of the abdomen restricted to tergites 1 or 2 to 4.

Perdita timberlakei Cockerell

(Figs. 807, 808, 882)

Perdita timberlakei Cockerell, 1925, Proc. Calif. Acad. Sci. (4)14:194, ♀, ♂.

This species is closely allied to *claypolei* but its average size is smaller, it is more shiny, and it has more extensive yellow markings than typical *claypolei*, which occupies the same territory. The type locality is Riverside, and the species depends mostly on *Eriogonum gracile* for its pollen.

Female.—Head and thorax dark blue-green. Clypeus somewhat blackish; often marked with three yellow spots or a line on anterior margin. Collar of pronotum and tubercles, pale yellow. Abdomen fuscous; base of tergite 1, broad band at base of tergites 2 to 4, and sometimes a narrower band at base of tergite 5, yellow. Yellow and dark bands of tergite 2 nearly equal in width; yellow on following segments nearly reaching lateral margins; yellow on tergite 1 includes lateral margins and connects with a rather large rounded or oval mark on anterior part of disk. Legs fuscous, front knees, front tibiae and tarsi, almost entirely yellow, and middle tibiae yellow on anterior, at least at base. Scape of antennae yellow, but a spot at apex; pedicel and flagellum above, brown; underside of flagellum pale ferruginous. Mandibles ferruginous, becoming dark red at apex. Tegulae yellowish at base and hyaline on outer margin. Wings nearly clear hyaline, nervures testaceous, subcosta and margins of stigma pale fuscous.

Head broader than long; inner orbits distinctly converging below. Proboscis rather short, galeae reaching about halfway to base of stipites in repose. Mandibles stout, somewhat tapering to blunt tips. Facial foveae about as wide as interval between them and eyes and reaching from upper level of antennal sockets, or slightly above, not more than halfway to level of anterior ocellus. Pterostigma moderately large, about three-fourths as wide as first submarginal cell; marginal cell with parts beneath and beyond stigma of about equal length. Pygidial plate triangular, with narrowly obtuse apex. Tarsal claws simple, although those of hind legs have a vestigial inner tooth. Head and thorax shining, with weak tessellation on mesonotum and

moderately strong tessellation on frons; punctures of mesonotum fine and widely spaced, those of anterior part of frons much closer, and those of clypeus comparatively strong. Pubescence whitish, rather thin, long, and erect, becoming shorter on face and denser on occiput and cheeks. Length: 3.5–4.5 mm.; anterior wing, 2.5–2.6 mm.

Male.—Head and thorax dark blue-green; sometimes a brownish cast on sides of thorax and on propodeum. Anterior margin of gular region and narrow line on anterior part of inferior orbits, slightly yellowish. Mandibles except reddish tips, labrum, and face below level of antennae, white; the white ascending obliquely above antennae on sides of face and intruding between antennal sockets in middle. Collar of pronotum testaceous; a triangular spot on posterior corners of disk, and tubercles, pale yellow. Abdomen brown, more yellowish beneath and darker above on apical half; basal half of tergite 2 and narrow band at base of next one or two tergites, yellow. Legs yellow; coxae, sometimes a streak on posterior side of front femora, posterior side of middle femora, hind femora except more or less of basal half above, and outer margin of hind tibiae, pale fuscous or brown. Wings about as in female; tegulae more testaceous.

Head broader than long and considerably broader than thorax; cheeks evenly rounded behind and about two-thirds as wide as eyes. Mandibles rather thick at base, sharp at apex, and reaching somewhat beyond the far margin of proboscis fossa. Scape of antennae about twice as long as thick; flagellum stout, with middle joint much broader than long. Facial foveae faint and punctiform. Flanks of pronotum moderately impressed. Frons tessellate but shining, with fine sparse punctures; mesonotum almost polished, with minute and widely-spaced punctures. Pubescence about as in female, although sparser; white part of face nude. Tergite 7 with a small and truncate median lobe. Subgenital plate about one and one-half times as long as wide, with parallel sides and slightly rounded apex; discal hair shorter, sparser, and less curled than in *claypolei*. Aedeagus much as in *claypolei*, but parameral lobes more slender and thickened apical part of sagittae only slightly narrowed toward apex in dorsal view. Length: about 2.5–3.5 mm.; anterior wing, 1.9–2.3 mm.

Material examined.—CALIFORNIA. Riverside Co.: 95 females, 14 males, Riverside, on *Eriogonum gracile*, July 5 to Nov. 2 in different years (Timberlake, except one example collected by J. C. Chamberlin); 1 male, Piñon Flat, San Jacinto Mts., on *E. fasciculatum*, June 4, 1939; 1 female, 1 male, The Gavilan, on *E. gracile*, Oct. 1, 1952 (Timberlake). San Bernardino Co.: 1 female, 3 males, Rialto, on *Eriogonum* and *Brassica*, July 25, 1958 (E. I. Schlinger); 6 females, 1 male, Mill Creek, 4,000 feet, San Bernardino Mts., on *E. gracile*, Aug. 21, 1939; 1 female, 2 males, Tetley Park, San Bernardino Mts., on *E. gracile*, Aug. 19, 1947; 14 females, 14 males, Mohave River at Deep Creek, on *E. gracile* and *E. mohavense*, Aug. 14, 1936 (Timberlake). Los Angeles Co.: 2 females, 2 males, Altadena, on *E. virgatum*, Aug. 2, 1934 (C. D. Michener); 1 male, La Crescenta, July 21, 1939 (R. M. Bohart). Ventura Co.: 1 male, 7.8 miles west of Ojai, on *E. gracile*, Sept. 12, 1950 (Timberlake). San Diego Co.: 1 male, Chihuahua Valley, Aug. 17, 1958 (Schlinger); 7 females, 3 males, 5 miles north of Warner Springs, on *E. gracile*, Sept. 12, 1938; and 1 female, Green Valley, 5 miles south of Cuyamaca, on *E. fasciculatum*, Aug. 8, 1951 (Timberlake).

Perdita lucens, n. sp.

(Figs. 809, 810, 883)

P. lucens differs from *timberlakei* in having a more weakly tessellate and more shining frons and somewhat less extensive yellow markings. In the male, the white on the face extends much more prominently above antennae in median line than in allied species.

Female.—Head and thorax dark green or bluish green; clypeus except on upper border, and labrum, blackish; rarely a small yellow spot on middle of clypeus. Collar of pronotum and tubercles, pale yellow. Abdomen fuscous, or tinged with brown; narrow enclosed yellow band at base of tergites 2 to 4 or 5; rarely yellow bands broader than dark intervals, with transverse yellow mark on disk of tergite 1. Legs fuscous, front and middle knees, front tibiae except beneath, pale yellow; front tarsi brown, becoming more or less yellow on anterior side of

basitarsi. Antennae dark brown, flagellum paler beneath, scape yellow except for dark spot at apex, or entirely dark. Mandibles testaceous or reddish, darkened at apex, often infuscated toward base. Tegulae testaceous hyaline, with yellow base. Wings nearly clear hyaline, nervures pale brown, subcosta fuscous but becoming yellow at base.

Head somewhat broader than long; inner orbits convergent below. Facial foveae well impressed, about as wide as interval between them and eyes and half as long as space between antennal sockets and anterior ocellus. Mandibles moderately thick, slightly tapering, rounded at apex, and without an inner tooth. Proboscis rather short, galeae reaching halfway to base of stipites in repose. Characters of wings and pygidial plate virtually same as in *timberlakei*; sculpture and pubescence about same, except mesonotum polished, instead of weakly although distinctly tessellate, and frons more shining. Length: 3.5–4.5 mm.; anterior wing, 2.6–2.8 mm.

Male.—Head and thorax green or bluish green; mandibles except red tips, labrum, more than anterior half of face, tubercles, mark on posterior corners of disk of pronotum, and collar, white. Median extension of white on frons more or less expanded, sometimes going as high as lateral extensions; latter broad and blunt at upper ends. Abdomen fuscous or brown; a yellow band at base of tergites 2 and 3 or sometimes 4, usually covering about basal half of segment except on tergite 4; rarely tergites 1 to 4 mainly yellow, with apex of tergites 1 to 3 narrowly pale brown. Venter brownish yellow, becoming more brownish toward apex. Legs pale yellow, hind femora fuscous except at apex and on anterior side. Scape of antennae pale yellow; flagellum duller yellow beneath, brownish above; streak on dorsal edge of scape, and pedicel, fuscous. Tegulae and wings about as in female.

Head somewhat broader than long, and broader than thorax; cheeks strongly receding and much narrower than eyes. Face below antennae gently convex from side to side; lateral plates plane, but not appreciably concave. Mandibles strongly tapering from broad base, sharp at apex, and reaching far margin of proboscis fossa. Facial foveae punctiform. Scape of antennae less than twice as long as thick; flagellum stout, with middle joints broader than long. Flanks of pronotum at most only moderately impressed. Head and thorax shining; frons rather strongly tessellate; mesonotum more or less polished; puncturation weak and very sparse. Pubescence whitish, erect, moderately long on mesonotum, moderately dense on cheeks and occiput, absent on white part of face. Tergite 7 with a truncate median lobe broader than long. Subgenital plate about one and one-half times as long as wide, truncate at apex, moderately narrowed toward base, with hair on apical part of disk moderately long and slightly curled. Aedeagus similar to that of *timberlakei*, but parameral lobes less slender, and thickened apical part of sagittae (from widest part to apex) somewhat more than twice as long as wide at apex. Length: about 2.8–3.3 mm.; anterior wing, 2–2.2 mm.

Holotype female, allotype, and paratypes.—Eleven females, 1 male, Morongo Valley, San Bernardino Co., California, on *Eriogonum nodosum*, Oct. 5, 1934 (Timberlake). *Additional paratypes*.—CALIFORNIA. San Bernardino Co.: 2 females, Atolia, Sept. 3, 1956 (R. M. Bohart); 1 male, mouth of Deep Creek, Aug. 11, 1956 (E. I. Schlinger); 1 female, 1 male, Barstow, June 9, 1938 (F. T. Scott); 1 female, Yucca Valley, on *E. inflatum*, Sept. 28, 1944 (Timberlake). Los Angeles Co.: 12 females, 3 males, 4 miles northwest of Acton, on *E. inflatum*, Aug. 25, 1958 (R. H. Painter); 3 females, Acton, on *E. inflatum*, Aug. 25, 1958 (Painter); 1 female, Acton, Aug. 25, 1958 (Schlinger); 1 male, Llano, on *E. mohavense*, June 16, 1953 (Timberlake); 3 females, 1 male, 4 miles southeast of Pearblossom, on *E. fasciculatum*, Aug. 19, 1956 (R. R. Snelling). NEVADA. Churchill Co.: 1 male, 25 miles northeast of Fernley, Aug. 29, 1956 (T. A. Haig).

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

NASUTA SECTION

This group of nine species is closely allied to the *claypolei* section group, but the species are mostly smaller, the pterostigma is a little broader, the light markings are more extensive, the clypeus of the female is often entirely light, and the face marks of the male are yellow instead of white and cover most of face below the

level of the anterior ocellus. The lower part of the face, antennae, and labrum are often curiously modified in the male. The species, like those of the *claypolei* section, are oligolectic on species of *Eriogonum* and have been collected in California, Nevada, Arizona, and New Mexico. Certain species of this section have caused more perplexity than usual in the association of the sexes, as all occur at flowers of *Eriogonum* and more than one species may be flying at the same time and place, accompanied possibly by species of the *claypolei* section, especially *jucunda* and *lucens*, with which they may be confused. None of the species belonging here have been reported previously.

Female.—Head somewhat broader than long; inner orbits slightly to moderately convergent below. Facial foveae about half as long as space between antennal sockets and anterior ocellus. Proboscis rather short, galeae reaching halfway to base of stipites when folded in repose. Mandibles moderately stout, blunt at apex, with inner tooth more or less weak and sometimes vestigial. Pterostigma usually not much shorter or narrower than first submarginal cell. Pygidial plate moderately broad, with apex subacute to somewhat broadly rounded or truncate. Sculpture and pubescence in general similar to that in species of *claypolei* group: frons usually more tessellate and duller than mesonotum; puncturation generally weak, with punctures of clypeus no stronger than those of frons. Head and thorax in most species dark blue; clypeus often entirely light; abdomen mainly yellow, or dark with light bands. One species mainly yellow, with dark green marks on head and thorax.

Male.—Head usually broader than long. Face below antennae sometimes modified, with anterior border of clypeus elevated into a vertical plate or strongly arched medially; or face impressed on each side of strongly prominent supra-clypeal area, with labrum very short and transverse. Cheeks usually receding and not much broadened. Antennae short; scape usually not much more than twice as long as thick; flagellum very stout. Structure of tergite 7, subgenital plate, aedeagus, and tarsal claws similar to that in *claypolei* group. Pubescence moderately developed; yellow part of face nude. Coloration similar to that of female except face usually yellow nearly to level of anterior ocellus.

Perdita distans, n. sp.

(Figs. 811, 812, 884)

This is the only species of the *nasuta* or *claypolei* subgroups in which the female is mainly yellow with dark green marks on the vertex, mesoscutum, and mesopectus. The male has much more extensive dark markings than the female, thus reversing the usual sexual coloration pattern in *Perdita*.

Female.—Head, thorax, and abdomen pale clay yellow; frons and vertex more orange yellow. Transverse mark covering ocelli (rarely extending outward to margin of eyes), large roundish to subquadrate mark on each side of posterior part of mesopectus, and large mark on mesoscutum, dark green. Green mark on scutum covering a little less than anterior two-thirds of disk, with a posterior, triangular extension on each side in alignment with outer margin of scutellum; lateral margins of scutum and a quadrate area (broader than long) in posterior middle, pale. Foveae of face and second tergite, blackish. Legs and antennae concolorous; flagellum slightly reddened or brownish; a narrow transverse fuscous streak on outer side of flagellar joints 2 to 4. Proboscis and mandibles concolorous; latter red at apex. Tegulae testaceous hyaline with broad pale-yellow margin. Wings hyaline, nervures testaceous brown, subcosta darker brown.

Head somewhat broader than long; inner orbits slightly convergent below. Face below antennae strongly convex; lateral extensions of clypeus visible in frontal aspect; subantennal plates not much longer than wide. Facial foveae a little wider than interval between them and eyes and reaching from upper level of antennal sockets about halfway to level of anterior ocellus. Mandibles moderately stout, with a small inner tooth, and reaching far margin of

proboscis fossa. Proboscis short, galeae hardly reaching halfway to base of stipites. Pterostigma moderately large, not quite as wide as first submarginal cell; part of marginal cell beneath stigma about equal in length to part beyond. Pygidial plate about as long as wide at base; moderately narrowed to rounded apex. Head and thorax somewhat dullish, tessellation most distinct on the mesonotum, that of frons very fine and rather weak; clypeus with sparse punctures, rest of face nearly impunctate, mesoscutum with moderately sparse fine punctures. Pubescence white, rather short, fine, erect, and thin, although rather conspicuous; that on cheeks much finer and denser. Length: 3.4–4 mm.; anterior wing, 2.3–2.4 mm.

Male.—Sometimes colored and marked much as in female, but with dark mark on mesoscutum larger, covering four-fifths of length, posterior yellow mark transverse; broad dark V-mark on propodeum; oblique dark band from base of front wings to middle coxae. Usually, however, a large mark on occiput extending forward to cover ocelli but seldom reaching summit of eyes, all or almost all of mesoscutum and propodeum, and posterior half of mesepisternum, dark green or blue-green; but scutellum, metanotum, and at least a small spot on middle of propodeum, yellow. Abdomen more orange yellow than in female; apical margin of tergites very narrowly pale brownish; a pale brown mark on each side of tergite 1, a little more than halfway from base. Foveae of tergite 1 pale brown; those of frons fuscous. Antennae and legs pale yellow. Apex of mandibles pale red. Tegulae and wings about as in female.

Head usually shaped much as in female, with cheeks strongly receding; but rarely greatly enlarged and as massive as thorax, with cheeks broadly rounded beneath, as wide as eyes, and widest slightly above middle of eyes. Facial foveae punctiform. Mandibles tapering and very acute at apex, reaching slightly beyond far margin of proboscis fossa. Sculpture similar to that of female, but finer; face impunctate. Pubescence similar but finer; face entirely nude. Median lobe of tergite 7 rather broadly truncate at apex. Subgenital plate about one and one-half times as long as wide, widened toward base but rounded at apex; fine short setae on apical part of disk. Aedeagus similar to that in allied species: dorsal lobes of caulis shorter than volsellae; parameral lobes moderately slender; apical part of sagittae from where it begins to narrow somewhat longer than wide and narrowed less than half to apex. Length: 2.5–3 mm.; anterior wing, 1.8–2 mm.

Holotype female, allotype, and paratypes.—Nineteen females, 4 males, Yermo, San Bernardino Co., California, on *Eriogonum reniforme*, June 17, 1939 (Timberlake). *Additional paratypes*.—San Bernardino Co.: on same flower, 1 female, Yermo, July 9, 1938; 4 females, 1 male, Yermo, June 2, 1941; and 1 male, 14.7 miles west of Barstow, June 4, 1938 (Timberlake). Inyo Co.: 1 female, Brown, June 11, 1942 (R. M. Bohart). San Diego Co.: 12 females, 6 males, Ocotillo, on *E. thomasi*, April 27, 1941; 14 females, 1 male, Borego, on *E. reniforme*, April 27, 1954 (Timberlake); 15 females, 12 males, on *E. reniforme*, April 27, 1954 (P. D. Hurd, Jr.); 1 female, Borego, April 26, 1954 (J. G. Rozen); and 2 females, 1 male, Borego Springs, June 4, 1958 (E. I. Schlinger).

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

Perdita nasuta nasuta, n. subsp.

(Figs. 813, 814, 885)

The female of *nasuta* is distinguished from its closest allies by its entirely yellow or orange yellow legs and abdomen. The male differs from all other species of *Perdita* in having the anterior border of the clypeus elevated into a large, vertical, quadrate plate.

Female.—Head and thorax dark blue or blue-green; mandibles except reddish tips, labrum, clypeus, tubercles, and collar of pronotum, yellowish white. Sometimes very small lateral face marks between clypeus and anterior end of eyes. Legs and abdomen yellow, latter with a strong orange tinge; pygidial plate concolorous, lateral foveae of tergite 2 fuscous. Scape, pedicel, and first joint of flagellum, clear pale yellow; flagellum otherwise pale reddish brown, becoming

more yellowish beneath especially toward base. Tegulae hyaline, with base yellowish-white. Wings hyaline, nervures testaceous brown, subcosta and margins of stigma a little darker.

Head distinctly broader than long; inner orbits moderately convergent below. Clypeus strongly convex, broader than high, lateral extensions short, broad, and fully visible in frontal aspect; dorsal margin of disk evenly rounded with sides sloping straight toward base of mandibles. Mandibles moderately stout, reaching hardly beyond middle of proboscis fossa, bluntly rounded at apex, and with an almost vestigial inner tooth. Proboscis short, galeae when folded in repose reaching considerably less than halfway to base of stipites. Facial foveae well impressed, broader than narrow interval between them and eyes and reaching about halfway from upper level of antennal sockets to level of anterior ocellus. Antennae short, flagellum about as long as eyes, with middle joints broader than long. Pterostigma about as long and almost as wide as first submarginal cell; part of marginal cell beneath stigma more or less longer than part beyond, which is often no longer than wide. Pygidial plate a little longer than wide, plane, and narrowed toward moderately wide and rounded apex. Head and thorax shining, mesonotum polished, frons minutely tessellate; puncturation minute and sparse, on head mostly restricted to face below antennae, most distinct on clypeus. Pubescence white and rather sparse, most dense on cheeks, longest on anterior coxae and mesopectus, short and erect on mesonotum, short and antrorse on lower face, frons and vertex almost nude. Length: 2.8–3.5 mm.; anterior wing, 2–2.3 mm.

Male.—Head and thorax dark green or bronzy green, definitely not bluish as in female. Gular region of head, inferior orbits to middle of eyes, mandibles except red tips, proboscis, labrum, face to level of anterior ocellus, antennae, prothorax in large part, and legs, yellow. A greenish bar across disk of pronotum, continued very narrowly on flanks. Facial foveae brownish. Abdomen orange yellow; base and lateral margins of tergite 1 (or sometimes only a basal mark and a transverse spot on each side above), a faint apical band and a more distinct transverse spot on each side on tergites 1 to 3 or 5, rather inconspicuously brown or pale fuscous. Tegulae and wings as in female.

Head considerably broader than long; inner orbits slightly convergent below. Cheeks strongly receding. Mandibles moderately slender, acute at apex, and reaching far margin of proboscis fossa. Facial foveae punctiform. Face deeply impressed on each side near anterior end of eyes, with a strong, broad, and rounded longitudinal ridge between the pits; anterior border of clypeus elevated into a large quadrate plate with its anterior face plane, perpendicular to longitudinal axis of head, somewhat broader than high, and excavated on anterior middle to receive labrum. Antennae very short and incrassate; scape somewhat less than twice as long as wide, oblique at apex with outer margin shortened; middle joints of flagellum about twice as broad as long. Flanks of pronotum hardly impressed. Sculpture and pubescence nearly as in female, but face entirely nude and impunctate, punctures of mesonotum very weak, and hair sparser and coarser. Median lobe of tergite 7 as long as wide and emarginato-truncate at apex. Subgenital plate about one and one-half times as long as wide at rounded apex, somewhat widened toward base; short, very fine pubescence on apical part of disk. Aedeagus much as in allied species; caulis short and broad; parameral lobes longer than caulis and moderately wide in lateral view, sagittae subangulate at widest part as seen from above, with part beyond angulation about one and one-half times as long as wide. Length: 2–2.6 mm.; anterior wing, 1.6–1.9 mm.

Holotype female and allotype.—Six miles southeast of Palm Springs, Riverside Co., California, on *Eriogonum trichopes*, May 30, 1930 (Timberlake). *Paratypes*.—On same flower, 4 to 6 miles south and east of Palm Springs (about halfway between Palm Springs and Cathedral City and some labeled simply as from Palm Springs). Eleven females, 27 males, May 30, 1930; 8 females, 1 male, June 8, 1930, including one pair taken in shade of *Dicoria* seedlings; 26 females, 13 males, June 8, 1937; 9 females, 8 males, June 25, 1941; 1 female, 17 males, May 6, 1946; 17 females, 42 males, June 24, 1952; 13 females, 9 males, June 11, 1954 (Timberlake); 15 females, 69 males, June 24, 1952 (W. E. La Berge); and 2 females, June 16, 1954 (J. C. Hall).

Additional material examined (mostly on *E. trichopes*).—CALIFORNIA. Riverside Co.: 1 female, 1 male, 2 miles northwest of Rancho Mirage, July 27, 1950 (Timberlake). San Bernardino

Co.: 6 males, 2 miles west of Barstow, July 7, 1938 (Timberlake); 1 female, 1 male, 11 miles west of Ludlow, 2,150 feet, June 22, 1931 (H. A. Scullen); 8 females, 5 males, 14 miles west of Ludlow, June 30, 1952 (R. H. and L. D. Beamer, C. Weiner, A. Wolf, C. Liang and W. La Berge); 1 male, 6 miles north of Atolia, Sept. 4, 1958 (E. I. Schlinger). NEVADA. Clark Co.: 13 males, 11 miles west of Arden, June 6, 1941 (Timberlake); 18 females, 9 males, 4 miles east of Glendale, June 20, 1939 (Timberlake); 2 females, Glendale, June 15, 1930 (E. W. Davis). ARIZONA. Mohave Co.: 7 females, 5 males, Beaver Dam, June 20, 1939 (Timberlake). Yuma Co.: 2 females, 2 males, Yuma Test Station, May 29, 1955 (G. D. Butler and D. Tuttle); 1 female, 5 males, 11.7 miles north of Dome, and 4 males, 15 miles north of Dome, May 17, 1955 (Timberlake). Pinal Co.: 14 females, 1 male, 10 miles south of Toltec, June 21, 1953 (T. R. Haig).

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

Specimens from San Bernardino County, California, and Clark County, Nevada, have whiter wings and verge toward *P. nasuta galacticoptera*. One female from Maricopa County, Arizona, has been referred to *P. nasuta obscuresscens*, but specimens from south of Toltec are nearly typical *nasuta*.

Perdita nasuta obscuresscens, n. subsp.

P. nasuta in the central part of Arizona eastward differs from the typical form in having the femora dark and sometimes also the abdomen. The darkest specimens examined come from near Rock Springs in Yavapai County, and some of the females from that locality have the abdomen entirely pale fuscous except beneath.

Female.—Like typical *nasuta* except in color. Femora fuscous except at apex; hind tibiae dark except at base. Abdomen fuscous above, with base of tergite 1 yellowish, or yellowish suffusion at base of following segments; in some localities abdomen entirely or almost entirely yellow or orange yellow, as in typical form. In one female from the type locality there is a large fuscous mark on each side of the disk of clypeus. Length: 3–3.5 mm.; anterior wing, 2 mm.

Male.—Not clearly distinguishable from the typical form.

Holotype female, allotype, and paratypes.—Six females, 9 males, 3 miles north of Rock Springs, Yavapai Co., Arizona, on *Eriogonum trichopes*, July 7, 1932 (R. H. and L. D. Beamer, C. Liang and M. La Berge). *Additional paratypes*.—ARIZONA. Maricopa Co.: 1 female, 10 miles east of Gila Bend, June 15, 1955 (G. D. Butler). Pinal Co.: 6 females, 18.2 miles northwest of Oracle Junction, on *E. trichopes*, Sept. 6, 1958 (Timberlake). Cochise Co.: 1 male, Wilcox, on *E. thomasi*, Aug. 26, 1958 (P. D. Hurd, Jr.); 3 females, 7 males, 7 miles west of Bowie, July 12, 1952 (Beamers, C. Liang and W. La Berge). NEW MEXICO. Dona Ana Co.: 6 females, Las Cruces, July 15, 1952 (Beamers, C. Liang and W. La Berge).

Types in the collection of the University of Kansas, Lawrence; paratypes in collections of the University of California at Riverside and Berkeley, and the University of Arizona.

Perdita nasuta galacticoptera, n. subsp.

Specimens of *nasuta* from Inyo County, California, differ from the typical form in having milky-white wings with pallid nervures.

Female.—Like typical *nasuta*, but abdomen paler yellow, often faintly marked with suffused pale fuscous spot on each side of tergites 1 to 4. Wings milky hyaline, nervures colorless, subcosta and margins of stigma pale brownish. Length: 2.5–3.8 mm.; anterior wings, 2.1–2.5 mm.

Male.—Differs only in having white wings and pallid nervures. Length: 2.5–3 mm.; anterior wing, 1.9–2.1 mm.

Holotype female and allotype.—Surprise Canyon, Panamint Mts., Inyo Co., California, on *Eriogonum inflatum*, April 25, 1957 (Timberlake). *Paratypes*.—Forty-three females, 228 males,

taken with the types, April 22-25, 1957 (Timberlake, P. D. Hurd, Jr., and G. I. Stage); 1 female, Mazourka Canyon, Inyo Mts., 6,000 feet, on *E. inflatum*, June 1, 1937 (C. D. Michener); 7 females, 8 males, Mazourka Canyon, July 2, 1953 (J. W. MacSwain); 1 female, 2 males, Westgard Pass, June 18, 1942 (R. M. Bohart); and 1 male, 5 miles west of Lone Pine, on *E. inflatum*, June 4, 1937 (Michener).

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

***Perdita thermophila thermophila*, n. subsp.**

(Figs. 815, 816, 886)

The male of *thermophila* has the face normal, without the peculiarities of allied species, and yellow nearly to the level of the anterior ocellus, but with the margin of the yellow uneven above. The female has the clypeus yellowish-white and the abdomen dark with yellow markings.

Female.—Head and thorax dark blue; mandibles except red tips, labrum, clypeus, tubercles, and collar of pronotum, white or yellowish white. Abdomen fuscous, or more or less tinged with brown above; venter yellowish; base of tergites 1 to 4 or 5 broadly yellow, the yellow on tergites 2 to 4 or 5 forming an enclosed band, generally broader than dark intervals; in certain paratypes the yellow reaching lateral margin on tergites 3 and 4, and tergite 5 becoming entirely or almost entirely yellow. Legs fuscous; front femora broadly at apex, front and middle tibiae and tarsi, pale yellow; hind knees pale yellowish; hind tarsi very pale fuscous or brownish. Flagellum of antennae brown; scape entirely, and pedicel and first joint of flagellum except above, yellow. Tegulae hyaline, with yellowish-white base. Wings slightly whitish hyaline, nervures pale testaceous, margins of stigma and subcosta brown.

Head distinctly broader than long; inner orbits converging below. Proboscis short, galeae in repose reaching halfway to base of stipites. Mandibles moderately tapering, bluntly rounded at apex, and with a small inner tooth. Facial foveae somewhat wider than interval between them and eyes and reaching from upper level of antennal sockets about halfway to level of anterior ocellus. Pterostigma nearly as long and as wide as first submarginal cell; marginal cell with parts beneath and beyond stigma of about equal length, with the latter part slightly longer than its apical width. Pygidial plate as long as wide at base and moderately narrowed to rounded apex. Head and thorax shining, with face, vertex, and anterior border of mesoscutum minutely tessellate and slightly dullish, remainder of mesonotum polished; puncturation sparse, minute, and faint, most distinct on lower face of clypeus, frons mainly impunctate. Pubescence whitish: thin and short on lower face and mesonotum, moderately dense and long on occiput and cheeks, most of frons and middle of mesonotum nearly nude. Length: 3.4-4 mm.; anterior wing, 2.5-2.7 mm.

Male.—Head and thorax dark blue-green. Anterior part of gular region, inferior orbits to middle of eyes, mandibles except pale-red tips, labrum, and face to level of foveae, yellow; but definitely paler yellow on lower part of face. Upper margin of yellow more or less uneven, with a broad median lobe nearly to anterior ocellus; the green sometimes sharply lobate on each side. Tubercles, collar, large triangular mark on each side of posterior margin of disk, and sometimes anterior border of flanks of pronotum, pale yellow. Abdomen yellow; a spot on each side of basal declivity of tergite 1, and a spot on each side of apical margin of tergite 1 and of several following segments, pale brown; brown spots sometimes intensified and enlarged to form narrow apical bands on tergites 1 to 4 or 5, with an additional mark across base of tergite 1. Legs and antennae yellow; flagellum only slightly brownish above. Tegulae and wings as in female.

Head rotund, only slightly broader than long; inner orbits converging below. Cheeks strongly receding and narrower than eyes. Face below antennae evenly convex and unmodified. Mandibles simple, tapering, acute, and reaching somewhat beyond far margin of proboscis fossa. Antennae moderately incrassate; scape slightly more than twice as long as wide and tapering toward base; joints of flagellum only a little broader than long. Facial foveae minute and punctiform.

Head and thorax shining; frons and vertex slightly dullish from minute tessellation; mesonotum polished, with sparse and very minute punctures; face almost impunctate. Pubescence much as in female, but sparser; face entirely nude. Median lobe of tergite 7 rather broadly truncate. Subgenital plate broad at base; disk about as long as wide and minutely pubescent at broadly rounded apex. Aedeagus similar to that in allied species; thickened apical part of sagittae moderately narrowed toward apex and about twice as long as wide. Length: 2.5–3.5 mm.; anterior wing, 1.9–2 mm.

Holotype female and allotype.—Morongo Valley, San Bernardino Co., California, on *Eriogonum inflatum*, Aug. 20, 1936 (Timberlake). *Paratypes*.—San Bernardino Co.: 2 females, 5 males, Morongo Valley, on *Eriogonum inflatum*, Aug. 28, 1934, and 12 females, 9 males taken with the types (Timberlake); 1 female, 20 miles west of Twentynine Palms, on same flower, Aug. 20, 1936 (Timberlake). Riverside Co.: 1 female, Palm Springs, June 30, 1946 (D. J. and J. N. Knull); 5 males, Magnesia Canyon, June 22, 1958 (E. I. Schlinger). San Diego Co.: 1 female, Borego, on *Euphorbia polycarpa*, May 3, 1956 (P. D. Hurd, Jr.); 4 females, 4 males, Borego, Aug. 20, 1958 (Schlinger). Imperial Co.: 1 male, sand dunes, west of Glamis, on *Eriogonum deserticola*, July 25, 1960 (R. C. Dickson).

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

Perdita thermophila trilobata, n. subsp.

Differs from typical *thermophila* in the darker abdomen of the female and in the more strongly and more constantly trilobed face marks of the male.

Female.—Agreeing with *thermophila*, but abdomen fuscous with the yellow bands usually restricted to tergites 2 to 4, narrow, broadly enclosed, and sometimes nubilous. Legs as in *thermophila*, except middle and hind tibiae nearly all dark. Length: 3–4 mm.; anterior wing, 2.5–2.6 mm.

Male.—Like typical *thermophila* and sometimes hardly distinguishable, but yellow of frons almost always trilobed, middle lobe not or hardly reaching higher than lateral lobes, and the green descending acutely on each side, sometimes to antennal sockets. Abdomen usually more strongly banded, tergite 1 and last four sometimes mainly or entirely pale fuscous or brownish. Length: 2.4–3 mm.; anterior wing, 1.7–2 mm.

Holotype female, allotype, and paratypes.—Eleven females, 17 males, 8 miles east of Quartzsite, Yuma Co., Arizona, on *Eriogonum deflexum*, Sept. 13, 1958 (Timberlake). *Additional paratypes*.—ARIZONA. Yuma Co.: 1 female, 3 males, 28.4 miles south of Quartzsite, on *E. deflexum*, Sept. 25, 1955; 1 male, 11.7 miles north of Dome, on *E. trichopes*, May 17, 1957 (Timberlake). Yavapai Co.: 2 males, 17 miles north of Wickenburg, on *Eriogonum*, Aug. 29, 1930 (Timberlake). Maricopa Co.: 1 male, 6 miles west of Wickenburg, on *E. densum*, Sept. 11, 1957 (Timberlake). Pinal Co.: 10 females, 26 males, Casa Grande, labeled perhaps wrongly from *Baileya*, July 6, 1950 (R. H. Beamer); 2 females, 2 males, 14 miles north of Casa Grande, July 6, 1950 (J. G. Rozen). CALIFORNIA. San Bernardino Co.: 7 females, 6 males, Lake Havasu, on *E. deflexum*, Oct. 17, 1955 (M. Washbauer); and 11 females, 2 males, 25 miles south of Ivanpah, on same flower, Oct. 12–13, 1958 (J. W. MacSwain and R. W. Thorp).

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

Perdita gentilis, n. sp.

Only the female of *gentilis* is known, and when the male is discovered it may prove to be a race of *thermophila*. The female differs from *thermophila* in having the scape of the antennae, the tubercles, and the abdomen entirely or almost entirely dark.

Female.—Head and thorax dark blue. Mandibles except red tips, labrum, clypeus, and a short thin band on collar of pronotum, yellowish white. Sometimes tubercles slightly whitish at apex; sometimes labrum and two stripes on disk of clypeus more or less pale brown. Abdomen fuscous; venter and sometimes base of tergites 2 and 3 or 4 paler but not definitely yellowish. Legs brownish fuscous, becoming paler on tibiae and tarsi; apex of front femora, front tibiae and tarsi, clear pale yellow; middle knees slightly yellowish. Antennae fuscous; scape often more or less yellowish at base, or sometimes mostly suffused with pale yellow beneath. Tegulae hyaline, the base more opaque and yellowish. Wings hyaline with very slight duskiness, nervures rather dark testaceous brown, subcosta and margins of stigma fuscous.

Head distinctly broader than long; inner orbits convergent below. Proboscis short, galeae reaching about three-fourths of way to base of stipites. Mandibles rather slender, with a small inner tooth close to rounded apex. Disk of clypeus about as high as wide, with broad lateral extensions well exposed in frontal aspect. Facial foveae almost as wide or a little wider at lower end than space between them and eyes, and reaching from upper level of antennal sockets generally a little more than halfway to level of anterior ocellus. Pterostigma moderately large and a little narrower than first submarginal cell; marginal cell with the parts beneath and beyond the stigma equal in length. Pygidial plate about as long as wide at base, with sides rather strongly convergent to rounded apex, which is less broad than in *thermophila*. Head and thorax minutely tessellate, more weakly on thorax; posterior middle of mesoscutum virtually polished; frons and vertex somewhat dullish. Puncturation nearly obsolete, punctures of mesoscutum faint and sparse; an orbital row of punctures on each side of lower face more distinct, but still very fine. Pubescence whitish, thin and fine: very short on face, short and erect on mesoscutum and becoming moderately dense on cheeks, but the frons nude. Length: 3–4 mm.; anterior wing, 2.5–2.6 mm.

Holotype female and paratypes.—Ten females, 25 miles northeast of Fernley, Churchill Co., Nevada, Aug. 29, 1956 (T. R. Haig). *Additional paratype*.—One female, Sparks, Washoe Co., Nevada, Aug. 2, 1948 (H. and G. Townes).

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

***Perdita clypeata clypeata*, n. subsp.**

(Figs. 817, 818, 887)

The males of *clypeata* and *semilutea* have the lower sides of the face depressed and the disk of the clypeus strongly convex from side to side, with its apical margin elevated and strongly bowed to receive the labrum. The female of *clypeata* has the face entirely dark, but the scape and pedicel of the antennae clear bright yellow.

Female.—Head and thorax dark blue. Mandibles testaceous yellow except red tips; tubercles and collar of pronotum, yellow. Abdomen brown to fuscous; venter yellowish; a nubilous yellow patch at base of tergites 2 and 3, or tergites 2 to 4, with patch on tergite 2 smaller than that on tergite 3. Legs fuscous, paler distad; tarsi pale brown; apex of front femora, front tibiae and tarsi, yellow. Scape and pedicel of antennae clear yellow; flagellum brown; sometimes upper side of pedicel suffused with brown. Tegulae hyaline, with base yellow. Wings whitish hyaline, nervures pale testaceous, subcosta and margins of stigma brown.

Head hardly broader than long; inner orbits of eyes moderately convergent below. Proboscis short, galeae in repose reaching slightly less than halfway to base of stipites. Mandibles moderately slender, tapering to rather broad but obliquely rounded apex, and without an inner tooth. Disk of clypeus broader than high. Facial foveae wider than interval between them and eyes and reaching from upper level of antennal sockets halfway to level of anterior ocellus. Pterostigma nearly as long and as wide as first submarginal cell; marginal cell with part beyond stigma about as long as wide and shorter than part beneath. Pygidial plate as long as wide at base, narrowly rounded at apex. Head and thorax shining, with minute tessellation most distinct

on frons and vertex, and disk of mesoscutum almost polished; punctures on mesoscutum very minute and sparse, on face below antennae moderately strong and close. Pubescence whitish and rather sparse, longest on underside of thorax, densest on cheeks, short, erect, and thin on mesonotum, and still shorter on lower half of face. Length: 3.5–3.9 mm.; anterior wing, 2.2–2.4 mm.

Male.—Head and thorax dark green, becoming blue on propodeum. Anterior half of gular region and cheeks to middle of eyes (orbital mark narrowing to a thin line at and above middle of eyes), mandibles except red tips, labrum, face to level of foveae, and antennae, bright yellow. Upper margin of yellow on frons sometimes nearly even, but usually green descends more or less narrowly on each side to antennal sockets, with median yellow mark spearhead-shaped, and yellow on sides of face partly enveloping foveae. Pronotum yellow, with a dark crossband gradually broadened toward middle to envelop hind margin briefly and reduced to a line on upper part of flanks. Abdomen brown, becoming fuscous on tergite 1 and shading into yellow on basal half of tergite 2 and more or less on base of following one or two segments. Legs yellow; hind coxae fuscous except beneath, apical half of claws reddish. Tegulae and wings about as in female.

Head rotund in frontal aspect; orbits converging moderately below. Cheeks rounded beneath and about half as wide as eyes. Face below antennae convex except at sides; supraclypeal area moderately, and apex of clypeus strongly, prominent, outline between them somewhat concave in lateral view. In frontal view, apical margin of clypeus strongly bowed to receive rather small labrum. Mandibles moderate in length, not reaching beyond far margin of proboscis fossa, and acute at apex. Antennae short and incrassate, scape only a little longer than wide and tapering toward base, flagellum clavate, with all joints except last much broader than long. Facial foveae minute and oval. Flanks of pronotum normal. Sculpture and pubescence about as in female, except that face entirely impunctate and nude. Tergite 7 narrowed gradually from base to median lobe, which is narrowly truncate at apex. Subgenital plate and aedeagus remarkably similar to those of *nasuta*, but sagittae more narrowed toward apex. Length: 2.5–2.9 mm.; anterior wing, 1.9–2 mm.

Holotype female, allotype, and paratypes.—One female, 5 males, Andreas Canyon, near Palm Springs, Riverside Co., California, on *Eriogonum inflatum*, May 15, 1932 (Timberlake). *Additional paratypes*.—One male, type locality, except at several hundred feet higher elevation, on same flower, May 9, 1954; 2 females, 6 males, Borego, San Diego Co., on same flower, April 26, 1934 (Timberlake); and 2 males, 2 miles southwest of Beals Well, Imperial Co., on same flower, May 13, 1949 (R. C. Dickson).

Types in collection of the Citrus Experiment Station, Riverside.

Perdita clypeata immaculata, n. subsp.

This race of *clypeata* differs only in its slightly more robust form and entirely dark abdomen.

Female.—Agreeing closely with *clypeata* in coloration except abdomen blackish without light markings; venter dark, but pygidial plate testaceous. More robust than *clypeata*, with broader head, thorax, and abdomen. Length: about 3.5–4 mm.; width of abdomen, 1.25 mm. (about 1.1 mm. in *clypeata*); anterior wing, 2.5–2.6 mm.

Male.—Not appreciably different from typical *clypeata*.

Holotype and paratypes.—Four females, about 25 miles east of Mesa, presumably in Maricopa Co., Arizona, June 11, 1942 (H. A. Scullen). *Allotype and additional paratypes*.—Four females, 4 males, Hayfield, and 1 male, 3.4 miles west of Desert Center, Riverside Co., California, on *Eriogonum inflatum*, June 4, 1960 (Timberlake and Dickson); 3 females, Hayfield road, 1 mile north of Highway 60 and 70, on same flower, June 29, 1960 (R. C. Dickson).

Types in collection of the Citrus Experiment Station, Riverside, except two paratypes returned to Dr. H. A. Scullen.

***Perdita semilutea*, n. sp.**

(Figs. 819, 820, 888)

The male of this species is similar to *clypeata* in structure, but its face is yellow to the level of the anterior ocellus, and the pronotum and abdomen are entirely or almost entirely yellow. The female is unknown.

Male.—Head and thorax dark green. Gular region to end of proboscis fossa, inferior orbits to above middle of eyes, mandibles except red tips, labrum, face to level of anterior ocellus, antennae, pronotum, legs, and abdomen, bright yellow. Basal half of tergite 1 fuscous, and a small oval pale fuscous spot on each side of apical border of tergites 1 to 2 or 3. Tegulae yellow at base, broadly hyaline on outer margin. Wings whitish hyaline, nervures nearly colorless, subcosta and margins of stigma pale brown.

Almost identical with *clypeata* in structure of face and clypeus. Mandibles slightly longer, reaching somewhat beyond far margins of proboscis fossa. Facial foveae minute and punctiform. Venation, sculpture, and pubescence not significantly different from *clypeata*. Apex of tergite 7, subgenital plate, and aedeagus virtually same as in *clypeata*, although apex of sagittae is slightly broader. Length: 2.5–2.9 mm.; anterior wing, 2–2.2 mm.

Holotype and paratypes.—Three males, Box Canyon, Riverside Co., California, on *Eriogonum thomasi*, April 19 and 27, 1952 (Timberlake).

Types in collection of the Citrus Experiment Station, Riverside.

***Perdita labrata*, n. sp.**

(Figs. 821, 822, 889, 901)

The male of this species and males of *xerophila* and *varleyi* have the lower sides of the face impressed, with the supraclypeal area protuberant and the clypeus and labrum unusually transverse. In the male of *labrata* the scape is about twice as long as wide and tapers toward the base. The female lacks light maculations on the face, pronotum, and abdomen.

Female.—Head and thorax dark blue, without light markings; face mostly blackish below level of antennae. Abdomen black, or sometimes tinged with brown; without light markings, but basal corners and reflexed sides of tergites more or less pale testaceous, and pygidial plate testaceous. Legs fuscous; anterior side of front tibiae usually testaceous or yellowish; front and middle tarsi brownish yellow. Antennae fuscous, or more brownish on flagellum; scape dark, or sometimes pale brownish beneath. Mandibles testaceous or rufotestaceous and red at tips. Tegulae pale brown at base, broadly hyaline on outer margin. Wings whitish hyaline, nervures nearly colorless, stigma yellowish, its margins and subcosta pale brown.

Head slightly broader than long; inner orbits hardly converging below. Proboscis short, with galeae in repose barely reaching more than halfway to base of stipites. Mandibles moderately stout, rather blunt at apex, with a small inner tooth. Facial foveae short, not much longer at most than twice the diameter of one of the ocelli, or about one-fourth as long as space between antennal sockets and anterior ocellus. Pterostigma about as long and nearly as wide as first submarginal cell; part of marginal cell beneath stigma about as long as part beyond, part beneath sometimes longer and always longer than wide. Pygidial plate somewhat longer than wide at base; apex rounded and slightly less than half as wide as base. Tarsal claws with a minute inner tooth. Head and thorax shining; mesonotum faintly, frons and vertex distinctly tessellate. Frons, sides of face, and mesonotum with minute and moderately close punctures, clypeus with coarser but shallow punctures. Pubescence whitish, fine, rather short and sparse, becoming denser on cheeks and longer on front coxae and underside of thorax. Length. 3.9–4.3 mm.; anterior wing, 2.5–2.9 mm.

Male.—Head and thorax dark green. Anterior part of gular region, inferior orbits to middle of eyes, labrum and face to level of foveae, pale yellow. Margin of the green on frons sometimes nearly even, sometimes lobate with the green reaching antennal sockets. Collar of pronotum, cuneate mark on posterior corners of disks sometimes confluent with large mark on tubercles, pale yellow. Abdomen brown or fuscous, with venter and a broad enclosed but not sharply defined band at base of tergites 2 to 3 or 4, pale yellow. Legs yellow; hind femora brown except beneath, and outer side of hind tibiae, pale brown. Antennae somewhat brighter yellow than face; pedicel and four or five following joints pale brown above. Tegulae hyaline, with basal margin pale yellow. Wings as in female.

Head somewhat broader than long; cheeks rounded behind and nearly as broad as eyes. Sides of face opposite supraclypeal area strongly impressed, with impression involving whole width of lateral plates and delimited obliquely above from middle of antennal sockets to a point on orbits just below foveae. Clypeus more than four times as broad as high; lateral extensions long, gradually narrowed, and fully visible in frontal aspect of head. Labrum narrowly transverse, more than four times as broad as long, and armed with two or three long bristles at outer corners. Supraclypeal area protuberant and no broader than subantennal plates forming sides of protuberance. Mandibles dilated at base, obliquely narrowed within on apical fourth, and reaching somewhat beyond far margin of proboscis fossa. Facial foveae minute and punctiform. Antennae moderately short; flagellum subclavate, with most of joints broader than long; scape about twice as long as wide and tapering toward base. Flanks of pronotum moderately impressed. Tarsal claws very small; inner tooth distinct. Sculpture and pubescence about as in female, except face below antennae impunctate. Tergite 7 with usual narrow truncate lobe at apex. Subgenital plate rounded at apex, not much longer than wide, only slightly narrowed toward apex, and with minute short setae on apical part of disk. Genitalia very nearly as in allied species; expanded apical part of sagittae as seen from above about twice as long as broad, and narrowed moderately to apex. Length: about 2.5–3.8 mm.; anterior wing, 1.9–2.5 mm.

Holotype female, allotype, and paratypes.—Two females, 33 males, Andreas Canyon, near Palm Springs, Riverside Co., California, on *Eriogonum fasciculatum*, var. *polifolium*, April 24, 1932 (Timberlake). *Additional paratypes* (mostly on same flower, but flower not recorded on a few specimens.—Riverside Co.: 2 females, Andreas Canyon, May 15, 1932; 4 males, May 11, 1935; 2 females, 4 males, May 9, 1954; 22 females, 17 males, May 10, 1954 (Timberlake); and 6 females, 3 males, April 24, 1954 (J. C. Hall); 4 females, 14 males, Chino Canyon, near Palm Springs, April 20–21, 1960 (J. Powell), and 3 females, 7 males, same locality, on *Eriogonum* except one male on *Larrea divaricata*, April 20 (J. R. Powers). San Diego Co.: 2 females, 1 male, between the Narrows and Sentinae Canyon, May 22, 1941 (R. C. Dickson); 3 males, Borego, April 26, 1955 (P. D. Hurd, Jr.). San Bernardino Co.: 2 females, 4 miles north of Warners Well, May 31, 1937 (Geo. C. Varley).

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

Perdita xerophila xerophila, n. sp.

(Fig. 902)

The male of *xerophila* differs from *labrata* in having the supraclypeal area more prominent and the scape of the antennae not narrowed toward the base. In the female, the clypeus, a supraclypeal mark, the scape and pedicel of antennae, and the tubercles, are pale yellow, but there is a tendency for the clypeus to be partly darkened in typical *xerophila* and it becomes entirely dark in the subspecies *discrepans* and *fuscornis*.

Female.—Head and thorax dark blue-green. Mandibles except red tips, labrum, clypeus, supraclypeal mark broader than long and lengthened in middle (together with clypeal mark forming a triangular figure broader than high), often anterior corners of face with a linear extension on orbits to level of antennae, collar of pronotum, and tubercles, pale yellow. (In one paratype,

upper border of clypeus with a fuscous mark on each side, other facial marks absent.) Abdomen fuscous or slightly tinged with brown; base of tergites 2 to 3 or 4 broadly suffused with yellow. Rarely, abdomen mainly pale yellow; an apical band on tergites 1 to 3 brownish fuscous, lateral margins dark on tergites 1 and 2, apical half or more of tergites 4 and 5 suffused with pale brown, and a dark spot on lateral margins of tergites 3 and 4 close to base. Legs yellow, front and middle femora fuscous except broadly at apex, hind femora dark, although sometimes with a yellow streak on dorsal margin, front and hind coxae usually dark, and sometimes coxae and trochanters of all legs dark in large part. Scape and pedicel of antennae clear pale yellow, flagellum brown except first joint. Tegulae hyaline, with yellowish-white spot at base. Wings milky hyaline, nervures almost colorless, stigma pale yellowish, its margins and subcosta pale brown.

Head slightly broader than long; inner orbits somewhat convergent anteriorly. Proboscis moderately short, apex of galeae reaching halfway to base of stipes when folded in repose. Mandibles obtuse at apex and with a small inner tooth. Facial foveae generally a little wider than interval between them and eyes, and reaching from just above level of antennal sockets hardly halfway to level of anterior ocellus. Pterostigma about as long and as broad as first submarginal cell; marginal cell with part beneath stigma considerably longer than part beyond; latter about as wide as long. Pygidial plate about as long as wide at base; lateral margins moderately convergent to rounded apex. Tarsal claws small, with a minute inner tooth. Head and thorax shining; frons and vertex distinctly, and mesonotum faintly tessellate. Face below antennae with sparse punctures, most distinct on clypeus; punctures of frons excessively minute, those of mesonotum also minute and sparse, although becoming closer on anterior part of scutum. Pubescence white, thin and short, but becoming rather dense on cheeks and long on front coxae and mesopectus. Length: 3.5-4 mm.; anterior wing, 2.5-2.6 mm.

Male.—Head and thorax dark green. Anterior half or a little more of gular region of head, inferior orbits to middle of eyes, mandibles except red tips, face to level of foveae, antennae, and legs, yellow. Base of hind coxae fuscous on dorsal side. Demarkation of yellow and green on frons sometimes almost even, but the green generally lobate on each side, with lobes more or less acute but sometimes rounded and reaching usually much less than halfway toward antennal sockets. Pronotum yellow; a broad fuscous band from flank to flank, reduced to a thin line where disk meets flanks and with a narrow medial extension to hind margin of disk. Abdomen with tergites 2 to 3 or 4 yellow, tergite 1 generally pale fuscous, and apical segments pale brown; or sometimes apical and lateral margins of tergites 2 to 4 brown with the yellow enclosed, and sometimes tergite 1 with a small yellowish spot at summit of median crease. Tegulae and wings as in female.

Head slightly broader than long; cheeks rounded beneath and almost as broad as eyes. Mandibles broad at base, bent inward near base and thence tapering and nearly straight to acute apex and reaching somewhat beyond far margin of proboscoidal fossa. Sides of face impressed; supraclypeal area even more prominent than in *labrata*, with knob transversely rounded and broader than subantennal plates, and a rounded ridge extending backward between antennal sockets. Clypeus and labrum about as in *labrata*. Facial foveae minute and punctiform. Antennae rather short and stout; flagellum slightly clavate, with all joints but last broader than long; scape subquadrate, almost as broad at base (with radicle disregarded) as at apex, convex above, concave beneath, and hardly twice as long as wide. Flanks of pronotum moderately impressed. Sculpture and pubescence much as in female, but face impunctate, and hair of front coxae and mesopectus short and fine. Tergite 7 with a narrowly truncate median lobe, as in allied species. Subgenital plate nearly twice as long as wide at apex, widened moderately at base, slightly rounded at apex, and with short fine setae on apical part of disk. Genitalia very nearly as in *labrata*; expanded part of sagittae as seen from above nearly twice as long as wide, but slightly narrower at apex than in *labrata*. Length: about 2.5-3 mm.; anterior wing, 1.8-2.2 mm.

Holotype female, allotype, and paratypes.—Three females, 3 males, 2 miles southwest of Beals Well, Imperial Co., California, on *Eriogonum inflatum*, May 13, 1949 (R. C. Dickson). *Additional paratypes*.—CALIFORNIA. Imperial Co.: 2 females, 2 males, Beals Well, on same flower, May 13, 1949 (R. A. Floeck); 1 male, 12 miles south of Palo Verde, on same flower,

April 30, 1952 (Timberlake). Riverside Co.: 4 males, Desert Center, May 2, 1955 (W. R. M. Mason); 3 females, 19.4 miles west of Desert Center, on *E. trichopes*; 3 males, Hayfield, on *E. inflatum*; and 1 male, 11 miles northeast of Desert Center on *E. inflatum* June 4, 1960 (Timberlake and Dickson). ARIZONA. Yuma Co.: 6 males, 15 miles north of Dome, on *E. trichopes*, May 17, 1955 (Timberlake); 14 females, 3 males, Yuma Test Station, May 29, 1955 (G. D. Butler, Jr., and D. Tuttle).

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

Perdita xerophila discrepans, n. subsp.

(Figs. 823, 824, 890)

Females that have been collected in Nevada with males indistinguishable from typical *xerophila* differ from *xerophila* females from the Colorado Desert in having the face entirely dark. Such females, because of their dark faces, are difficult to distinguish from the females of *varleyi*, but their wings are more whitened.

Female.—Head and thorax dark blue; almost all of face below antennae blackish except subantennal plates. Collar of pronotum and tubercles, pale yellow. Abdomen yellow above and beneath, with apical margin of tergites 1 to 5 rather narrowly and nubilously infuscated; dark band on tergite 1 extended forward on lateral margins to summit of basal declivity and bent inward at that point to form an acute lobe on each side, base of segment also infuscated and the yellow therefore notched at middle on each side and reaching margins subbasally; dark band on tergite 2 also extended forward on lateral margins to enclose the yellow; lateral margins of following segments with a small fuscous spot on each side. Legs fuscous; apex of front and middle femora and their tibiae and tarsi, yellow; hind tarsi, and sometimes also hind tibiae, pale brownish. Mandibles yellow, with apical third red. Scape and pedicel of antennae yellow; scape marked slightly with brown above; upper side of pedicel, and flagellum, brown. Tegulae hyaline, with pale-yellow base. Wings milky hyaline, nervures almost colorless, subcosta and margins of stigma pale brown.

Structural characters in agreement with typical *xerophila*, except that parts of marginal cell beneath and beyond stigma more nearly equal in length. Length: about 3.8–4 mm.; anterior wing, 2.6–2.7 mm.

Male.—Not appreciably different from male of typical *xerophila*.

Holotype female, allotype, and paratypes.—Four females, 5 males, Kyle Canyon road, Charleston Mts., 23 miles northwest of Las Vegas, Clark Co., Nevada, on *Eriogonum fasciculatum*, June 4, 1941 (Timberlake). *Additional paratypes*.—Two males, 11 miles west of Arden, Clark Co., on *E. trichopes*, June 6, 1941 (Timberlake).

Types in collection of the Citrus Experiment Station, Riverside.

Perdita xerophila fuscicornis, n. subsp.

(Fig. 903)

The female of *fuscicornis* has a dark face, like *discrepans*, but it differs in having the scape and pedicel of the antennae dark and the wings somewhat less whitened. The male differs from the other forms of *xerophila* only in having the scape a little broader, with the ventral edge no longer (or hardly longer) than the oblique apical margin.

Female.—Head and thorax dark blue; face below antennae fuscous. Collar of pronotum and tubercles, pale yellow. Abdomen fuscous; a more or less broad but enclosed yellow band on tergites 2 to 4 or 5 arcuately margined behind (especially on tergite 2). Legs brown or fuscous; anterior tibiae and tarsi, pale yellow; middle tibiae yellowish beneath. Mandibles testaceous

yellow with apex red. Tegulae pale yellow, or pale brown edged with yellow at base and broadly hyaline on outer margin. Wings whitish hyaline, nervures pale testaceous, subcosta and margins of stigma brown.

Structural characters, including sculpture and pubescence, as in other races of *xerophila*, with parts of marginal cell beneath and beyond stigma about equal in length. Length: 3.8–3.9 mm.; anterior wing, 2.6–2.7 mm.

Male.—Not differing from other races of *xerophila*, except scape of antennae appreciably broader, with ventral edge and oblique apical margin subequal (cf. figs. 902 and 903).

Holotype female, allotype, and paratypes.—Three females, 37 males, 5 miles west of Lone Pine, Inyo Co., California, on *Eriogonum inflatum*, June 4, 1937 (C. D. Michener). *Additional paratypes*.—Inyo Co.: 1 female, 4 males, Mazourka Canyon, 6,000 feet, Inyo Mts., on same flower, June 1, 1937; 4 males, Westgard Pass, on same flower, June 15, 1937 (Michener); and 1 male, Darwin Falls, on *Larrea*, May 30, 1937.

Types at present in collection of the Citrus Experiment Station, Riverside; paratypes in collection of the University of Kansas, Lawrence.

***Perdita varleyi varleyi*, n. subsp.**

(Figs. 825, 826, 891, 904)

This species was known originally only from males, which have the scape of the antennae unusually broad and oblique (fig. 904). Subsequently females were found associated with such males, but they are distressingly similar to females of *discrepans*, although there seems to be no doubt that they actually belong with *varleyi*. The discovery of *varleyi* near Idria in San Benito County confirms this association, although the Idria specimens constitute a subspecies with snowy-white wings.

Male.—Head and thorax dark green. Anterior margin of gular region, inferior orbits to middle of eyes (usually very narrowly), mandibles except red tips, labrum, face to level of foveae, and antennae, bright yellow. Small cuneate spot on hind corners of pronotum, sometimes collar narrowly, and tubercles, pale yellow. Abdomen yellow beneath and brown or brownish fuscous above; basal tergite and three apical ones darker; tergites 2 to 4 (or 2 and 3) with an enclosed yellow band, or sometimes mainly yellow with a dark apical band. Legs yellow; upper side of middle and hind coxae fuscous; outer margin of hind tibiae sometimes with fuscous tinged. Tegulae hyaline, with yellow base. Wings somewhat whitish hyaline, nervures testaceous, margins of stigma and subcosta brown.

General structure of head nearly as in *labrata*, but supraclypeal prominence broader, and antennal sockets much more than their own diameter apart. Antennae very distinctive: scape much produced beneath, appearing much broader than long, with part of ventral edge nearly aligned with oblique apical margin; flagellum incrassate, hardly thicker toward apex, antennal joints 4 to 12 broader than long. Proboscis a little longer than in allied species, tip of galeae in repose reaching about three-fourths of distance to base of stipites. Facial foveae punctiform. Mandibles tapering from broad base to very acute tip and reaching well beyond far margin of proboscoidal fossa. Flanks of pronotum moderately impressed. Pterostigma nearly as long and as broad as first submarginal cell; marginal cell rather long, with parts beneath and beyond stigma subequal, and part beyond distinctly longer than wide. Head and thorax shining, frons and vertex distinctly, mesonotum faintly tessellate. Pubescence whitish, thin and rather short: face nude, except for fine short hair on a small area between and just above antennae; labrum with long bristle-like hairs at outer ends as in *labrata* and *xerophila*. Tergite 7 with apical lobe short and rounded. Subgenital plate longer than wide, nearly parallel-sided, slightly rounded at apex, and with short fine setae on apical part of disk. Genitalia much as in *labrata* and *xerophila*; broad apical part of sagittae in dorsal view longer than wide, narrowed about one-half to apex; apex slightly less broad than in *xerophila*. Length: 2.6–3.3 mm.; anterior wing, 1.9–2.4 mm.

Female.—Head and thorax dark blue; face fuscous below antennae except on each side opposite subantennal plates. Collar of pronotum and tubercles, pale yellow. Abdomen orange-yellow; tergite 1 and apical margin of tergites 2 to 4 fuscous, or with yellow reduced to an enclosed band on tergites 2 to 4 or 5. Legs fuscous; apex of front femora, front and middle tibiae and tarsi, yellow. Mandibles testaceous yellow; apical fourth red. Antennae brownish fuscous; scape, pedicel, and extreme base of flagellum, yellow; pedicel fuscous above and scape sometimes considerably infuscated. Tegulae and wings as in male.

Structural characters, including sculpture and pubescence, as in *xerophila* and *labrata*, except that proboscis and marginal cell (probably not too reliable) are like those of the male. Length: 3.2–4 mm.; anterior wing, 2–2.6 mm.

Holotype male and paratypes.—Eleven males, 4 miles north of Warrens Well, San Bernardino Co., California, on *Eriogonum fasciculatum* var. *polifolium*, June 1, 1937 (George C. Varley).⁴

Allotype female and paratypes.—Seven males, 8 females, 4 miles northwest of Acton, Los Angeles Co., on *E. inflatum*, Aug. 25, 1958 (R. H. Painter); 1 male, 2 females, same date (E. I. Schlinger); and 1 male, Acton, Aug. 25, 1958 (Painter).

Types in collection of the Citrus Experiment Station, Riverside, except two paratypes returned to Professor Varley.

Perdita varleyi niveipennis, n. subsp.

This race of *varleyi* has snowy-white wings, and its discovery may indicate that somewhere in their distributional range the females of *varleyi* and *xerophila* may be indistinguishable.

Female.—Like typical *varleyi* in color and markings except wings milky white, nervures colorless, stigma white, and subcosta pale ferruginous or brownish. In other characters like *varleyi*, except for tip of galeae barely going beyond middle of stipites when folded in repose, and part of marginal cell beneath stigma often longer than part beyond (longer in 11 specimens, subequal in 11, shorter in 4). Length: about 3.5–4.5 mm.; anterior wing, 2.5–2.8 mm.

Male.—Like typical *varleyi*, except wings milky hyaline, with subcosta and margins of stigma pale brownish. Length: 3.2 mm.; anterior wing, 2 mm.

Holotype female, allotype, and paratypes.—Twenty-six females, 1 male, 10 miles north of Idria, San Benito Co., California, on *Eriogonum inflatum*, July 12, 1959 (M. S. Wasbauer).

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

⁴ Two females taken by Varley at the same time and place have been assigned to *P. labrata*.

SUPPLEMENT TO PARTS I TO IV

Most of the material considered here was not available when the earlier parts of this work were completed.

Subg. *Macroteropsis* Ashmead

A new key to the males of this group has been prepared to show the relationship of *haplura* and *magniceps* to the other species.

1. Mandibles simple, acute, or subacute at apex.....2
 Mandibles bidentate, the inner tooth at or near apex.....3
2. Head dark greenish, with clypeus and a narrow supra-clypeal mark testaceous yellow; head much broader than long, broadest and truncate anteriorly, cheeks about as wide as eyes and rounded beneath; wings slightly whitish, nervures testaceous.....*arcuata* Fox
 Head ferruginous, becoming yellow below level of antennae, subtruncate anteriorly, not much narrowed behind and less transverse than in *arcuata*; cheeks very broad, angulate opposite middle to eyes, where width equals length of eyes; thorax and abdomen partly ferruginous; wings milky hyaline, nervures pallid.....*magniceps* Timberlake
3. Wings milky hyaline, nervures pallid; clypeus transverse, almost reaching level of antennae, subantennal plates broader than long4
 Wings not whitened; head truncate anteriorly; clypeus short and transverse, but not reaching level of antennae, subantennal plates small, but not transverse.....5
4. Teeth of mandibles unequal, inner tooth preapical; disk of clypeus not produced over base of labrum, its apical margin often slightly emarginate on each side to set off a slight, triangular, median lobe; head ferruginous, the vertex and cheeks blackish, the face with a smoother blisterlike area on each side opposite the middle of eyes; abdomen dusky ferruginous*portalis* Timberlake
 Mandibles bifid at apex, teeth subequal; head very large, much wider than long; disk of clypeus subtrilobate at apex and projecting far over base of labrum; subantennal plates much broader than long and obliquely transverse; head ferruginous, black behind, and with a large black mark, widening above, opposite upper half of each eye; abdomen dark, depressed, almost as broad as long and much broader than thorax.....*haplura* Cockerell
5. Face testaceous yellow below level of antennae, abdomen ferruginous; head much broader than long, cheeks rounded beneath and about as broad as eyes; disk of clypeus much broader than high and slightly dentate at anterior corners; subantennal plates about as broad as long, face with short appressed whitish hair.....*laticornis* Cockerell
 Like *laticornis* in most characters, but hair of face slightly thinner and second ventral segment of abdomen with a small, median conical process.....*echinocacti* Timberlake

Perdita haplura Cockerell

(Figs. 827, 828, 892)

Perdita haplura Cockerell, 1922, Proc. U. S. Nat. Mus., 60, Art. 18:19, ♀; Timberlake, 1960, Univ. Calif. Publ. Entom., 17:124.

Male.—Head ferruginous (somewhat reddened by cyanide in specimens examined and possibly more yellowish than ferruginous in life); vertex and occiput black; a large black mark on each side of frons, rounded above, narrowed to a point below, and touching upper half of each eye; ferruginous color extends above each black mark to summit of eyes and sometimes emits two slender lines, one running straight back from eye, and one (originating further mesad) running obliquely inward for a short distance. Thorax black, the anterior third of mesoscutum greenish, and propodeum dark blue. Tubercles testaceous yellow. Abdomen brownish fuscous, with apical depression of tergites slightly paler. Legs fuscous, apex of front femora, front tibiae, and all tarsi, ferruginous. Antennae almost uniformly ferruginous, but first six joints of flagellum with faint dusky ring at apex and fifth and sixth joints with a transverse blackish

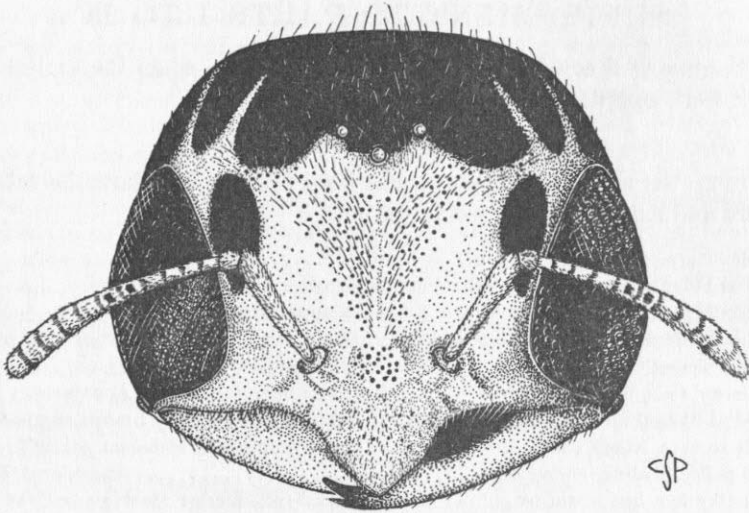


Figure A. *Perdita haplura*. Frontal view of head of male.

spot. Tegulae testaceous at base, subhyaline on outer margin. Wings white and subopaque, nervures yellowish white.

Head much broader than long, broadest and truncate anteriorly except for projecting disk of clypeus. Cheeks broad, broadening to somewhat wider than eyes posteriorly. Vertex also very broad behind eyes and ocelli; posterior pair of ocelli about twice their distance apart from margin of eyes and nearly as far from occipital margin. Mandibles stout, strongly curved, bifid at apex; outer tooth larger and sharper; base of mandible lying one-half or more below level of eye in lateral view of head. Proboscis just barely exceeding fossa, which is narrowed posteriorly. Labrum rounded, about as long as broad, rather small. Clypeus transverse; disk as high as broad, almost reaching level of antennae, extending triangularly far over base of labrum, and with a very slight obtuse lobe on each side; lateral extensions almost perpendicularly reflexed but partly visible as narrow pointed lobes extending on each side somewhat more than halfway to base of mandibles. Subantennal plates obliquely and narrowly transverse, but broadening outwardly. Facial foveae forming a large, faint, circular, shining depression in black mark on each side of frons. Flanks of pronotum very broad, with anterior and posterior halves meeting in a deep reëntrant angle. Venation normal for *Macroteropsis*, with pterostigma extremely narrow and marginal cell almost equally pointed at each end. Head minutely tessellate and moderately shining; frons with minute close punctures in median area and none in a broad area on each side; vertex with fine and well-separated punctures distinctly coarser than those of frons. Thorax minutely tessellate, a little duller than head; the mesoscutum with minute punctures about one to two puncture widths apart; scutellum with coarser and sparser punctures; propodeum more coarsely tessellate and more shining than other parts. Abdomen shining and impunctate. Head mainly nude, middle of frons with short fine hair, vertex with longer erect hair; hair of mesoscutum short, fine, and appressed, with a few coarser hairs interspersed; pubescence of apical segments of abdomen very fine and appressed. Abdomen depressed, convex above, concave beneath, much broader than thorax and almost as broad as long. Tergite 7 narrowed to broadly rounded apex. Subgenital plate as broad as in *portalis*; apical half of disk narrowed to rounded apex. Caulis of genitalia about one-fourth longer than wide, basal orifice large, apical lobes broad and blunt with a small angular projection on outer margin possibly representing a paramere; only one pair of volsellae but these very large and with numerous black tubercles on obliquely inclined outer face; sagittae cylindrical, increasing slightly in width on apical half, the chitinized outer rods spreading slightly apart and bifid at apex, with outer prong blunt, inner one acute and united with membrane forming eversible sac which

emerges at this point. Length: about 5 mm.; greatest width of head, 1.9 mm.; greatest width of abdomen, 2.2 mm.; anterior wing, 3.4 mm.

Material examined.—Two males, Sanderson, Terrell Co., Texas, May 10, 1951 (O. Bryant); in collection of the California Academy of Sciences. (The type female of *halpura* was collected at Sanderson, May 9, 1912.)

Subg. *Heteroperdita* Timberlake

In the supplements in Parts III and IV two new species of *Heteroperdita*, *P. maculosa* and *P. wasbaueri*, were described: still another new species of this elegant little group is now at hand.

Perdita scutellaris, n. sp.

(Figs. 829, 830, 893)

This bee has an orange-ferruginous abdomen with an apical white band on each segment. Both sexes run to *coldeniae* in the table in Part I (Univ. Calif. Publ. Entom., 9:366) but the lateral face marks are continued narrowly to the summit of eyes, the scutellum is yellow, and the yellow spot at the base of propodeum is comparatively small. The pygidial plate of the female is also very distinctive, as are the mandibles, which are short, almost straight, and very blunt, and have a small rounded lobe projecting from the inferior margin at the apex, and a comb of coarse, stiff, incurved bristles along the inferior margin of the shaft, the bristles becoming very short at the little lobe.

Female.—Head and thorax black. Mandibles except rufotestaceous apical half, labrum, clypeus, supraclypeal and lateral marks, white. Lateral marks extending narrowly along orbits to summit of eyes, there expanding and becoming distinctly yellow and bending outward more or less around summits, although reduced to a thin line between facial foveae and eyes. Collar of pronotum, broad band on hind border of disk, tubercles, lateral margins of mesoscutum very narrowly, axillae, scutellum, and a triangular mark generally a little broader than long on base of propodeum, pale yellow. Abdomen orange-ferruginous; a broad white band at apex of tergites 1 to 5 extending to cover lateral margins on tergites 2 to 5, with ferruginous color enclosed, oblique at outer ends and broadly emarginate between two small rounded lobes. Tergite 1 similarly colored, but with two cut-off circular spots instead of rounded lobes. In some specimens, ferruginous bands reduced in width, with white color predominant. Lateral foveae of tergite 2 black. Legs black; apex of femora including apical half of posterior side of front pair, tibiae, and tarsi, white, but middle tibiae with a dusky mark behind, hind tibiae black behind except on basal third, and four apical joints of hind tarsi dusky. Scape of antennae pale yellow, pedicel and flagellum testaceous yellow, first three joints of flagellum with fuscous ring above. Tegulae whitish at base, testaceous hyaline at outer margin. Wings hyaline, nervures pale testaceous.

Head a little longer than wide, with facial quadrangle distinctly longer than wide, but head otherwise much as in allied species. Clypeus strongly convex from side to side, but not especially prominent. Proboscis moderately elongate and when extended about twice as long as head; both maxillary and labial palpi rather long and slender, but not reaching apex of galeae. Facial foveae about twice as wide as interval between them and eyes and reaching from upper level of antennal sockets about halfway to level of anterior ocellus. Ocelli slightly larger than usual; posterior pair about equally distant from each other and from nearest eye and hardly more than their own diameter from occipital margin. Pterostigma much more lanceolate than in *coldeniae*; marginal cell more elongate and more nearly equaling length of first submarginal cell, part beyond stigma distinctly longer than part beneath. Foveae of tergite 2 small, oval, about twice as long as wide. Pygidial plate rather broad across base but narrowing rapidly to slender apical part, which is about twice as long as wide, almost parallel-sided, and bifid at apex, with two little teeth separated by a semicircular notch. Front and middle femora and middle tibiae dilated

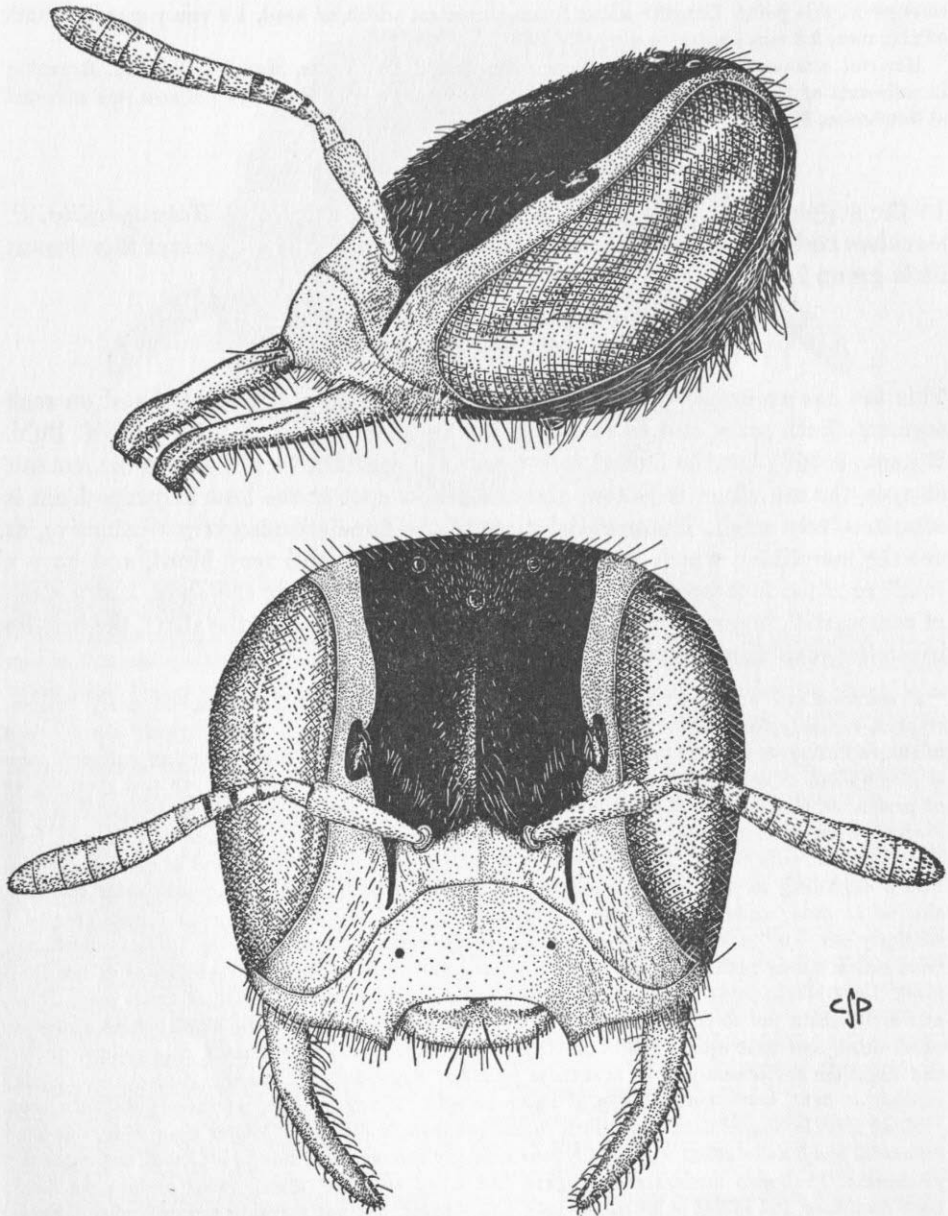


Figure B. *Perdita scutellaris*. Lateral and frontal view of head of female.

more than usual, middle femora widest close to base, there being nearly half as wide as long. Head and thorax minutely tessellate and dullish, but sculpture not so excessively fine as in *coldeniae* and other allied species. Middle of frons just before anterior ocellus sometimes with a group of six to ten fine punctures, which may be concealed by pubescence. Pubescence white, plumose, appressed and more or less dense on lower half of face, upper exposed part of cheeks and occiput, meso- and metapleura of thorax, apical half of front femora, and most of dorsum of thorax, including lateral ridges of propodeum; a large bare area on each side of frons, a

small bare spot at middle on each side of mesonotum, scutellum thinly hairy, and disk of clypeus nude; undersurface of head on each side of proboscoidal fossa invested with long, simple, slightly curved hairs, directed backward. Length: about 4 mm.; anterior wing, 2.8 mm.

Male.—Colored much as in the female; but mandibles except tips, posterior orbits to middle of eyes, and face below level of antennae, white. Lateral face marks similar but more expanded just above level of antennae. Ferruginous color of abdomen present on tergites 1 to 6. Tibiae and tarsi of all legs entirely white. Flagellum of antennae paler than in female, especially beneath, but the two apical joints pale brownish and first two joints faintly ringed with fuscous coloration above. Tegulae and wings as in female.

Head and facial quadrangle no longer than wide, but head otherwise shaped about as in female. Facial foveae not discernible. Mandibles slender, tapering, and acute. Flanks of pronotum not impressed. Sculpture and pubescence about as in female, but punctures not discernible on upper middle of frons. Tergite 7 of abdomen produced into a triangular apical lobe, with base of triangle somewhat convex, apical part plane, and tip narrowly obtuse. Subgenital plate quadrate, slightly longer than wide, convex on outer ventral surface, disk nearly nude. Caulis of genitalia nearly as long as wide (with inclusion of dorsal lobes about twice as long as wide); dorsal lobes elongate, parallel-sided, incurved beyond basal part, and with broad and almost truncate tips; parameral lobes ventral, almost hidden in dorsal view, slender, and much shorter than dorsal lobes; volsellae slender and cylindrical, superior pair curved and with only one tubercle at apex, inferior pair slightly clavate and with about five or six tubercles; basal rods of sagittae a little longer than apical part; rods of apical part ventral in position, distinctly clavate, and spreading apart, but joined briefly on dorsal side at apex by subchitinized extensions; eversible sac emitted from apex of sagittae. Length: 2.9 mm.; anterior wing, 2.5 mm.

Holotype female, allotype, and paratypes.—Nine females, 1 male, 18 miles west of Blythe, Riverside Co., California, on *Coldenia plicata*, April 16, 1958 (P. D. Hurd, Jr.). *Additional paratypes*.—Five females, 3 males, sand dunes west of Glamis, Imperial Co., on *Eriogonum deserticola* June 13 and 28, 1960; 2 females, 5 males, same locality and flower, July 25; 3 females, same locality, on *Coldenia plicata*, June 28 and July 12; and 5 females, 2 miles west of Glamis, on *C. plicata*, July 25 (R. C. Dickson).

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

Subg. *Glossoperdita* Cockerell

Perdita navarretiae powelli, n. subsp.

This bee is so similar to *navarretiae* in color, markings, venation, and sculpture that I place it as a subspecies although the proboscis seems to be somewhat shorter. If it were assigned to the subgenus *Epimacrotera* it would fall with *namatophila*, which has the thorax except tubercles entirely blue and the pterostigma much longer and broader. The male of *powelli* differs from the two forms of *navarretiae* previously known in having the cheeks broader, the lateral white marks of face evenly truncated just below the level of antennae, the subantennal plates dark and abdominal markings on only the first two tergites. The female is distinguished from *angusticeps* by the apparently shorter proboscis, the entirely dark face, and the greater development of the white markings on the abdomen.

Male.—Head and thorax dark blue; meso- and metanotum and subantennal plates of face black; anterior edge of cheeks reddened, especially so close to base of mandibles. Mandibles white at base, testaceous broadly at middle and red at apex. Labrum white, tinged with testaceous coloration. Most of face below antennae except subantennal plates, interrupted band on posterior margin of disk of pronotum, and tubercles, white. Disk of clypeus narrowly edged with black on dorsal margin; lateral marks about as high as wide, very broad below and evenly truncate just below level of antennae; supra-clypeal mark transverse. Abdomen almost uniformly ferruginous above and beneath; a yellowish white band just in front of apical depression on

tergites 1 and 2, rather narrowly interrupted on each side of tergite 1, much more broadly interrupted on tergite 2. Legs fuscous; extreme apex of all femora, front and middle tibiae except beneath, front and middle tarsi except apical joint of middle pair, tinged with brown; hind tibiae brown with white base, and hind tarsi pale brown. Antennae blackish, flagellum gradually changing to brown on apical half, apical eight joints yellowish beneath. Tegulae testaceous hyaline, becoming darker at base, with an anterior white spot. Wings dusky hyaline, nervures and margins of stigma brown.

Head quadrate, as broad as long, anterior half of inner orbits diverging below. Cheeks much broader than eyes, evenly rounded and broadest just above level of middle of eyes. Disk of clypeus prominent and about as high as wide. Lateral plates of face very broad anteriorly. Proboscis distinctly although not greatly exceeding unusually wide and deep proboscoidal fossa. Mandibles stout, strongly curved, tapering, acute at apex. Facial foveae linear, about their own width from margin of eyes and not quite half as long as space between antennal sockets and anterior ocellus. Posterior ocelli nearly equidistant from nearest eye and occipital margin. Flanks of pronotum only slightly impressed. Pterostigma lanceolate, with only a slender pale streak between dark margins; first submarginal cell broad and shorter than marginal cell; marginal cell nearly parallel-sided, truncate at apex, with part beneath stigma somewhat shorter than part beyond. Head and thorax minutely tessellate and moderately shining, frons and vertex duller than other parts; puncturation extremely fine, close but rather indistinct on frons, sparse on vertex and mesonotum, and sparse, scattered, and coarser on clypeus. Pubescence whitish, short, subdepressed, and thin, that of face mostly radiating from bases of antennae; hair of gular region, underparts of thorax, metanotum, and sides of propodeum somewhat longer and more erect. Abdomen ovate, subdepressed, and broader than thorax. Apical lobe of tergite 7 somewhat longer than wide and subtruncate at apex. Subgenital plate and genitalia essentially as in *navarretiae* and *angusticeps*, but having six dark tubercles evenly spaced in a straight line on margin of inner or inferior pair of volsellae, and *navarretiae* having only five tubercles, one being offset. Length: 4.5 mm.; anterior wing, 2.8 mm.

Female.—Head and thorax dark blue, with slight purple luster on head. Labrum, clypeus, supraclypeal area, anterior part of sides of face opposite clypeus, pronotum, mesoscutum except anterior border, scutellum, and metanotum, black or blackish; basal part of labrum more brownish. Interrupted band on hind border of pronotal disk, and tubercles, white. Abdomen brown, with a preapical white band on tergites 1 to 4; band on tergite 1 rather broad, deeply but rather narrowly notched on each side behind, and bent forward on lateral margins at each end; bands on tergites 2 to 4 interrupted on each side, with lateral marks broad and quadrate and median mark narrow and indistinctly interrupted at middle. Venter pale brown, suffused with dull yellow across base of second to fourth segments. Legs blackish, tarsi yellowish (but front legs and antennae lacking). Tegulae and wings as in male.

Head distinctly longer than wide; cheeks strongly receding and nearly as wide as eyes. Clypeus very prominent and labrum slightly broader than long. Mandibles stout, with small inner tooth. Proboscis moderately elongate, galeae and glossa shorter than long stipites. Facial foveae linear, about their own width from margin of eyes and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Venation as in male. Pygidial plate very narrow, acute at apex. Frons microscopically tessellate, dull, and with extremely fine and moderately sparse punctures; cheeks and face below antennae more shining, with comparatively coarse punctures on clypeus; mesoscutum tessellate, moderately dull, with fine sparse punctures; punctures of scutellum nearly as coarse as those of clypeus. Pubescence thin and whitish, much abraded in type, but frons and mesonotum presumably almost nude, as in female of *angusticeps*. Length: 4 mm.; anterior wing, 2.9 mm.

Holotype male and allotype.—Grass Valley, Nevada Co., California, July 5, 1956 (J. Powell), in collection of the Citrus Experiment Station, Riverside.

Subg. *Epimacrotera* Timberlake

As five additional species have been discovered since the initial work on this group, a new key to the females of *Epimacrotera* has been prepared.

1. Abdomen ferruginous 2
 Abdomen dark 4
2. Head and thorax with white markings, or only tubercles white..... 3
 Head and thorax without light markings; mesonotum strongly tessellate, dull, and with sparse, fine punctures *dichroa* Timberlake
3. Larger species, about 5 mm. long; median mark on clypeus and large subquadrate lateral marks, white; face with sparse, fine, erect hair..... *ainsliei* Crawford
 About 3 mm. long; small lateral face marks, sometimes lacking, and small spot on tubercles, white; face with coarse subappressed white hair; mesonotum moderately shining and rather closely punctured *crassula* Timberlake
4. Head as wide as long, or wider than long 5
 Head longer than wide; mesoscutum almost polished and with fine, rather sparse punctures; head and thorax blue-green without light markings; disk of mesoscutum and scutellum, black *nigriventris* Timberlake
5. Abdomen with white markings on lateral margins of tergites 1 to 3 or 4..... 6
 Abdomen entirely dark 7
6. Markings of face restricted to a small white mark adjacent to clypeus on each side; abdomen with a white mark on each side of tergites 1 to 3, those on tergite 1 small; mesoscutum delicately tessellate and dullish, with rather close fine punctures, area bordering scutellum duller and more densely punctured *polycarpae* Timberlake
 Lateral face marks large and reaching margin of eyes, and clypeus with a small median mark and a larger one on each side; abdomen marked with white on each side of tergites 1 to 4; mesoscutum dull, with almost dense fine punctures..... *williamsi*, n. sp.
7. Mesoscutum more weakly or minutely tessellate, at least moderately shining, and with punctures more or less distinct, although sometimes very minute..... 8
 Mesoscutum strongly tessellate, dull, and with punctures sparse, minute, and obscure; dark blue-green, with clypeus black, shining, and strongly punctured..... *diversa* Timberlake
8. Face with white lateral marks, sometimes small marks on disk of clypeus..... 9
 Face and clypeus without light markings; tubercles of thorax white; mesoscutum distinctly tessellate, moderately shining, and with sparse distinct punctures; dark blue-green, with clypeus shining and black *nanula* Timberlake
9. Mesoscutum more strongly tessellate or more strongly punctured..... 10
 Mesoscutum rather dull, with extremely fine tessellation and very minute, close punctures; lateral marks of face rather small, and disk of clypeus sometimes with three small white spots *binotata* Timberlake
10. Mesoscutum distinctly tessellate, dullish, and with moderately close fine punctures; head and thorax dark blue-green, clypeus shining black and coarsely punctured; lateral marks of face rather large and almost reaching level of antennae; thorax entirely dark
biguttata, n. sp.
 Mesoscutum weakly tessellate, shining, with punctures distinct, fine, and moderately close; head distinctly broader than long; lateral face marks broader than high and reaching hardly above level of clypeus; mesonotum more brassy green than in allied species; tubercles white *euphorbiae* Timberlake

Perdita crassula Timberlake

Perdita crassula Timberlake, 1958, Univ. Calif. Publ. Entom. 14:381, ♂.

Additional specimens of this species, including the female, are now at hand from Willcox, Arizona.

Female.—Head and thorax dark green, propodeum more bluish. Labrum and clypeus black, or black tinged with brown. Mandibles except red tips, small lateral face marks, and tubercles, white; face marks hardly reaching level of antennae, or sometimes lacking. Abdomen ferruginous, foveae of tergite 2 black. Legs brownish fuscous, hind knees testaceous, apex of front femora,

front tibiae except behind, front tarsi, and middle knees, pale yellowish. Antennae fuscous, flagellum pale brown beneath. Tegulae white at base and hyaline on outer margin. Wings faintly dusky, nervures testaceous brown, subcosta and margins of stigma fuscous.

Head slightly wider than long; inner orbits slightly converging below. Mandibles moderately stout, subacute at apex, with a small inner tooth. Proboscis short, as in male, galeae much shorter than stipites and exceeded by short labial palpi. Facial foveae about their own width from margin of eyes, narrowed to a point above, and reaching from level of upper margin of antennal sockets hardly more than halfway to level of anterior ocellus. Pterostigma about half as wide as first submarginal cell; marginal cell moderately long, parts beneath and beyond stigma subequal, apical truncation shorter than metacarpus. Abdomen of normal shape for *Perdita*, pygidial plate moderately broad and narrowed to obtuse apex. Tarsal claws with a small inner tooth. Head and thorax finely tessellate and moderately shining; rather close fine punctures on frons, somewhat sparser punctures on mesonotum, vertex nearly impunctate. Pubescence whitish, moderately thin: hair of face, cheeks, and mesonotum short, suberect, and moderately coarse; that of underparts of thorax longer and finer. Length: about 3 mm.; anterior wing, 2.1–2.3 mm.

Material examined.—Three females, 3 males, Willecox, Cochise Co., Arizona, on *Euphorbia*, Aug. 14, 1958 (P. D. Hurd, Jr.); and 2 males, same data (R. M. Bohart and D. D. Linsdale).

Perdita williamsi, n. sp.

(Figs. 831, 832, 894)

This bee is so similar to *polycarpae* that it conceivably could prove to be a race of that species, but the light markings are more extensive and the sculpture stronger.

Female.—Head and thorax dark green, becoming more bluish on pleura and propodeum. Labrum testaceous brown. Disk of clypeus black, large mark on each side and small irregular median mark, white. Lateral face marks also white, about as high as wide, rounded toward clypeus, filling space between clypeus and eye, and reaching level of antennae. Thorax dark except for large yellowish-white mark on tubercles. Abdomen blackish; yellowish-white mark on lateral margins of tergites 1 to 4, small on tergite 1, covering outer fourth of segment except apical depression on tergites 2 and 3, and small to moderately large on tergite 4. Legs black, tarsi brownish, knees, front tibiae, and outer side of middle tibiae except toward apex, white. Mandibles testaceous brown, becoming redder at apex and infuscated at base. Antennae blackish; flagellum brownish yellow beneath. Tegulae yellowish white at base and testaceous hyaline on outer margin. Wings dusky hyaline; nervures testaceous brown; stigma except yellowish-white central streak, and subcosta, fuscous. Median spot on clypeus or spots on either tergite 1 or tergite 4 are sometimes absent.

Head much broader than long; inner orbits nearly parallel. Proboscis short, galeae much shorter than stipites. Mandibles stout, with a small inner tooth. Facial foveae linear and tapering to a point above, about their own width from margin of eyes and reaching from level of middle of antennal sockets halfway to level of anterior ocellus. Pterostigma slender, little more than half as wide as first submarginal cell, with radius inserted at middle; marginal cell as long as stigma, with part beneath stigma shorter than part beyond. Pygidial plate triangular and narrowly obtuse at apex. Head and thorax dullish and minutely tessellate; face below antennae smooth, with only a few shallow punctures; frons with fine, rather close punctures, and vertex nearly impunctate except on occipital border; anterior half of mesoscutum sculptured much like frons, but posterior middle becoming slightly duller and almost densely punctured; punctures on scutellum sparser and stronger than those on scutum. Pubescence whitish, short, erect, and moderately dense on face and mesonotum, becoming longer on underparts of thorax. Length: 3.5 mm.; anterior wing, 2.3–2.4 mm.

Male.—Head and thorax dark green. Mandibles except red tips, labrum, face below level of antennae except supraclypeal area, underside of scape and pedicel of antennae, and tubercles, white. Antennae fuscous above, flagellum brownish yellow beneath. Abdomen blackish, tergite 7 testaceous; a large white mark on each side of tergites 2 and 3, and sometimes a small white

mark on each side of tergite 4. Legs fuscous; extreme apex of femora, front and middle tibiae, basal third of hind tibiae, and all tarsi, yellowish white. Tegulae and wings as in female.

Head much broader than long; inner orbits somewhat divergent above. Cheeks receding and much narrower than eyes. Disk of clypeus somewhat less than twice as broad as high, rounded above, with broad lateral extensions partly visible in frontal aspect of head. Mandibles stout, reaching far margin of proboscis fossa, and with an obtuse inner tooth. Facial foveae faint, about two to three times as long as wide. Posterior ocelli about their own distance apart from margin of nearest eye, much closer to occipital margin. Head and thorax above strongly but minutely tessellate and dull, frons obscurely punctured, punctures on mesoscutum very fine and rather close, those on scutellum sparser and coarser. Pubescence fine and whitish, much as in female, but hair on outer side of hind tibiae coarse, as in other males of this group. Subgenital plate and aedeagus much as in *polycarpae*, but outturned apical points of sagittae slightly longer, and parameral lobes more sinuate and in lateral view more expanded toward apex, which appears to be obliquely truncate. Length: 3 mm.; anterior wing, 2 mm.

Holotype female, allotype, and paratypes.—Three females, 1 male, 10 miles east of Bahia San Quintin, Baja California, Mexico, on *Euphorbia*, Sept. 9 and 10, 1955 (F. X. Williams). *Additional paratypes.*—Two females, 1 male, La Paz, Oct. 7 and 11, 1955 (Williams).

Types in collection of the California Academy of Sciences; two paratypes in collection of the Citrus Experiment Station.

Perdita biguttata, n. sp.

This bee is similar to *euphorbiae* but more blue-green, with somewhat larger lateral face marks, the head and thorax duller, and the punctures of the frons comparatively dense. The proboscis is shorter and the sculpture much coarser than in *binotata*.

Female.—Head and thorax dark blue-green; labrum and clypeus black. Lateral face marks white, rather large and quadrate, somewhat broader than high and almost reaching level of antennae. Thorax and abdomen entirely dark, abdomen black. Legs black; a small white spot at base of front tibiae; tarsi brownish. Antennae blackish, flagellum brown beneath. Tegulae testaceous at base, hyaline on outer margin. Wings somewhat dusky hyaline, nervures testaceous brown, subcosta and margins of stigma fuscous.

Head somewhat broader than long, but less transverse than in *euphorbiae*. Mandibles stout, rather obtuse at apex, with a small inner tooth. Proboscis short, galeae shorter than stipes. Facial foveae linear, about their own width from margin of eyes and reaching from level of upper margin of antennal sockets about two-thirds of distance to level of anterior ocellus. Venation as in *crassula* except that part of marginal cell beyond stigma distinctly longer than part beneath, with radius meeting stigma beyond its middle; pterostigma about same width as in *euphorbiae*, narrower than in *binotata*. Pygidial plate triangular, almost as broad at base as long, and narrowly obtuse at apex. Head and thorax tessellate and moderately shining, punctures on frons finer and much closer than on mesonotum; vertex with only a few scattered punctures; face below antennae smooth, shining and with rather coarse and moderately close punctures. Pubescence whitish, short, erect, and abundant on face, cheeks and mesonotum, and longer but no denser on underside of thorax except on the front coxae. Length: 4 mm.; anterior wing, 2.6 mm.

Holotype and paratype.—Two females, 18 miles northeast of Douglas, Cochise Co., Arizona, on *Eriogonum abertianum* var. *neomexicanum*, Sept. 5, 1958 (P. D. Hurd, Jr.).

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

Subg. *Pentaperdita* Cockerell and Porter

Perdita nigrifacies Timberlake

This little-known species is now represented by two additional specimens. One female, collected nine miles south of Fresno, Zacatecas, Mexico, on *Zaluzania*

globosa, Aug. 20, 1956 (J. W. MacSwain) is similar to the one reported from C. del Maiz, San Luis Potosi (Univ. Calif. Publ. Entom., 14:386), but lacks the remnants (or precursors) of a band on tergite 5. Another female, from El Huisache, San Luis Potosi, Aug. 22, 1954 (J. G. Chillecott), has a narrow arcuate band on tergites 2 to 5; each band, except that on tergite 5, reaches the lateral margins, and all are narrowly interrupted in the middle, that on tergite 2 a little more widely than the others. This specimen has sparser and finer punctures on the face and mesonotum and may possibly be distinct. More material of this interesting species is needed—including the male, which is as yet unknown.

Subg. *Hexaperdita* Timberlake

***Perdita heterothecae trizonata*, n. subsp.**

P. heterothecae was described from Tempe and Phoenix, Arizona, and the female was said to have a straight, narrow, whitish band, slightly interrupted medially, at the base of tergites 2 to 4. In the limited amount of material at hand from the Phoenix area, half of the females have the bands slightly interrupted, but in California material the bands are nearly always interrupted. Of ten females collected near Globe, Arizona, however, only two have interrupted bands and less than two per cent of the females collected at or near Willcox, Arizona, have the band interrupted. In discussing *heterothecae* in 1956 I mentioned the possibility that it might intergrade with *bishoppi*, but at Willcox, the easternmost point at which *heterothecae* has been collected, no trend toward intergradation is evident—in fact, the opposite trend is obvious. In view of this it is desirable to designate the Willcox material as a new subspecies.

Female.—Like typical *heterothecae* except for having light abdominal bands broader (usually about as broad as dark apical bands) and entire, although sometimes notched behind at middle. Band on tergite 2 reaching lateral foveae; those on tergites 3 and 4 ending a short distance from lateral margins of segments. As in typical *heterothecae*, ground color of abdomen sometimes pale orange-ferruginous, at least on apical segments.

Male.—Not differing appreciably from typical form.

Holotype female, allotype, and paratypes.—Eleven females, 2 males, Willcox, Cochise Co., Arizona, on *Aster intricatus*, Aug. 18, 1958 (P. D. Hurd, Jr.). *Additional paratypes*.—Two females, 10 males, Willcox, on *Aster intricatus*, Aug. 20, 1958 (E. G. Linsley); 3 males, Willcox, Aug. 14, and 4 females, 5 males, Aug. 18, 1958 (D. D. Linsdale); 3 males, Willcox, one marked from *Euphorbia*, Aug. 14, 1958 (R. M. Bohart); 1 female, 3.5 miles south of Willcox, Aug. 20, 1958 (Hurd); and 1 female, 4 males, 2.5 miles south of Willcox, Aug. 17, 1956 (E. Ordway).

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

Subg. *Pygoperdita* Timberlake

***Perdita malacothricis* var. *unica*, n. var.**

Although this bee looks, and possibly may be, distinct, because of the greatly reduced maculation of the abdomen, it is placed at present as a variety of *malacothricis*, with which it agrees in all peculiarities of structure and also in the color and markings of the head and thorax. Because of the slight roughness of the basal area of the propodeum it runs in the key (Univ. Calif. Publ. Entom., 11:276–284)

to *malacothricis*, but if this character is misinterpreted it would be looked for in the couplet defining the two forms of *nevadensis* (*malacothricis* itself, under the same circumstance, would go to *distropica*). If conspecific it should rank as a variety, as it was collected near the center of the known distributional range of *malacothricis*.

Female.—Head and thorax dark green; subantennal plates, mesoscutum except anterior border, scutellum, and metanotum, black. Two lateral marks and a median mark on disk of clypeus, transverse lateral face marks widening toward orbits, two small contiguous supra-clypeal spots, tubercles, and a small spot on posterior corners of disk of pronotum, white. Labrum, anterior border of clypeus and two stripes on its disk, brownish black. Abdomen fuscous, tinged with brown; a well-interrupted, pale-yellow band on tergites 1 to 4, that on tergite 4 more narrowly interrupted and broadly and shallowly emarginate behind on each side, each part of those on tergites 1 to 3 narrowed to a point within. Legs fuscous, knees and anterior side of front tibiae pale yellow. Antennae black, flagellum tinged with brown and becoming brownish yellow beneath. Tegulae white at base, testaceous hyaline on outer margin. Wings nearly clear hyaline, nervures testaceous brown, subcosta and margins of stigma fuscous.

Head broader than long; inner orbits somewhat diverging anteriorly. Facial foveae shallow, not sharply defined, a little less than their own width from margin of eyes and reaching from lower level of antennal sockets about two-thirds of distance to level of anterior ocellus. Mandibles stout, obtuse at apex, and with a distinct inner tooth. Proboscis moderately long and slightly exceeding fossa in repose. Disk of clypeus obtusely produced on each side of base of labrum. Subantennal plates large, but hardly longer than wide. Posterior ocelli slightly closer to nearest eye than their distance apart, distinctly more distant from occipital margin. Pterostigma rather small, shorter than marginal cell and no more than half as wide as first submarginal cell; marginal cell widest in basal half, part beyond stigma distinctly longer than part beneath. Pygidial plate less narrow than usual in *Pygoperdita*, nearly plane and obtuse at apex. Tarsal claws almost simple. Frons and vertex tessellate and dullish, punctures close on frons, occiput, and cheeks, becoming sparse on vertex; face below antennae shining, with punctures sharper than those on frons but much less close. Mesoscutum polished, almost impunctate on disk, but anterior border roughened by close sulcate punctures; scutellum with moderately close punctures; mesopleura rather closely and strongly punctured. Truncation of propodeum more strongly declined than usual and longer than basal part; basal area slightly roughened by fine longitudinal wrinkles. Abdomen shining, apical tergites minutely punctured. Pubescence fine and whitish, moderately abundant, short, and erect on face, becoming longer and denser on cheeks and occiput; mesonotum almost nude except for short erect hair on punctured anterior border of scutum; apical fimbria of abdomen pale ochraceous. Length: 6.75 mm.; anterior wing, 4.6 mm.

Holotype female.—Fan Hill Canyon, 10 miles northeast of Thousand Palms, Riverside Co., California, April 6, 1955 (W. R. M. Mason), in collection of the Canadian Department of Agriculture, Ottawa.

Subg. *Perdita* F. Smith

ZONALIS GROUP

The three new forms herewith described may be distinguished by means of the following key, which will supersede couplets 19 to 26 of the key to the species of the *zonalis* group (Univ. Calif. Publ. Entom., 14:304-315).

1. Mandibles comparatively massive, strongly curved on outer margin and dilated within, dilation narrowing gradually to apex.....*dicksoni* Timberlake and *adjuncta* Timberlake
- Mandibles less dilated within or abruptly narrowed before apex; an inner tooth sometimes set off by an indentation.....2

2. Abdomen with four narrow dark bands; pronotum entirely yellow or with a dark mark on flanks3
 Light parts generally pale yellow or creamy white; pronotum with a dark band across disk except in *pallidiventris*; abdomen with five dark bands, but only four in *haigi* which has the ground color white5
3. Flanks of pronotum more impressed than usual; frons rather strongly and closely punctured; mesonotum closely punctured and with coarse, short, erect hair4
 Light parts deeper yellow than in *oregonensis*; pronotum and almost entire face below level of antennae, light; frons finely and rather sparsely punctured, mesonotum moderately closely punctured*festiva* Timberlake
4. Subantennal plates generally entirely dark and flanks of pronotum with a large dark mark; dark bands of abdomen well developed*oregonensis oregonensis* Timberlake
 Pronotum entirely and face below level of antennae almost entirely light; dark bands of abdomen abbreviated, but band at junction of tergites 1-2 almost reaching lateral margins*oregonensis expleta*, n. subsp.
5. Tergite 1 with a dark band at apex only, or with a V-shaped dark band at base6
 Tergite 1 dark, with a more or less narrow light band; pronotum with a dark band across disk7
6. Pronotum pale yellow, with a dark mark on flanks; face marks creamy white, including a large supraclypeal mark; abdomen creamy white, with five dark bands, including a V-shaped band at base of tergite 1*pallidiventris*, n. sp.
 Pronotum pale yellow, with a dark band from flank to flank; clypeal and lateral face marks pale yellow; supraclypeal area, subantennal plates, and a large mark on disk of clypeus, black; abdomen creamy white with four narrow dark bands*haigi*, n. sp.
7. Frons somewhat dullish, more closely and more distinctly, although finely, punctured; light parts more or less yellow8
 Frons shining, generally less closely punctured; light parts usually yellowish white or creamy white9
8. Mandibles dilated within and abruptly narrowed before apex; supraclypeal mark sometimes large, but more often divided or evanescent; dark bands of abdomen broad, uneven; yellow band on tergite 2 slightly arcuate*aemula* Timberlake
 Mandibles comparatively slender; dark bands of abdomen rather narrow; yellow band on tergite 2 broad and even; supraclypeal mark divided into two spots or absent
stottleri flavida Swenk and Cockerell
9. Mandibles more slender and less curved on outer margin; pygidial plate broad, with apex broadly rounded and slightly notched10
 Mandibles moderately dilated within and rather strongly curved on outer margin; sides of pygidial plate nearly straight and converging to rather narrow and slightly retuse apex; markings creamy white, supraclypeal mark irregular or reduced to two spots; light band on tergite 1 narrowed to outer ends and expanded on each side of median crease
fraterna Timberlake
10. Frons with moderately close, uniformly fine punctures; face marks almost creamy white, supraclypeal mark well developed; abdomen pale yellow with five dark bands; light band on tergite 1 narrow and interrupted*lepidosparti lepidosparti* Timberlake
 Frons closely punctured, punctures rather fine on each side below, but becoming larger and sharper on upper middle; face marks pale yellow, disk of clypeus with two dark stripes, supraclypeal area dark*lepidosparti novella* Timberlake

Perdita oregonensis oregonensis Timberlake

One female and one male, taken one mile south of Hobart Mills, Nevada County, California, on *Chrysothamnus viscidiflorus*, Sept. 1, 1957, (J. M. Linsley), have slightly dusker wings than typical *oregonensis*. Two entirely typical females are from Macdoel, Siskiyou County, Aug. 21, 1954 (G. Ferguson). These and the

following specimens of *expleta* are the first of this species to be recorded from California.

***Perdita oregonensis expleta*, n. subsp.**

This form is known from only one female but it is so much more extensively yellow than typical *oregonensis* that a valid subspecies seems to be indicated. It differs in having the face almost all yellow below the level of antennae, the pronotum and legs yellow, and the dark bands of abdomen narrow, with those on tergites 2 to 4 ending rather far from the lateral margins of segments.

Female.—Agreeing with *oregonensis* except in markings. Head and thorax dark green. Narrow anterior border of genae and inferior orbits for a short distance, mandibles except red tips, labrum, and almost entire face below level of antennae, yellow. Lateral face marks end broadly above and encompass anterior end of foveae, but green of frons descends narrowly along outer suture of subantennal plates to clypeus. Pronotum yellow except for a longitudinal subhyaline streak on tubercles. Propodeum with extreme apical margin and four spots just before margin yellow. Abdomen pale yellow; four narrow fuscous bands partly at apex and partly at base of tergites 1-2 to 4-5, apical part ending far from lateral margins of segments, supplementary part concealed except on tergite 2 where it almost touches black lateral foveae. Legs entirely yellow. Scape and pedicel of antennae yellow, flagellum and pedicel above brownish fuscous, and underside of flagellum rather narrowly dull yellow. Tegulae yellow at base, subhyaline on outer margin. Wings slightly more opaquely whitish than in typical form. Length: contracted condition, 4.5 mm.; anterior wing, 3.8 mm.

Holotype female.—Seven miles northwest of Sierraville, Sierra Co., California, on *Chrysothamnus*, Sept. 9, 1957 (E. G. Linsley), in collection of the Citrus Experiment Station, Riverside.

***Perdita pallidiventris*, n. sp.**

This species is notable for its creamy-white abdomen with five dark bands, one of which, at the base of tergite 1, is narrow and V-shaped. Except for the lack of a dark cross-band on the pronotum it runs to *lepidosparti* in couplet 26 of the key to the *zonalis* group (Univ. Calif. Publ. Entom., 14:306).

Female.—Head and thorax dark green, subantennal plates black. Mandibles except reddened apical third, labrum, clypeus except usual pair of dots, supraclypeal mark, and lateral marks, creamy white. Lateral marks higher than wide, ending bluntly against end of foveae and slightly intruding between them and eyes. Pronotum pale yellow, with rather small dark mark at lower end of flanks. Abdomen creamy white, with five narrow black bands; band at base of tergite 1 V-shaped, running from middle of base to apical corners of basal declivity; following bands, except band at junction of tergites 1-2, falling slightly short of lateral margins of segments. Legs pale yellow, hind tibiae black except at base, and small joints of hind tarsi dusky. Scape entirely, and underside of pedicel, clear pale yellow, flagellum beneath duller yellow, and upper side of flagellum and pedicel blackish. Tegulae creamy white at base, testaceous hyaline on outer margin. Wings whitish hyaline, nervures pale yellowish, subcosta and margins of stigma testaceous.

Head only slightly broader than long; inner orbits parallel. Proboscis of moderate length, enclosed in fossa in repose, with apex of galeae reaching base of stipes. Mandibles moderately massive, with a narrow inner dilation ending abruptly well before subacute apex. Facial foveae more than twice as broad as interval between them and eyes and reaching from level of middle of antennal sockets about halfway to level of anterior ocellus. Pterostigma about three-fourths as wide as first submarginal cell; marginal cell with the parts beneath and beyond stigma subequal. Pygidial plate not well exposed in type, but very broad and appearing broadly rounded at apex. Frons tessellate and moderately shining, with fine punctures moderately close and well

distributed; mesonotum polished, with fine and moderately sparse punctures. Pubescence whitish, moderately thin, short, and erect on face, similar but coarser on mesonotum, becoming denser and more appressed before scutellum, and hair of cheeks and underparts of thorax longer and denser, as usual. Length: nearly 5 mm.; anterior wing, 3.6 mm.

Holotype female.—Coalinga Mineral Spring, Fresno Co., California, on *Eriogonum fasciculatum*, Aug. 8, 1956 (M. D. and G. I. Stage, and R. R. Snelling), in collection of the Citrus Experiment Station, Riverside.

***Perdita haigi*, n. sp.**

(Figs. 833, 834, 895)

In the key to the species of the *zonalis* group (Univ. Calif. Publ. Entom., 14:304–315) the female of *haigi* runs best to *lepidosparti novella*, although the abdomen has only four dark bands. It differs further from *novella* in having the punctures on the upper middle of frons sparser and weaker, the legs entirely pale, and the clypeus with a large subtriangular black mark covering most of the upper half of the disk. The male agrees best with *dicksoni*, but the head and thorax are much less tinged with blue, the head is broader, the legs are entirely yellow, and the abdomen is not orange on the apical half.

Female.—Head and thorax dark green; a large mark on basal half of clypeus extending forward between clypeal dots almost to apex, supraclypeal area, and subantennal plates, black. Mandibles except red tips, lateral extensions and anterior border of clypeus, and lateral face marks, pale yellow. Lateral marks higher than wide and intruding slightly between foveae and eyes. Band on posterior margin of disk of pronotum continuous with tubercles, and entire anterior border of pronotum, pale yellow. Abdomen creamy white; a narrow blackish band at junction of tergites 1–2 to 4–5, first two bands reaching lateral margins, other two slightly abbreviated. Legs pale yellow, hind tibiae tinged with pale brown on apical two-thirds of posterior side. Scape and pedicel pale yellow; pedicel above and flagellum brownish fuscous, with flagellum narrowly brownish yellow beneath. Tegulae yellow at base, subhyaline on outer margins. Wings slightly whitish hyaline, nervures testaceous yellow, subcosta and margins of stigma slightly darker.

Head broader than long; inner orbits parallel. Proboscis moderately long and included within fossa in repose. Mandibles moderately stout, slightly dilated on inner margin, abruptly narrowed before obtuse apex. Facial foveae strongly impressed, nearly their own width from margin of eyes and reaching from level of middle of antennal sockets but little more than halfway to level of anterior ocellus. Pterostigma large, about as long and more than two-thirds as wide as first submarginal cell; part of marginal cell beneath stigma somewhat longer than part beneath. Pygidial plate as broad as long, broadly rounded at apex, with only a slight indication of a median notch. Head and thorax shining, mesonotum polished, frons and vertex minutely and rather weakly tessellate; punctures of frons moderately fine and close opposite foveae, much sparser above that level; punctures of mesonotum fine and moderately close. Pubescence white, rather short and erect on mesonotum; a narrow band of denser, longer, and more plumose hair just in front of scutellum. Length: 4.5–5.5 mm.; anterior wing, 3.3–3.8 mm.

Male.—Head and thorax bluish green. Anterior part of gular region, inferior orbits nearly to middle of eyes, mandibles except red tips, labrum, and face to level of antennae, sulphur yellow. Lateral face marks ending obliquely from lower level of antennal sockets to margin of eyes just below foveae. Pronotum with a broad dark band from flank to flank; tubercles and rather narrow margins yellow. Abdomen yellow, with four or five fuscous bands; band at base of tergite 1 shallowly cup-shaped and connected with apical band by a dark line in median crease, sometimes with a short slender spur on each side of median line; other bands at junction of tergites 1–2 to 3–4 (one paratype with a well-developed band at junction of tergites 4–5), that on tergites 1–2 touching lateral foveae of tergite 2, others almost reaching lateral margins, but with part on apical margin of each segment much shorter than supplementary part. Legs entirely clear

yellow. Antennae yellow, with flagellum narrowly brown above. Tegulae and wings as in female except for more brownish subcosta and margins of stigma.

Head moderately broader than long; cheeks narrower than eyes and inner orbits parallel. Mandibles tapering to acute tips and reaching far margin of proboscival fossa. Facial foveae faint and punctiform. Frons and vertex tessellate, moderately shining, and with rather obscure, minute, and moderately close punctures; mesonotum polished, with numerous, but well-separated, minute punctures. Pubescence white, rather short and erect on face and mesonotum, much longer and denser on cheeks and underside of thorax. Subgenital plate about one and one-half times as long as wide, slightly broadening before rounded apex; disk with sparse fine setae, but some longer hairs on horizontal arms, as usual in this group. Caulis of genitalia broadly oval, rather narrow dorsal lobes oblique at apex; apical margin of parameral lobes fully exposed in dorsal view, with short fine setae fringing entire margin, but with somewhat longer setae on under-surface of inferior part (these appear marginal in lateral view); tips of volsellae exposed beyond dorsal lobes when viewed from above; sagittae short, with fused oval apical part acute but appearing thinly fusiform in lateral view, and slightly upturned at extreme tip. Length: 4.3-4.5 mm.; anterior wing, 3-3.2 mm.

Holotype female, allotype, and paratypes.—Four females, 4 males, 25 miles northeast of Fernley, presumably in Churchill Co., Nevada, Aug. 29, 1958 (T. R. Haig).

Types in collection of the Citrus Experiment Station, Riverside; paratypes in collection of the University of California, Davis.

HALICTOIDES GROUP

Perdita sexmaculata octonaria, n. subsp.

This bee differs from the well-known *sexmaculata* only in the maculation of the abdomen and is evidently a local race of that species.

Female.—Head and thorax dark blue-green, without markings; face below level of antennae mostly blackish. Mandibles except reddish tips, and middle of labrum, testaceous. Abdomen black, with a white mark on each side of tergites 1 to 4; marks on tergites 2 to 4 about same size as in typical form, and those on tergite 1 small. Marks on tergites 1 to 3 triangular and pointed within; corresponding marks of typical form on tergites 2 to 4 usually more or less quadrate or broadly oval. Pygidial plate rufotestaceous. Legs black or fuscous, tarsi brown, anterior side of front tibiae yellowish. Antennae fuscous, scape black, and flagellum brownish beneath. Wings dusky hyaline, nervures brownish. Length: 4.5 mm.; anterior wing, 3 mm.

Holotype female.—Ten miles east of Bahia San Quintin, Baja California, Mexico, Sept. 10, 1955 (F. X. Williams), in collection of the California Academy of Sciences.

Perdita decemnotata, n. sp.

(Figs. 835, 836, 896)

In the key to species of the *halictoides* group (Univ. Calif. Publ. Entom., 14:366-367) both sexes of *decemnotata* run to *sexmaculata*, from which they differ in having a light mark on each side of tergites 1 to 5, the marks on tergites 2 to 4 being large and broad.

Female.—Head and thorax dark blue-green, without markings; clypeus and supra-clypeal area black. Abdomen black with a white mark on each side of tergites 1 to 5, close to lateral margins; marks on tergite 1 small, others large and broad and separated by a little more than twice their own transverse length. Pygidial plate rufotestaceous. Legs black, front tibiae, on anterior side and front tarsi, dull yellowish. Scape of antennae black, flagellum dark brown above and much paler beneath. Mandible yellow at base, shading through testaceous into red at apex. Proboscis dilute fuscous. Tegulae testaceous, with fuscous base. Wings dusky hyaline, nervures and stigma brown, subcosta slightly darker; stigma only slightly paler centrally.

Head much broader than long; cheeks receding but about as broad as eyes. Disk of clypeus

convex, about twice as broad as high, and slightly produced on each side of base of labrum. Facial foveae strongly impressed, somewhat wider than interval between them and eyes, and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Mandibles stout, tapering, simple, acute at apex. Proboscis of moderate length, included within fossa in repose, galeae reaching base of stipites. Maxillary palpi with four very finely cylindrical and rather elongate joints. Pterostigma not as long as first submarginal cell and about three-fourths as broad; marginal cell equaling stigma in length, with part beneath stigma shorter than part beyond. Pygidial plate rather narrowly triangular, apex rounded. Head and thorax shining, mesonotum polished, cheeks and vertex almost polished, frons tessellate and somewhat dullish; punctures of face and mesoscutum fine and sparse, with posterior middle of scutum almost impunctate. Pubescence whitish, fine, erect, and rather long, but shorter on face, and much longer on underside of front coxae. Length: 5 mm.; anterior wing, 3.6 mm.

Male.—Head and thorax dark blue-green. Inferior orbits to middle of eyes, mandibles except red tips, labrum and face below level of antennae, yellow; the yellow extending broadly a short distance above antennae on each side, and acutely and briefly in middle to enclose not more than half of antennal sockets. Thorax dark, except for yellow tubercles. Abdomen black, with a large more or less oblong yellow mark on each side of tergites 1 to 5; marks on tergites 3 and 4 slightly larger than others, together covering nearly half of width of each segment. Legs yellow, femora and posterior side of hind tibiae blackish, and front and middle tibiae with a dark streak behind. Antennae yellow, but blackish above, the dark color fading out on apical half of flagellum, leaving only a duskiness at articulations. Tegulae fuscous at base, testaceous hyaline on outer margin. Wings hyaline, nervures testaceous, subcosta and margins of stigma fuscous.

Head distinctly broader than long; inner orbits slightly diverging in front. Cheeks simple, about as broad as eyes and widest above middle of eyes. Proboscis moderately long and included within fossa in repose; galeae tapering, acute at apex, and reaching base of stipites. Mandibles rather large, tapering, acute, and reaching slightly beyond far margin of broad proboscival fossa. Lateral extensions of clypeus well exposed in frontal aspect of head; disk of clypeus much broader than high. Facial foveae well impressed, elongate oval, and about four times as long as wide. Flanks of pronotum not impressed. Pterostigma about half as broad as first submarginal cell; second submarginal cell narrowed almost to a point above; marginal cell with parts beneath and beyond stigma subequal, and apical truncation shorter than metacarpus. Frons tessellate and moderately dull, vertex and cheeks more weakly tessellate, frons with minute obscure punctures; face below antennae shining, with punctures sparser, very minute, and weak; thorax minutely tessellate, very finely roughened on base of propodeum, mesonotum with minute and widely spaced punctures. Pubescence whitish, moderately long and erect on face and mesonotum, sparse on mesonotum, and rather dense and long on cheeks and underparts of thorax. Tergite 7 narrowed to short and truncate median lobe. Subgenital plate quadrate, a little broader at base than at slightly emarginate apex, with fine setae on disk fringing apical margin. Aedeagus similar to that of *missionis*, but parameral lobes not ridged on inner margin at apex; sagittae acute at apex, not obtuse as in *sexmaculata*. Length: 4 mm.; anterior wing, 3 mm.

Holotype female.—Nine miles southeast of Fresno, Zacatecas, Mexico, Aug. 7-14, 1954 (Linsley, MacSwain, and Ray F. Smith). *Allotype*.—Teotihuacan, Mexico, Mexico, 6,900 feet, Aug. 12, 1954 (J. G. Chillcott).

Type in collection of the Citrus Experiment Station, Riverside; allotype in collection of Canadian Department of Agriculture, Ottawa.

OCTOMACULATA GROUP

Perdita albipes, n. sp.

(Figs. 837, 838, 897)

In the key to the species of the *octomaculata* group (Univ. Calif. Publ. Entom., 17:2-22) the male of *albipes* runs out at couplet 150, as its mesonotum is polished and has very sparse punctures and thin short hair, and its frons is dull and im-

punctate. A distinctive color pattern also distinguishes it from *hirticeps*, *pluchea*, *paroselae*, and *pectidis*, which fall in the couplets 151 to 153.

Male.—Head and thorax blue-green. Narrow anterior margin of gular region, mandibles except red tips, labrum and face below level of antennae, white, with lateral marks ending bluntly a little above that level. Collar of pronotum, large mark on posterior corners of disk, and tubercles, white. Abdomen black at base and pale ferruginous apically, including apical part of tergite 3; a moderately wide and enclosed white band on tergites 1 to 3, basal on tergites 2 and 3, bounded apically in middle on tergite 3 by ferruginous color, and on tergite 1 subapical, abbreviated, and almost interrupted by dark median crease. Lateral margins of disk of tergite 1 and lateral margins of tergite 2 narrowly whitish, with pale margins of tergite 2 sending a spur inward for a short distance just before base of apical depression. Black area on tergite 3 consisting of oblique band on each side, together forming about two-thirds of enclosure of white band. Venter pale yellowish, becoming whiter on basal half. Legs white, with base of all coxae, front femora behind except at base and apex and small spot on their anterior side, small mark on posterior side of front tibiae, middle and hind femora except at base and apex and on ventral edge, and mark on each side of apical half of hind tibiae, blackish. Scape of antennae, underside of pedicel, and first joint of flagellum, white; a mark on scape above, dorsal side of pedicel, and flagellum, fuscous, but flagellum paler toward apex and broadly pale dull-yellowish beneath. Tegulae fuscous at base, anterior white spot, hyaline on outer margin. Wings nearly clear hyaline, nervures pale testaceous, margins of stigma and subcosta pale brown.

Head large, somewhat broader than long, and broader than thorax. Cheeks simple and almost as broad as eyes. Disk of clypeus broader than high, with lateral extensions gradually reflexed and mainly visible in frontal aspect of head. Proboscis moderately long, not surpassing fossa. Mandibles curved, tapering, acute, and reaching far margin of fossa. Facial foveae oval, about twice as long as wide. Flanks of pronotum not impressed. Pterostigma about two-thirds as wide as first submarginal cell; part of marginal cell beyond the stigma somewhat longer than part beneath. Face below antennae polished, with very minute and faint punctures; frons and vertex strongly tessellate, subopaque, and impunctate; cheeks and thorax minutely tessellate and shining; mesonotum almost polished and with minute, widely spaced punctures. Pubescence whitish, short and thin on face (probably still thinner on mesonotum, but damaged in type), and somewhat longer and denser on cheeks and underparts of thorax. Abdomen strongly convex above, but little recurved at apex; medioapical lobe of tergite 7 strongly rounded at apex. Subgenital plate slightly broader across base than long, with lateral margins straight and meeting apically at somewhat less than a right angle; disk with short fine setae. Genitalia with characteristic form of *octomaculata* group: parameral lobes somewhat ovals expanded toward apex; sagittae ovals fusiform as seen from above, not at all angulated on sides, and subacute at apex. Length: about 4.4 mm.; anterior wing, 3 mm.

Holotype male.—Santa Elena Canyon, Big Bend National Park, 2,145 feet, Brewster Co., Texas, Aug. 25, 1954 (R. M. Bohart), in collection of the Citrus Experiment Station, Riverside.

Perdita crotonis juabensis, n. subsp.

The female of *juabensis* falls with the races *leucoptera* and *titusi* in the key (Univ. Calif. Publ. Entom., 17:2-22, couplet 29) but differs in having the first three tergites white with four narrow black bands, and the fourth tergite whitish, tinged with ferruginous. The male has the wing slightly less whitened than the female and agrees best with *dilucida*, but differs in having the white bands of the abdomen more or less broader than the dark bands and the wings whiter.

Female.—Dark blue, with usual white markings on face and thorax. Lateral face marks very acute above and reaching almost to lower end of facial foveae; supraclypeal mark much broader than high; subantennal plates wholly dark. Abdomen white on basal segments, with four black bands; those at junction of tergites 1-2 to 3-4 narrow and part at base of tergites 3 and 4

represented mainly by a dark spot at each corner of segments; band at base of tergite 1 v-shaped with arms more or less knobbed, median crease also dark and more or less expanded at the base of V, and sometimes a fine dark dot near summit of basal declivity on each side and close to knob of lateral arms or confluent therewith. Basal part of tergite 4 broadly whitened; apical and lateral margins, as well as following segments, ferruginous. Venter pale ferruginous, becoming white on basal half. Legs white; coxae except apical half of front pair, femora except broadly at apex and except underside of front pair, and apical half of hind tibiae and hind tarsi, black. Antennae blackish, scape almost entirely white, and following seven or eight joints marked with white beneath. Tegulae white at base and hyaline on outer margin. Wings whitish hyaline, nervures pale testaceous, subcosta and margins of stigma pale brown. Structural characters, sculpture, and pubescence as in typical *crotonis*, except for longer wings. Length: about 5 mm.; anterior wing, 3.8 mm.

Male.—In general agreement with other forms of *crotonis*. Abdomen with three broad white bands (on tergites 1 to 3) set off by four black bands, tergite 4 also more or less white across the middle. Apex of abdomen ferruginous. Other marking about normal for species. Wings somewhat whitened, with subcosta and margins of stigma pale fuscous. Length: 4–5 mm.; anterior wing, 3–3.7 mm.

Holotype female, allotype, and paratypes.—Four females, 10 males, 12 miles south of Eureka, Juab Co., Utah, on *Croton texensis*, July 18, 1958 (J. W. MacSwain).

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

Perdita nuda Cockerell

(Figs. 839, 840, 898)

Perdita nuda Cockerell, 1896, Proc. Acad. Sci., Phila., 48:93, ♀; Timberlake, 1960, Univ. Calif. Publ. Entom., 17:119.

The male of *nuda*, which has been collected recently, runs out near *bruneri* in the key to the *octomaculata* group. It differs in having the mesonotum more brassy green, the yellow bands of the abdomen narrow, more or less broadly interrupted, those on tergites 1 and 5 usually evanescent, the two marks on tergite 4 much reduced, and the venter mainly dark.

Male.—Head and thorax dark green, with a brassy luster, becoming more bluish on propodeum. Mandibles except reddish tips, labrum, face below level of antennae except inner margin of subantennal plates more or less broadly and completely, collar of pronotum narrowly, spot on posterior corners of disk, and tubercles, pale yellow. Clypeus with usual pair of dark dots, sometimes with two small oblique fuscous marks on upper part of disk. Abdomen black; a narrow abbreviated yellow band on tergites 2 to 4 more or less broadly interrupted in middle, and sometimes similar marks on tergites 1 and 5. Venter dark; more or less suffused with yellow on segments 2 to 4. Legs yellow; posterior side of front and middle femora, line on front tibiae, posterior side of middle tibiae, spot on underside of trochanters, hind coxae except at apex, hind femora except more or less broadly on upper margin, hind tibiae except beneath, and hind tarsi, blackish. Antennae blackish; scape yellow except a dark mark above at apex; pedicel yellow beneath; flagellum narrowly yellowish beneath. Tegulae yellow at base, subhyaline on outer margin. Wings nearly clear hyaline, nervures and margins of stigma fuscous, but nervures yellow at extreme base of wing.

Head rotund and about as broad as long. Subantennal plates twice as long as wide. Proboscis slightly exceeding fossa in both sexes of New Mexico material now at hand, (somewhat shorter in Arizona females previously reported). Mandibles tapering, acute at apex, and reaching beyond far margin of proboscival fossa. Facial foveae oval, about twice as long as wide. Pterostigma hardly more than half as wide as first submarginal cell; marginal cell rather elongate, with part beyond stigma usually longer than part beneath. Sculpture and pubescence about as in female; mesonotum with very sparse and short erect whitish hair. Apical lobe of tergite 7 narrowed

ogivally to apex. Subgenital plate triangular; sides arcuately converging to rounded apex; apical half of disk with fine setae. Dorsal lobes of caulis truncate at apex and discontinuous with dorsal margin of parameral lobes, lobes being broad at base and narrow on apical half; fused body of sagittae fusiform, swollen at middle, and acute at apex. Length: 4.5–5.5 mm.; anterior wing, 3.5–3.9 mm.

Material examined.—NEW MEXICO. McKinley Co.: 19 males, 11 females, 9 miles west of Gallup, Aug. 18, 1958 (G. I. Stage). UTAH. Cache Co.: 7 females, Cornish, on *Chrysothamnus*, Aug. 6 and 12, 1959 (G. E. Bohart). COLORADO. Costilla Co.: 1 female, Fort Garland, Aug. 9, 1959 (L. Bruner).

Perdita ordinata, n. sp.

(Figs. 841, 842, 899)

The male of *ordinata* runs out in the key with *cazieri* and *durangoensis*. It differs in being smaller, having a somewhat duller and impunctate mesonotum, and having the interrupted abdominal bands reaching the lateral margins of the segments.

Male.—Head and thorax dark blue-green; in some specimens, inferior orbits to middle of eyes, labrum, and face below level of antennae, pale lemon yellow. Lateral marks obliquely truncate from upper level of antennal sockets to orbits just below foveae, with green of frons intruding narrowly between orbits and antennal sockets. Small cuneate marks on posterior corners of disk of pronotum, and tubercles, pale yellow. Abdomen black; a narrow whitish band on tergites 1 to 3, each band reaching lateral margins; band on tergite 1 moderately interrupted, other two somewhat more broadly interrupted. Apical lobe of tergite 7 testaceous, venter dark. Legs black; front coxae except at base, front trochanters except above, apex of femora and dorsal margin of front pair, base and anterior side of front and middle tibiae and their tarsi, yellow. Antennae fuscous above; scape except mark at apex, and underside of pedicel, pale yellow; flagellum brownish yellow beneath, except two apical joints. Tegulae fuscous at base, testaceous hyaline on outer margin. Wings dusky, nervures brownish or fuscous except yellow at extreme wing base.

Head somewhat broader than long; inner orbits parallel. Cheeks as broad as eyes. Proboscis moderately long, probably slightly exceeding fossa in repose; galeae slightly longer than stipites. Disk of clypeus nearly twice as broad as long; lateral extensions broad but well reflexed, barely visible in frontal aspect of head. Facial foveae about twice as long as wide. Pterostigma hardly more than half as wide as first submarginal cell; part of marginal cell beyond stigma somewhat longer than part beneath. Frons and vertex strongly tessellate, subopaque and impunctate; mesonotum also tessellate, but more shining than frons and with fine obscure punctures. Pubescence whitish: short, erect, and moderately abundant on dark part of face; denser and longer on cheeks; short and erect on mesonotum, but becoming a little longer on anterior border of scutum and much longer on sides and underparts of thorax. Apical lobe of tergite 7 narrowed gradually to ogival apex, about as usual in this group. Subgenital plate triangular, somewhat broader than long across base, obtuse at apex, and with short fine setae on disk. Caulis of genitalia broadly emarginate apically, parameral lobes rather slender; fused body of sagittae strongly angled near middle, acute at apex. Length: about 3.5 mm.; anterior wing, 2.4–2.7 mm.

Holotype male.—Willecox, Cochise Co., Arizona, Aug. 14, 1958 (R. M. Bohart). *Paratype.*—One male, 10 miles north of Snowflake, Navajo Co., Sept. 2, 1958 (D. D. Linsdale).

Types in collection of the Citrus Experiment Station, Riverside.

Perdita versuta, n. sp.

(Figs. 843, 844, 900)

The male of *versuta* has the abdomen largely ferruginous and runs near *labergei* in the key, but has different face marks and a broad yellow band on the three basal tergites. It is evidently closely allied to *picturata*, but has broader abdominal bands and the labrum normal instead of emarginate. Both *versuta* and *picturata* inhabit the coastal region of southern Texas.

Male.—Head and thorax dark blue-green, with dark color of frons descending on each side to subantennal plates. Mandibles except red tips, labrum, clypeus, lateral and supra-clypeal marks, pale yellowish; lateral marks gradually narrowing to an acute point at level of antennae, supra-clypeal marks as broad as high, and subantennal plates each with two small irregular yellowish dots at lower end. Collar of pronotum, euneate mark at posterior corners of the disk, and tubercles, yellowish white. Basal tergite of abdomen brownish fuscous, with an enclosed yellowish band, broadened medially, across middle; tergite 2 pale yellowish, with lateral and apical margins pale fuscous, but dark apical band abbreviated; following tergites pale ferruginous, but tergite 3 with a broad yellowish band. Venter pale yellowish with ferruginous tinge. Legs yellowish white; extreme base of front and middle coxae, basal half of hind coxae on outer side, large blotch on posterior side of front femora, middle and hind femora except at base and apex and beneath, and blotch on both sides of apical half of hind tibiae, fuscous. Antennae pale yellowish; a spot near apex of scape; upper side of pedicel and flagellum fuscous, but with dark color narrowing distad, leaving last five or six joints much more than half light. Tegulae fuscous at base, hyaline on outer margin. Wings whitish hyaline, nervures pallid, subcosta pale brownish.

Head broader than long; cheeks simple and narrower than eyes. Mandibles tapering from base to acute apex and almost reaching to far margin of proboscis fossa. Proboscis moderately short, galeae not quite equaling stipites. Disk of clypeus almost as high as wide; two dark dots just below middle; lateral extensions short, broad, gradually reflexed, and only partly visible in frontal aspect of head. Facial foveae oval, about twice as long as wide. Flanks of pronotum ordinary. Pterostigma nearly as wide as first submarginal cell; parts of marginal cell beneath and beyond stigma subequal. Frons and vertex strongly tessellate, dull and impunctate; face below antennae smooth, with a few widely spaced obscure punctures. Thorax minutely tessellate, moderately shining, with sparse weak punctures on mesonotum. Pubescence whitish: very thin and short on face and mesonotum; much longer but only moderately abundant on cheeks and underside of thorax. Abdomen elongate-oval; tergite 7 with a small subacute or almost ogival apical lobe. Subgenital plate as long as wide; lateral margins arcuately converging to somewhat rounded apex; disk with longer setae than in allied species. Aedeagus similar to that of *picturata*, differing only in minor details. Length: 4 mm.; anterior wing, 2.3 mm.

Holotype male.—27 miles south of Kingsville, Texas (presumably a few miles south of Sarita in Kenedy Co.), Aug. 28, 1954 (J. G. Chilleott).

Type in the collection of the Canadian Department of Agriculture, Ottawa.

VALIDA GROUP

This new group is based on the anomalous species *Perdita valida*, which cannot be placed in any previously known group of *Perdita*; when the male becomes known it may possibly require a new subgenus.

Female.—Mandibles tapering, acute, and simple. Proboscis rather short; maxillary palpi apparently only one-jointed. Subantennal plates about as broad as long, very short on inner margin and antennal sockets rather less than their own diameter from dorsal margin of clypeus. Antennal scape and pedicel ordinary in length and shape, but flagellum short and clavate, with all except last two joints thicker than long. Pterostigma moderately slender; marginal cell longer than usual in *Perdita*. Tarsal claws small, subquadrately expanded on basal half, with apex slender, tapering, strongly curved, and simple. Scopal hairs of hind legs rather short and coarse, not much longer than greatest width of tibia.

Perdita valida, n. sp.

The female of *valida* has no light markings except a yellowish T-mark on the clypeus. In Cockerell's key (1896) it runs to *phymatae* var. (couplet 51a), but the two species agree in hardly anything except the paucity of markings, and are certainly not closely allied.

Female.—Head and thorax blue-green; labrum, clypeus and prothorax brown. No light markings except a pale-yellow τ -mark on disk of clypeus; stem of the τ thick and reaching a little more than halfway from base to apex of disk, and arms slender (left arm long enough to follow curvature of margin). Collar and posterior corners of pronotal disk somewhat testaceous, but not definitely marked; tubercles dark. Abdomen blackish; pygidial plate testaceous brown. Legs brown; front and middle knees, front tibiae except behind, and front tarsi, yellow. Scape of antennae fuscous; pedicel and flagellum almost entirely orange to reddish ferruginous. Tegulae pale testaceous subhyaline, with a more opaque spot at anterior end of base. Wings milky hyaline, nervures and stigma pale yellowish.

Head somewhat broader than long; inner orbits almost parallel; cheeks narrower than eyes. Proboscis included within fossa in repose. Mandibles rather long and evenly curved. Labrum large, broader than long, and quadrate. Disk of clypeus much broader than long; lateral extensions strongly inflexed and not visible in frontal aspect of head. Posterior ocelli somewhat farther apart than distance from either to nearest eye margin or to occipital border. Pterostigma about two-thirds as wide as first submarginal cell; marginal cell fully as long as first submarginal cell, narrowed toward apex, part beneath stigma much shorter than part beyond; second submarginal cell narrowed about two-thirds to radius. Pygidial plate moderately broad at base, tapering to moderately narrow and rounded apex, with disk flat. Head and thorax minutely and delicately tessellate and shining; fine and rather close punctures on frons, and sparser punctures on mesonotum. Pubescence white, rather coarse, short, depressed, and rather abundant on face and mesonotum, longer and finer on cheeks and underparts of thorax. Apical fimbria of abdomen dense. Hair on dorsal margin of hind tibiae mosslike, on lower margin somewhat longer and strongly curved. Length: 4.8 mm.; anterior wing, 3.3 mm.

Holotype female.—Mesilla, Dona Ana Co., New Mexico, June 28, 1897 (A. P. Morse), Baker No. 2,310, in the U. S. National Museum, type No. 64,915.



PLATES

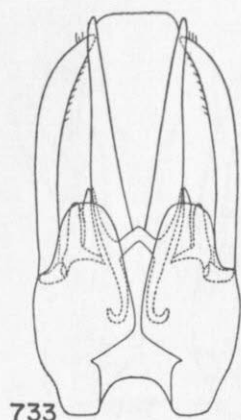
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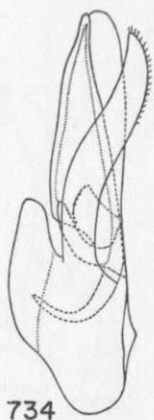
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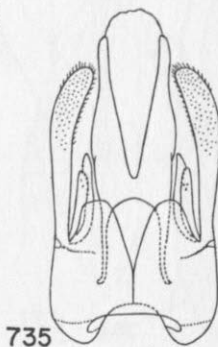
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wootonae



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wootonae



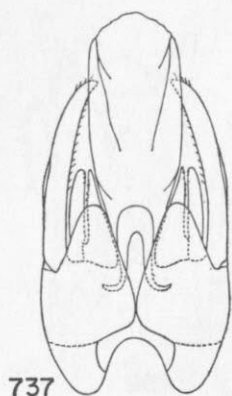
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viridinotata



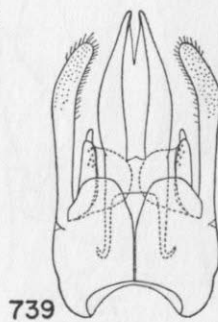
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holoxantha



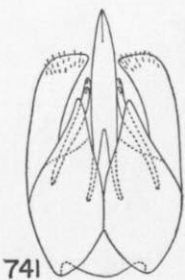
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perplexa



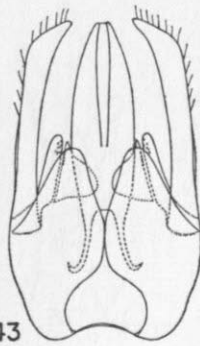
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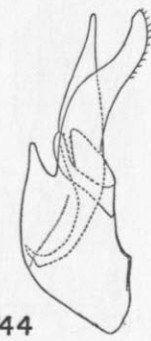
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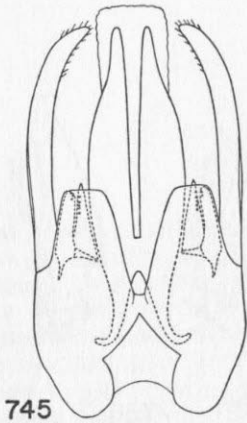
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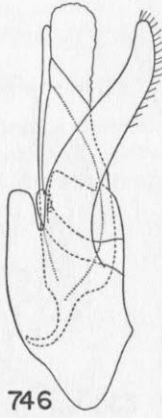
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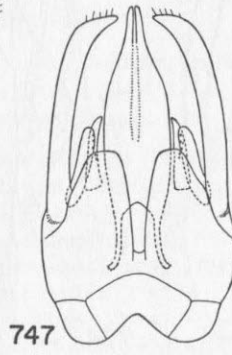
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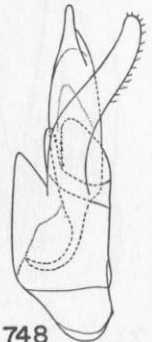
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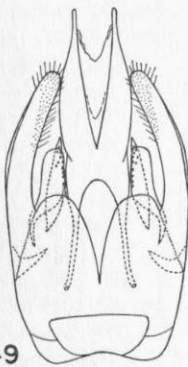
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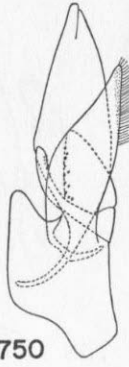
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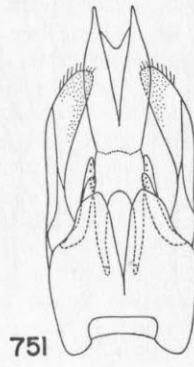
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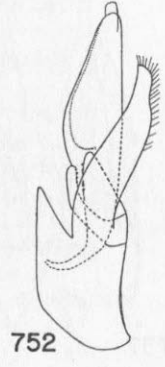
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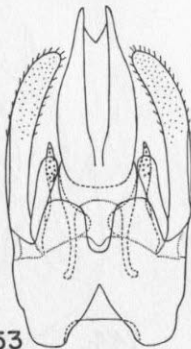
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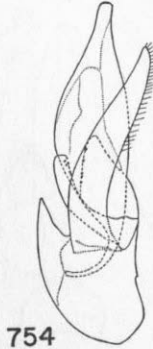
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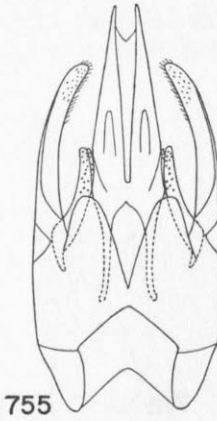
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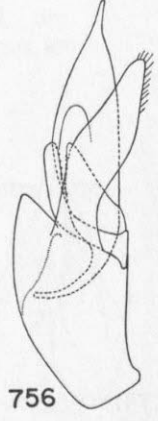
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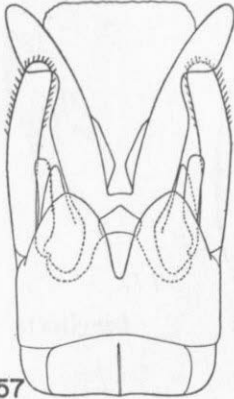
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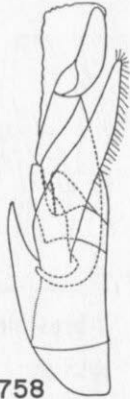
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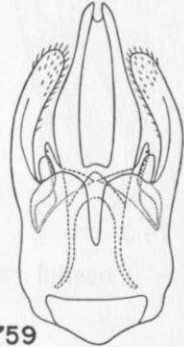
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grandiceps



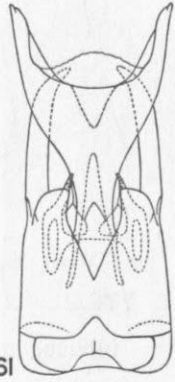
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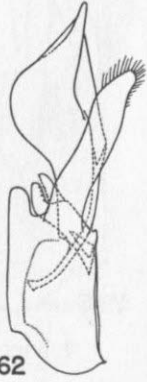
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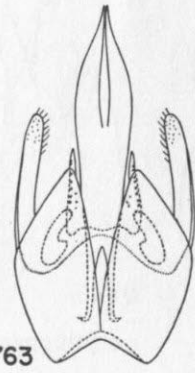
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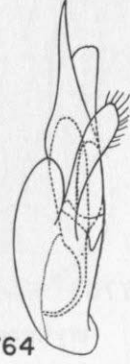
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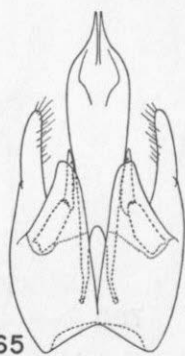
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exilis



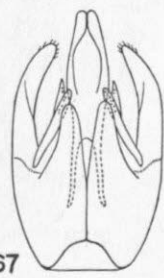
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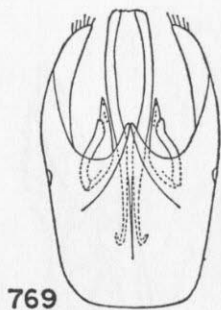
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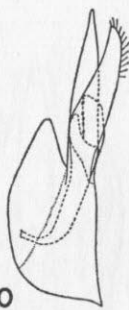
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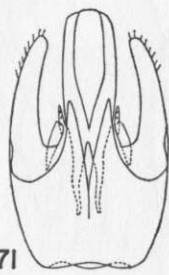
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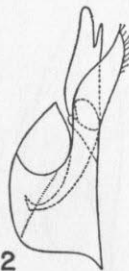
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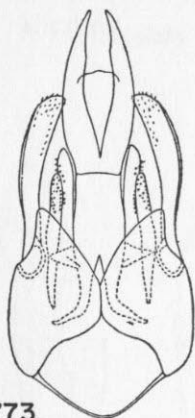
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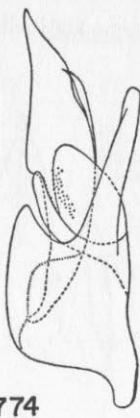
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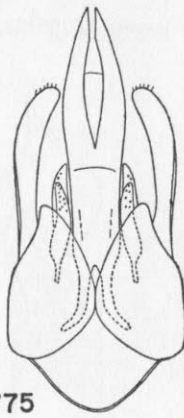
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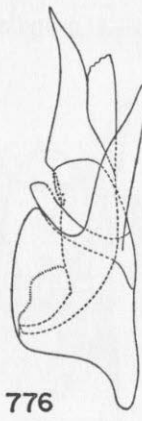
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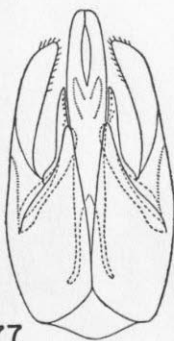
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fulvicauda



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nigridia



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nigridia



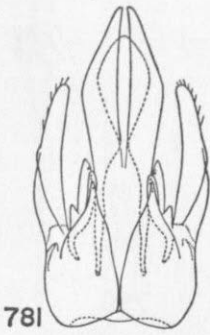
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subfasciata



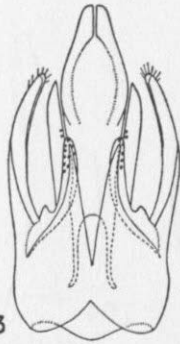
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snellingi



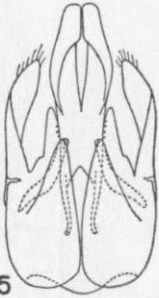
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colei



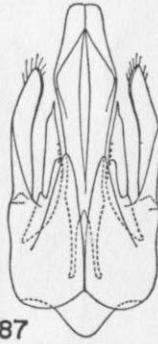
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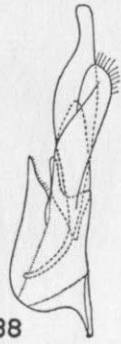
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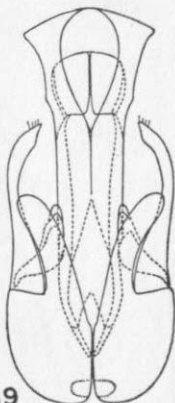
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r. rehni



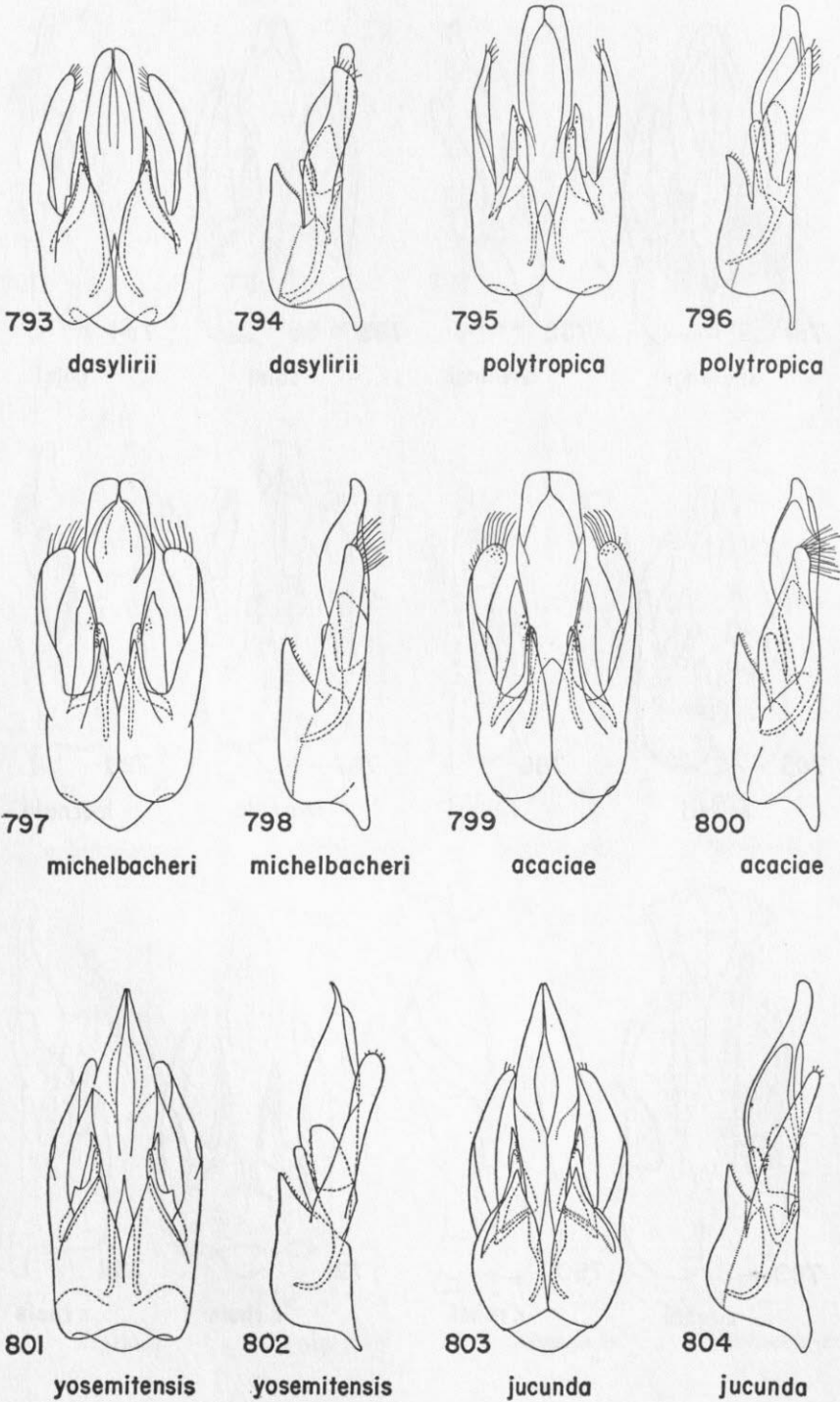
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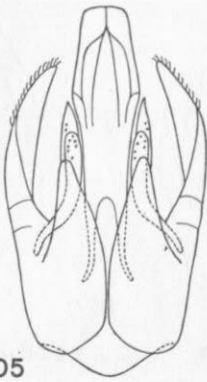
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r. rhois





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c. claypolei



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c. claypolei



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timberlakei



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lucens



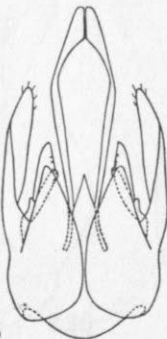
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812

distans



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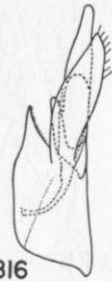
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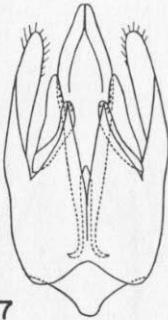
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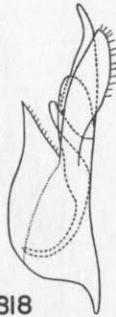
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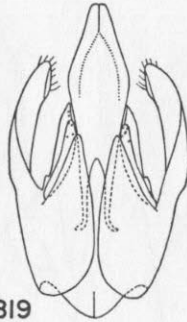
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c. clypeata



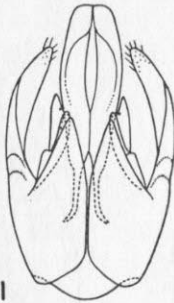
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semilutea



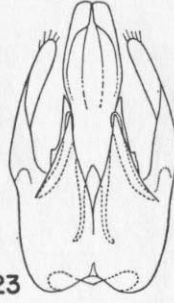
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labrata



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labrata



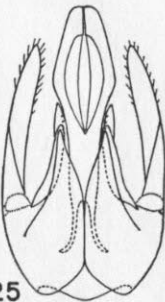
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x. deficiens



824

x. deficiens



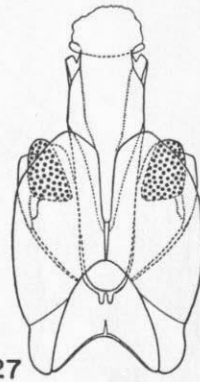
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varleyi



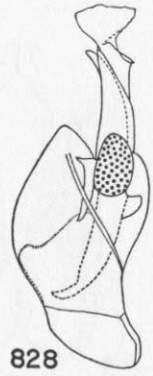
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varleyi



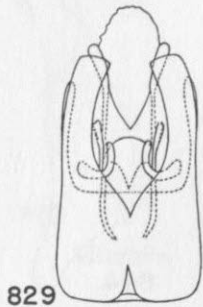
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haplura



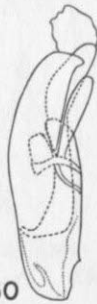
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haplura



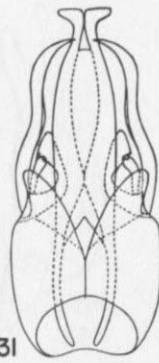
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scutellaris



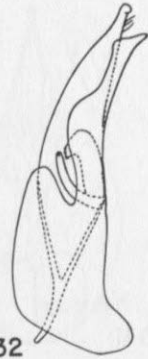
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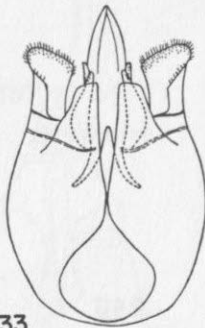
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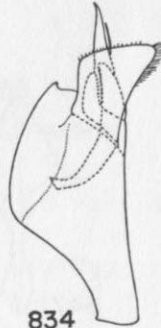
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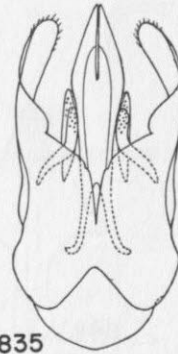
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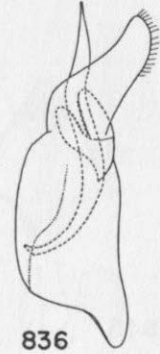
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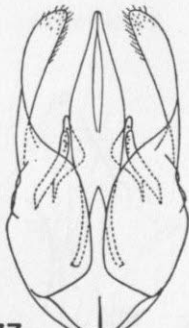
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decemnotata



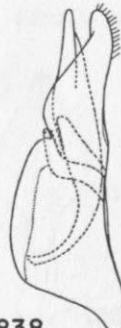
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decemnotata



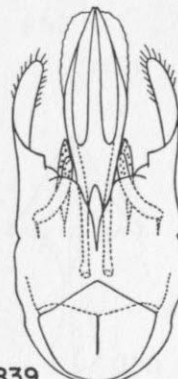
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albipes



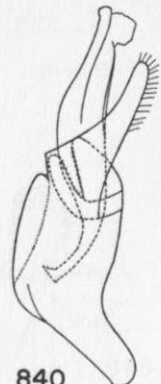
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albipes



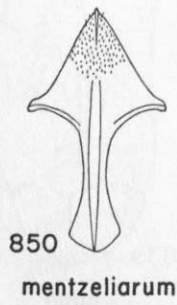
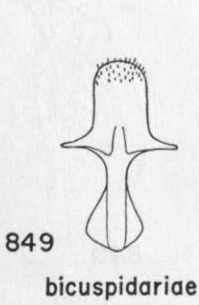
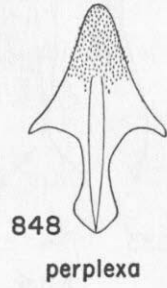
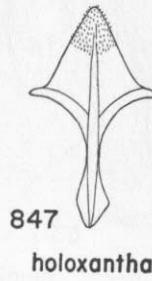
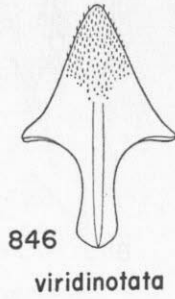
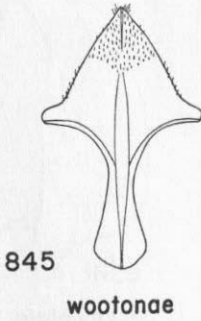
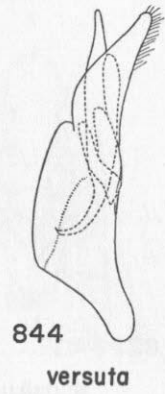
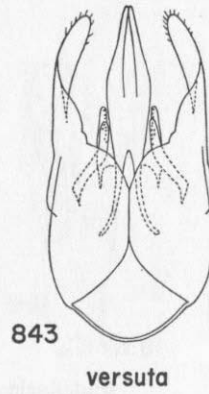
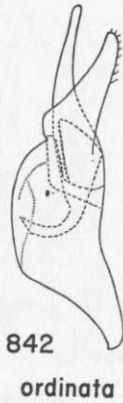
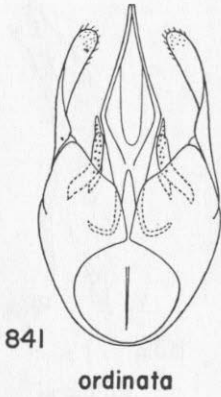
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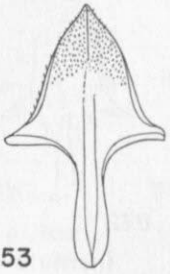
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840

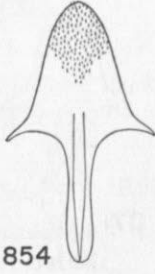
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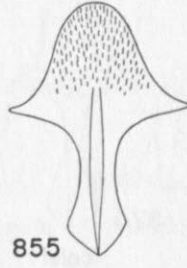
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lateralis



854

amplipennis



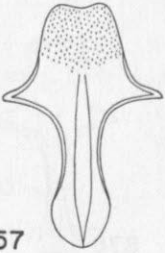
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vicina



856

wheeleri



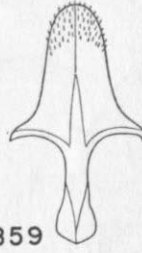
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858

ventralis



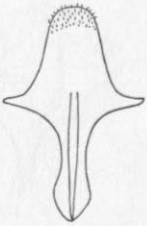
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semicrocea



860

exilis



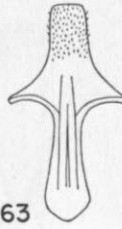
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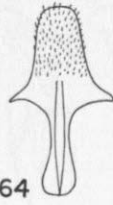
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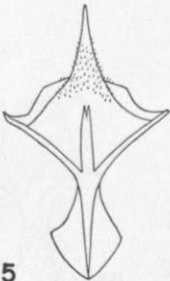
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austini



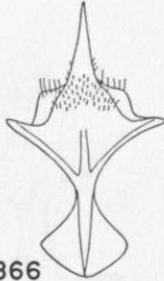
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brevihirta



865

erythropyga



866

fulvicauda



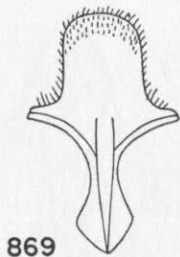
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nigridia



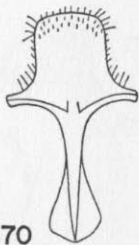
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subfasciata



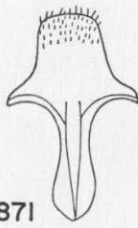
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snellingi



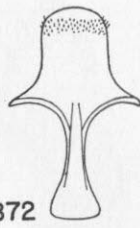
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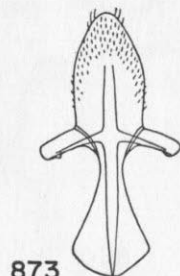
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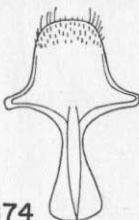
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inornata



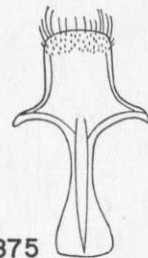
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r. rehni



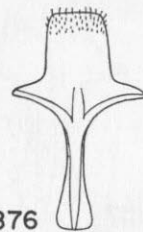
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r. rhois



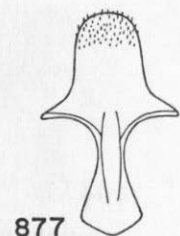
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dasyliirii



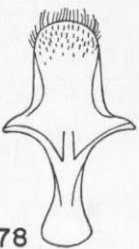
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polytropica



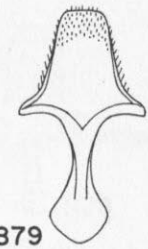
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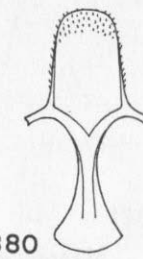
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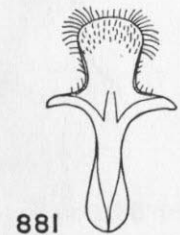
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880

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c. claypolei



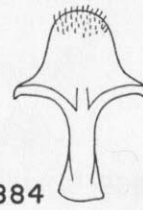
882

timberlakei



883

lucens



884

distans

