

SUPPLEMENTARY STUDIES ON THE
SYSTEMATICS OF
THE GENUS PERDITA
(Hymenoptera, Andrenidae)

BY

P. H. TIMBERLAKE

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(Hymenoptera, Andrenidae)

BY

P. H. TIMBERLAKE

INTRODUCTION AND ACKNOWLEDGMENTS

SINCE OR DURING the completion of my work on the monographic revision of the genus *Perdita*, published in seven parts (University of California Publications in Entomology 9:345-432, 11:247-350; 14:303-410, 17:1-156, 28:1-124, 28:125-388, 49:1-196), much new material has accumulated or has been submitted for study and identification. As a result, I have found it necessary to present this supplementary study, and it is expected that other parts may follow, as the topic is far from exhaustion.

In this part some 64 species are treated, of which 32 are thought to be new, and renewed study has revealed new synonymy involving four species and seven names.

This contribution to the advancement of science, like several of the last parts of my revisional study, has been supported by financial aid from National Science Foundation Grant No. GB-5611 and GB-2014.

Subgenus *Epimacrotera* Timberlake

Perdita umbrata, n. sp.

(Figs. 1361, 1362, 1399)

Perdita umbrata is a distinct and interesting species of *Epimacrotera* from Zacatecas, Mexico. The female runs to *diversa* in the key and is so similar that there is difficulty in distinguishing it, but it has the disk of mesoscutum blackish and the pygidial plate less acute than in *diversa*. The male, however, is distinctive in the mainly ferruginous abdomen and white mark on face and base of mandibles.

Female.—Head and thorax dark blue-green, labrum, clypeus, posterior half of mesoscutum and scutellum black. Abdomen fuscous, apical depression of tergites 2 to 4 more brownish; pygidial plate ferruginous. No light marking on face, thorax or abdomen. Legs blackish with front and middle knees very narrowly whitish; tibial spurs testaceous, tarsal claws more ferruginous. Antennae black at base, flagellum dark above but broadly brown beneath. Mandibles black, shading into red at apex. Tegulae testaceous, becoming fuscous toward base. Wings dusky hyaline, nervures and margin of stigma testaceous, subcosta fuscous.

Head as broad as long, with rounded outline; cheeks half as wide as eyes, and face depressed, except clypeus strongly convex from side to side. Posterior ocelli about their distance apart from nearest eye and half as far from occipital margin. Antennae short, inserted below middle of face; joints of flagellum as thick as long. Clypeus strongly inflexed on each side, lateral extensions not visible in frontal aspects. Facial foveae narrow, well impressed, about their own width from margin of eye and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Mandible stout, reaching far margin of labrum and with small inner tooth. Proboscis of ordinary length, when folded in repose filling fossa; galeae and labial palpi reaching base of stipites and maxillary palpi about four-fifths as long as galeae. Pterostigma slender, about half as wide as first submarginal cell, with median pale streak not much wider than dark margins; marginal cell moderately longer beyond than beneath stigma and metacarpus about one-half longer again than apical truncation; second submarginal cell nar-

rowed more than one-half to about two-thirds above, receiving recurrent nervures very close to base and apex. Tarsal claws with strong inner tooth. Pygidial plate triangular, about as long as wide at base and narrowly rounded at apex. Head and thorax tessellate and moderately dull, with puncturations very fine and sparse, but closer on frons than on mesonotum; punctures of clypeus comparatively coarse, shallow and moderately close. Disk of tergites minutely lineolate and dull. Pubescence whitish, thin, short and erect, denser on underside of head than elsewhere; hair of front coxae moderately long and dense; scopal hair of hind legs only slightly longer than greatest width of tibia and hair on outer margin of tibia somewhat darkened at base. Length: 4.5-5 mm; anterior wing: 3.3-3.4 mm.

Male.—Head and thorax blue green, thorax entirely dark. Mandibles, except shading into red on apical third or more, labrum, clypeus and lateral marks creamy white. Summit of clypeus in many cases very narrowly green; lateral marks transverse, twice as broad as high and not surpassing summit of clypeus. Abdomen ferruginous red or brown, with tergites more or less infuscated and apical depression of tergites paler. Legs blackish, extreme apex of front femora and streak on anterior side of front tibiae white; tarsi dark. Antennae, tegulae and wings about as in female.

Head quadrate, broader than thorax and broader than long. Checks rounded, as broad as eyes. Posterior ocelli about their distance apart from occipital margin and considerably farther from nearest eye. Antennae inserted well below middle of face, each about their distance apart from nearest eye. Supraclypeal area much broader than high, and subantennal plates rather small. Disk of clypeus convex, much broader than high, very broadly inflexed on each side, with lateral extensions narrowly visible in frontal aspect and about as long transversely as width of disk. Mandibles tapering, acute and reaching far margin of labrum. Proboscis and wings as in female. Flanks of pronotum normally impressed. Tarsal claws bifid. Abdomen broadly oval, depressed, about one and one-half times longer than wide; tergite 7 strongly narrowed to obtuse apex. Sculpture and pubescence similar to conditions in female; hair of face mostly restricted to area at and below level of antennae. Hair of hind tibiae coarse, suberect, and mostly a little longer than greatest width of tibia. Disk of subgenital plate quadrate, slightly narrowed to truncate apex and minutely pubescent; base of plate bilobate. Genital armature small but robust; caulis extremely short dorsally, but produced on each side in what appears to be a slender spine in dorsal vein, but having a broad base as seen from side; parameral lobes inserted low on sides of caulis, long, slender, attenuate, curving downward and inward to end beneath sagittae; these robust, very thick in dorsal view, with rods diverging to slightly knobbed tips, and greatly dilated at middle as seen from side; volsellae well exposed in dorsal view, the ventral pair robust with row of dark tubercles, other pair triangular, but in lateral view appearing slender, curved, and tapering to hooked apex. Length: 4-4.7 mm; anterior wing: 2.9-3 mm.

Holotype female and allotype.—Rio Grande, Zacatecas, Mexico, on yellow composite, Oct. 4, 1966 (G. E. and A. S. Bohart).

Paratypes.—Seventeen females, 6 males collected with the types.

Types in collection of the University of California, Riverside; paratypes in collection of George E. Bohart.

Subgenus *Cockerellia* Ashmead

Perdita albipennis heliophila Cockerell

New record.—MEXICO: One male, 2 females, Samalayuca, Chihuahua, Oct. 6, 1966 (G. E. and A. S. Bohart).

These specimens entirely lack light markings in both sexes, and I believe that *heliophila* is the only *Cockerellia* that may be entirely dark in the female sex. The specimens are considerably larger than *heliophila* from Utah.

Perdita hilaris Timberlake

Perdita hilaris Timberlake, 1968, Univ. Calif. Publ. Ent., 49:21, ♂.

One female of the subgenus *Cockerellia* from Newcomb, New Mexico, is placed with confidence with *hilaris* which was based on a male from Utah. It is distinguished from similar species in the following key.

Female.—Head and thorax dark blue green. Mandibles except red tips, clypeus and transverse lateral marks white. Labrum and two short longitudinal marks on upper half of disk of clypeus black. Interrupted band on hind margin of disk of pronotum and mark on tubercles white. Abdomen black, with white band on tergites 2 to 5; band on tergite 2 narrow, interrupted medially, and abruptly and very narrowly bent backward at outer ends along foveae; that on tergite 3 rather broad, slightly interrupted medially and touching apical depression only at outer ends; that on tergite 4 very broad, entire, and touching apical depression straight across except for transversely oval emargination on each side; and that on tergite 5 also broad and entire, and all passing broadly over onto reflexed ventral part of segments; same reflexed part of tergite 1 also white, but mark extending only slightly on dorsal surface. Tergite 6 ferruginous. Legs black, apex of front and middle tibiae rather broadly, front and middle tibiae except behind, front tarsi and small spot at apex of hind femora creamy white. Antennae black, scape narrowly white beneath, flagellum brown toward apex and brownish yellow beneath. Proboscis fuscus, galeae and glossa testaceous. Tegulae black at base, followed by narrow white band and testaceous subhyaline on apical half. Wings milky hyaline, nervures pallid.

Head and facial quadrangle distinctly broader than long; cheeks rounded, receding and about three-fourths as wide as eyes. Posterior ocelli about equidistant from occipital margin and nearest eye and slightly less than their distance apart. Facial foveae well impressed, narrow, close to margin of eyes, and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Face below level of antennae strongly convex; disk of clypeus large, somewhat broader than high, with lateral extensions broadly and strongly inflexed but partly visible in frontal aspect. Mandibles normal for *Cockerellia*. Proboscis long, galeae as long as length of head and subequal to length of labial palpi; maxillary palpi about half as long as galeae. Pterostigma about three times longer than wide and three-fourths as wide as first submarginal cell; marginal cell subequal beneath and beyond stigma, with metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed slightly more than one-half above and receiving recurrent nervure close to base. Head and thorax shining, face below antennae and mesonotum polished; frons and vertex very minutely granular and appearing almost opaque in direct view but moderately shining by reflected light. Frons with minute, rather close punctures, and supraclypeal area and clypeus with widely spaced punctures. Punctures of mesonotum fine, strong, much larger than those of face, moderately close on scutum, becoming more widely spaced in middle of disk and those of scutellum a little coarser and closer; metanotum also punctured. Pubescence white, fine and moderately long; erect on mesonotum and longer and denser on cheeks and sides of thorax; scopal hair of hind tibiae fine, very long and copious. Abdomen ovate, about twice as long as wide and convex above; pygidial plate large and broad as usual in *Cockerellia*, somewhat narrowed to slightly rounded apex. Length: nearly 6 mm; anterior wing: 4.4 mm.

Record.—One female, Newcomb, San Juan Co., New Mexico, on *Chrysothamnus nauseosus*, Sept. 21, 1965 (G. E. Bohart).

Female *hilaris* and other species having frons more or less distinctly punctured, face marks restricted to clypeus and lateral marks, wings milky hyaline, and going to couplets 22 to 29 in the 1954 key (Univ. Calif. Publ. Entom., 9:386-391) may be distinguished as follows:

KEY TO SPECIES ALLIED TO HILARIS

1. Abdomen with light bands 2
 Abdomen dark; face marks white, clypeus with two large black marks on upper part of disk; facial foveae represented by broad, smooth, shining space; mesonotum with moderately close fine punctures and moderately coarse, erect hair *incana* Timberlake
2. Scopal hair of hind legs whitish 3
 Scopal hair fuscous; clypeus black, a small median mark on disk and transverse lateral marks white; abdomen with enclosed yellow band on tergites 2 to 4; mesonotum closely punctured and with short, erect mosslike hair *scopata* Timberlake
3. Proboscis long, when retracted reaching or nearly reaching front coxae, when extended showing galeae as long or longer than head; joints 2 to 6 of maxillary palpi much longer than thick 4

Proboscis comparatively short, galeae shorter than length of head; joints 2 to 6 of maxillary palpi only slightly longer than thick and much shorter than joint 1; face marks pale yellow; scape of antennae orange yellow; tergites 2 to 4 with broad yellow band

- lepachidis* Cockerell
4. Mesonotum uniformly and densely punctured and hairy 5
 Mesonotum more sparsely punctured, punctures well separated on middle of scutum, with hair fine, moderately long and erect; face and abdominal markings white, clypeus with two small dark marks on upper half of disk; abdominal bands interrupted on tergites 2 and 5, and very broad on tergite 4 *hilaris* Timberlake
5. Clypeus more prominent, with lateral extensions abruptly and strongly inflexed, and not visible in frontal aspect. 6
 Clypeus less prominent, with lateral extensions curving downward on each side of labrum and partly visible in frontal aspect; disk of clypeus sparsely and faintly punctured; face and abdominal markings yellow, scape of antennae yellow except for apical dark spot above; mesonotum closely punctured, with short, erect mosslike hair ... *coreopsidis* Cockerell
6. Face including clypeus with fine distinct punctures; clypeus black, with median stripe and lateral face marks white (or clypeus white with large mark on each side of disk reaching more than half way to apex); abdomen with rather narrow band on tergites 2 to 4, and in some cases two spots on tergite 5 *tricornis* Timberlake
 Face marking creamy white or pale yellow, clypeus with small black mark on each side of summit; punctures of frons distinct, but those on clypeus small and faint except on dark parts; abdominal bands broad and yellow *lingualis* Cockerell

Perdita novoleona, n. sp.

(Figs. 1363, 1364, 1400)

The male of *novoleona* runs directly to *utahensis* in the 1954 key to *Cockerellia*, and appears to be closely allied. It differs in somewhat broader head and mandibles reaching only slightly beyond far margin of labrum (to base of each other in *utahensis*); mesoscutum with punctures rather widely spaced and the hair much thinner; flanks of pronotum less strongly impressed and posterior corners of disk much less prominent; and in many other small ways.

Male.—Head and thorax dark green. Small mark at anterior end of inferior orbits, mandibles except red tips, labrum, clypeus, broadly triangular lateral marks reaching level of antennae, subantennal marks, trace of a mark on anterior margin of supraclypeal area, elevated anterior margin of disk of pronotum, small mark at posterior corners of disk and mark on tubercles yellow. Abdomen brownish fuscous, with pale yellow band just preceding apical depression on tergites 2 to 6, interrupted medially on tergites 2 to 4 and deeply emarginate or interrupted on each side, median part of bands narrow, but outer ends broader, the cut-off lateral parts on tergite 2 quadrate, and similar parts necessarily more narrowed on following segments. Tergite 7 with large pale apical marks confluent with mark on lateral margins. Venter dark, with circular pale mark on each side of sternites 2 and 3. Legs brownish fuscous, mark on apical fourth of anterior side of front femora, front and middle tibiae at base and broadly on anterior side, front and middle tarsi and hind knees yellow. Antennae blackish, scape and next two joints yellow beneath, joints 2 and 3 of flagellum brown beneath. Tegulae pale testaceous subhyaline, with base yellow. Wings slightly more whitish than in *utahensis*; nervures testaceous yellow, margins of stigma and subcosta ferruginous.

Head somewhat broader than long; cheeks moderately receding and slightly broader than eyes, and widest opposite upper end of eyes. Posterior ocelli their distance apart from occipital margin and slightly more distant from nearest eye. Antennae inserted below middle of face and normal for *Cockerellia*. Face below level of antennae strongly convex; disk of clypeus somewhat broader than high, with lateral extensions strongly inflexed, not broadened at sides of labrum and not visible in frontal aspect. Mandibles tapering, acute and reaching slightly beyond far margin of labrum. Proboscis moderately long, barely exceeding proboscideal fossa in repose. Pterostigma

about three times as long as wide and three-fourths as wide as first submarginal cell; marginal cell large and shaped as usual in *Cockerellia*, with metacarpus more than twice as long as apical truncation. Head and thorax shining, face below level of antennae smooth and impunctate. Frons and vertex minutely granular, moderately dull, frons with minute and rather close punctures. Mesonotum polished with punctures somewhat stronger than those of frons and moderately close, becoming more widely separated on middle of scutum. Pubescence white, fine, erect; thin and moderately short on mesonotum and face, and much longer on vertex, cheeks and sides of thorax. Abdomen shaped as usual in *Cockerellia*, nearly bare; apex of tergite 7 broadly truncate at apex. Subgenital plate strongly convex on ventral side, shorter than in *utahensis* and with much shorter white hair. Genital armature similar to the parts in other species of *Cockerellia*, differing in small details of structure, with the strongly oblique shape of caulis, as seen from side probably affording the most distinctive difference. Length: 6 mm; anterior wing: 4.7 mm.

Holotype male.—Fifty-three miles south of Saltillo, Nuevo León, Mexico, Sept. 7, 1962 (Univ. Kansas Mex. Exped.).

Type in collection of the University of Kansas, Lawrence.

Subgenus *Procockerellia* Timberlake

The five species of *Procockerellia* and *Allomacrotera* now known resemble the species of *Cockerellia* more or less closely but have a reduced number of segments in their maxillary palpi. With the exception of *albonotata*, these species are very uncommon and at most only one to three specimens of each have been collected and the males of only two species have been found. *P. stephanomeriae* was placed originally in *Procockerellia*, but its male when later discovered was found to have all of its tarsal claws bifid and it was removed to *Allomacrotera*. The male of *albonotata* has the claws of the front and middle tarsi bifid but those of hind tarsi long, simple and strongly curved.

KEY TO THE SPECIES OF PROCOCKERELLIA AND ALLOMACROTERA

- 1. Females 2
 Males 6
- 2. Frons and mesonotum strongly and closely punctured 3
 Frons and mesonotum more finely punctured, the puncture of mesonotum widely spaced 4
- 3. Lateral face marks large, triangular, intruding between foveae and eyes, straight and oblique on inner margin to middle of sides of disk of clypeus; clypeus, except anterior margin and two submedian stripes, supraclypeal and subantennal marks creamy white; abdomen with three broad, white arcuate bands *excellens* Timberlake
 Three marks on clypeus, separated by broad black stripes, and transverse lateral marks, with short orbital extension, white; abdomen with broader bands, those on tergites 2 and 3 interrupted medially, that on tergite 2 very narrow and that on tergite 5 much abbreviated; proboscis comparatively short, galeae shorter than stipites, and maxillary palpi with four short segments *brachyglossa*, n. sp.
- 4. Face with white marks on clypeus and parocular area 5
 Face and thorax dark; basal half of mandibles and line on underside of scape of antennae white; abdomen with four entire yellowish-white bands, that on tergite 5 abbreviated; dark blue green, labrum, clypeus and disk of mesonotum black *moabensis*, n. sp.
- 5. Disk of clypeus black, but lateral extensions of clypeus and triangular lateral marks, reaching level of antennae white; mark on lateral margin of tergite 1 and band on tergites 2 to 5 yellowish white, that on tergite 5 abbreviated; proboscis elongate, glossa reaching base of front coxae in repose; maxillary palpi five-jointed *albonotata* Timberlake
 Similar but white mark on each side of clypeus small; white bands on abdomen restricted to tergites 2 to 4, very narrowly interrupted medially and not quite reaching lateral margin of segments; proboscis reaching front coxae in repose, but maxillary palpi very short and three-jointed *stephanomeriae* Timberlake

- Claws of hind tarsi long and simple; face nearly all white below level of antennae; tibiae of all legs except behind and all tarsi white; abdomen with narrow subapical bands more or less broken or interrupted on each side, or restricted to lateral marks; maxillary palpi five-jointed *albonotata* Timberlake
- Claws of hind tarsi bifid at apex; clypeus lateral and subantennal marks white; abdomen dark, except for testaceous apex; maxillary palpi three-jointed. . *stephanomeriae* Timberlake

Perdita albonotata Timberlake

New records.—Ten males, 50 females, 5.2 miles southwest of Colorado City, Mohave Co., Arizona, collecting pollen from *Stephanomeria exigua*, Aug. 31, 1967 (Hall and Timberlake); 1 male, 9 females, 16.6 miles southeast of Hurricane, Washington Co., Utah, on same flower, Aug. 31 (Timberlake).

Perdita brachyglossa, n. sp.

The proboscis is remarkably short for this group and the maxillary palpi are very short and four-jointed.

Female.—Head and thorax dark blue green, dark part of clypeus black, dilated part of mandibles except inner margin, three marks on clypeus, lateral marks, underside of scape of antenna, interrupted band on hind margin of disk of pronotum and tubercles white. Clypeus with two broad submedian stripes confluent with dark anterior margin of disk, the enclosed median white mark narrowed above. Lateral marks broader than high and transverse except for a short orbital extension. Abdomen black, small spot on lateral margins of tergite 1 and band on tergites 2 to 5 creamy white; band on tergite 2 narrow, well interrupted medially, expanded at outer ends, passing over onto ventral part of sclerite and enclosing posterior half of foveae; band on tergites 3 and 4 much broader, passing over onto ventral part of segments, and that on tergite 3 narrowly interrupted at middle; band on tergite 5 much abbreviated. Apical depression of tergites, especially of tergites 4 and 5 pale testaceous, and pygidial plate testaceous. Venter dark, apical margin of sternite 5 and sternite 6 rufotestaceous. Legs black, front and middle knees, front and middle tibiae except behind, and front tarsi (small joints more testaceous) creamy white. Scape and pedicel black above, pedicel and next three or four joints narrowly white beneath, the flagellum brownish fuscous above but beneath gradually becoming more broadly yellowish or brownish on apical joints. Incurved tip of mandibles dark red, inner margin of dilated part testaceous. Labrum and proboscis fuscous, galeae testaceous brown. Tegulae testaceous hyaline with an uneven white band between hyaline part and fuscous base. Wings whitish hyaline, nervures pale testaceous, margins of stigma slightly brownish.

Head slightly broader than long, inner orbit of eyes converging below; cheeks broadly rounded, strongly receding and about two-thirds as wide as eyes. Posterior ocelli about their distance apart from nearest eye and somewhat closer to occipital margin. Facial foveae close to margin of eyes, moderately wide and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Antennae inserted a little below middle of face, middle joints of flagellum as long as thick. Face below level of antennae strongly convex, disk of clypeus as broad as high, strongly rounded across summit, lateral extensions slightly inflexed but unusually narrow and not produced on each side of labrum. Mandibles strongly dilated on inner margin, with strongly incurved tips longer than the basal width. Proboscis short, galeae shorter than stipites and a little shorter than labial palpi; maxillary palpi about one-fourth as long as galeae and four-jointed. Pterostigma two-thirds as wide as first submarginal cell; marginal cell as long as stigma, much longer beyond than beneath stigma, with metacarpus about twice as long as apical truncation. Tarsal claws moderately large, simple and tapering from base. Head and thorax shining, mesonotum polished, frons and vertex strongly tessellate and moderately dull; frons and mesonotum with fine but strong punctures rather close on frons and moderately well separated on middle of scutum. Pubescence abundant, fine, white, moderately long and erect, becoming longer on vertex and occiput and much longer on sides of propodeum. Hair of front coxa moderately dense and minutely plumose. Scopal hair of hind tibiae long, rather dense and wavy. Abdomen very minutely lineolate, moderately shining, mostly bare but with

abundant coarse hair across apical part of tergite 5. Pygidial plate large, polished on disk, with apical truncation nearly half wide as base. Length: 5.5 mm; anterior wing: 4 mm.

Holotype female.—Four and one-half miles southwest of Marble Canyon, Coconino Co., Arizona, on *Thelesperma*, Aug. 30, 1967 (Timberlake).

Type in collection of the University of California, Riverside.

Perdita moabensis, n. sp.

This is distinguished from other species of *Procockerellia* by the lack of face and thoracic markings and by having mandibles but little dilated on inner margin although strongly hooked inward at tip.

Female.—Dark green, labrum, clypeus, disk of mesoscutum and scutellum black. No light markings on face and thorax. Abdomen fuscous, with arcuate pale yellow band on tergites 2 to 5; band on tergite 2 widened at outer ends, reaching lateral margins but deeply indented by the black lateral foveae; bands on tergites 3 and 4 bent backward and narrowed at outer ends, and reaching lateral margins, and that on tergite 5 much abbreviated. Legs black, front and middle knees, front and middle tibiae except behind and all tarsi white. Antennae black, scape with a white line beneath, flagellum dull yellowish beneath. Mandibles white, shading into red on apical third. Proboscis fuscous, galeae and glossa much paler. Tegulae pale testaceous, fuscous at base. Wings milky hyaline, nervures very pallid.

Head rotund, no broader than long, inner orbits slightly convergent below and facial quadrangle about as wide as long. Cheeks very strongly receding and half as wide as eyes. Posterior ocelli a little less than their distance apart from nearest eye and equally distant from occipital margin. Facial foveae close to margin of eye, and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted just below middle of face, middle joints of flagellum slightly longer than thick. Face depressed, clypeus showing only slight curvature in respect to rest of face, but strongly produced and convex from side to side; lateral extensions broadly inflexed and hardly visible in frontal aspect. Mandibles large, moderately dilated, straight on inner margin, slightly widening to apical fourth, where abruptly narrowed and bent inward. Proboscis elongate, the glossa very long; maxillary palpi five-jointed. Pterostigma large, about four times longer than wide and about three-fourths as wide as first submarginal cell; marginal cell slightly longer beneath than beyond stigma, with metacarpus twice as long as apical truncation; second submarginal cell narrowed about two-thirds above, and receiving first recurrent nervure close to base. Head and thorax shining; face below antennae polished, frons and vertex strongly tessellate, rather dull and obscurely punctured; mesonotum polished, sparsely and minutely punctured, the punctures on middle of scutum widely spaced. Pubescence rather thin, fine, erect and white, rather short on face and mesonotum and much longer on cheeks and sides of thorax. Hair of front coxa rather short and thin, but scopal hair of hind tibiae very long, dense and minutely and densely crinkled. Abdomen narrowly ovate, widest across tergite 2, convex above and moderately shining. Pygidial plate large, nearly as long as wide at base and broadly truncate at apex. Length: 6 mm; anterior wing: 5.1 mm.

Holotype female.—Moab, Grand Co., Utah, Aug. 8, 1963 (G. F. Knowlton).

Type in collection of the University of Kansas, Lawrence.

Subgenus *Xeromacrotera* Timberlake

Perdita cephalotes (Cresson)

The fifth known specimen extends the range of *cephalotes* to Arizona.

New record.—One male, 1.6 miles north of The Gap, Coconino Co., Arizona, at flowers of *Chrysothamnus*, Aug. 30, 1967 (J. C. Hall).

Subgenus *Pentaperdita* Cockerell and Porter

Perdita bradleyana Timberlake

New record.—One female, Rio Grande, Zacatecas, Mexico, on yellow composite, Oct. 4, 1966 (G. E. and A. S. Bohart).

Perdita fortis, n. sp.

(Figs. 1397, 1398, 1417)

This species is similar to *bradleyana* and *coahuilensis* but the puncturation is slightly coarser and that of the frons sparser. The male has a robust form, which suggested the name *fortis*, and has the genital armature distinctive but similar to the parts in *coahuilensis*.

Female.—Head and thorax dark green, disk of mesoscutum and scutellum black; clypeus, transverse lateral marks not going above level of summit of clypeus, collar of pronotum, well-interrupted band on posterior margin of disk and tubercles white. Clypeus with two broad black stripes narrowly separated from each other and confluent across summit of disk, but not reaching anterior margin. Abdomen black, with three white bands successively less interrupted from tergite 2 to 4; band on tergite 2 reduced to lateral marks, produced backward around posterior end of foveae (in one paratype marks much larger and separated from each other by less than their transverse length); band on tergite 4 in form of two elongate oval marks slightly oblique to each other, narrowly separated and well enclosed in type, but extended to lateral markings in two paratypes; band on tergite 3 arcuate, moderately interrupted and reaching lateral margins. Pygidial plate ferruginous. Legs black, small joints of tarsi more brownish. Scape of antennae black, flagellum brown beneath and fuscous above. Labrum and proboscis fuscous. Mandibles black, but red on apical third or more and sometimes beyond middle on inner margin. Tegulae testaceous hyaline, extreme base fuscous. Wings whitish hyaline, nervures and stigma pale testaceous, subcosta fuscous except at base and apex.

Head distinctly broader than long; cheeks evenly rounded, about two-thirds as wide as eyes. Posterior ocelli their distance apart from nearest eye and somewhat closer to occipital margin. Facial foveae slender, close to margin of eye, and reaching from level of middle of antennal sockets somewhat more than halfway to level of anterior ocellus. Antennae inserted below middle of face, middle joints of flagellum as long as thick; antennal sockets slightly farther from margin of eye than their distance apart. Face below level of antennae strongly convex; disk of clypeus broader than high, lateral extensions gradually inflexed and partly visible in frontal aspect. Mandibles robust, apex moderately incurved, inner margin of shaft moderately and roundly dilated. Proboscis normal for group, not exceeding fossa in repose; galeae reaching base of stipites; maxillary palpi five-jointed. Pterostigma rather small, about half as wide as first submarginal cell; marginal cell longer than stigma, much longer beyond than beneath stigma, with metacarpus more than twice as long as apical truncation; second submarginal cell narrowed nearly two-thirds above. Head and thorax smooth, shining, with strong fine punctures, rather close on frons and moderately sparse on clypeus and mesonotum. Pubescence rather coarse, white, erect; moderately short and thin on mesonotum, somewhat longer and denser on face and cheeks, and still longer on mesosternum; hair of front coxa unusually short and thin. Abdomen broadly ovate, depressed; pygidial plate triangular, slightly longer than wide at base and narrowly obtuse at apex, disk plane. Length: 5.45 mm; anterior wing: 3.8 mm.

Male.—Head and thorax dark bluish green, disk of mesoscutum and scutellum black. Clypeus except for two short vertical stripes on upper half of disk, almost confluent at summit, and transverse lateral marks, about twice as high, creamy white. Thorax entirely dark except for whitish collar of pronotum. Abdomen black, broad apical depression of tergites 1 to 6 whitish subhyaline and tergite 7 pale ferruginous. Legs black, small joints of tarsi tinged with ferruginous. Antennae black, flagellum narrowly brown beneath. Labrum testaceous. Mandibles testaceous, whitish toward base, apex dark red, and a small spot at middle of base black. Proboscis fuscous, galeae testaceous. Tegulae and wings as in female.

Head broader than long, truncate across oral margin; cheeks moderately receding, broader than eyes and evenly rounded. Posterior ocelli somewhat more than their distance apart from nearest eye and still more remote from occipital margins. Facial foveae obscure, punctiform. Antennae inserted far below middle of face and a little below level of middle of eyes, scape reaching about two-thirds of distance to level of anterior ocellus, and middle joints of flagellum as long as wide. Face below level of antennae strongly convex; disk of clypeus somewhat broader

than high, lateral extensions well inflexed, but partly visible in frontal aspect and about as long transversely as width of disk. Mandibles rather massive, thick at base, tapering and acute at apex and reaching slightly beyond far margin of labrum. Flanks of pronotum normal. Proboscis and wings as in female. Head and thorax smooth, shining, finely punctured; punctures close on frons, sparser on face below antennae and on vertex, and widely separated in area between lateral ocelli and margin of eyes, and mostly widely spaced on mesonotum. Pubescence thin, erect and whitish; moderately long on vertex, occipital margin and mesonotum, more decumbent on face, and shorter and denser on cheeks and underside of thorax. Abdomen ovate, broader than thorax, widest at junction of tergites 2 and 3, and narrowed to truncate apex of tergite 7. Pubescence of abdomen fine, rather short and appressed, mostly on and across apical depression of tergites. Subgenital plate slender, slightly expanded at apex, with a subapical curved fold or ridge, beyond which it is narrowly rounded and fringed with a few short hairs. Capsule of subgenital armature quadrate, broadest at base and somewhat narrowed toward apex, infolded at apex to produce two sharp submedian points; parameral lobes moderately narrow, strongly incurved and nearly hairless; sagittae with fused apical part ovately expanded, but with two slender prongs at apex, and the spurs of the basal rods extremely long and attenuate; the one pair of volsellae well exposed in dorsal view. Length: 4.5 mm; anterior wing: 3.9 mm.

Holotype female and allotype.—Rio Grande, Zacatecas, Mexico, on yellow composite, Oct. 4, 1966 (G. E. and A. S. Bohart).

Paratypes.—Three females taken with the types.

Types in collection of the University of California, Riverside; paratypes in collection of George E. Bohart.

Perdita idahoensis Timberlake

New record.—One male, Antelope Springs, 8 miles south of Deep Spring, Inyo Co., California, on *Gutierrezia microcephala*, Sept. 1, 1965 (G. I. Stage).

Perdita melanochlora Cockerell

New records.—One male, 4 miles west of Westgard Pass, Inyo Co., California, Sept. 3, 1965 (P. Rude); 1 male, Westgard Pass, June 16, 1966 (Middlekauff and Rentz).

Subgenus *Hexaperdita* Timberlake

Perdita compacta, n. sp.

P. compacta is similar to *callicerata* to which it runs in the 1956 key. It differs in the darkened subcosta and margins of stigma, much broader shaft of the mandible, narrowly truncate apex of the pygidial plate and the shorter, more mosslike hair of mesoscutum. The type lacks the first recurrent nervure in both wings, but presumably this is not a constant characteristic.

Female.—Head and thorax dark green. Base of mandibles, sides of labrum, clypeus, triangular lateral marks reaching level of antenna, collar of pronotum, large mark on each side of hind margin of disk and tubercles white. Abdomen fuscous banded with white at base and with testaceous suffused with pale brown on apical segments; tergite 1 with a pale median mark, partly on disk and partly on basal declivity, the mark divided by a dark line in median crease; tergite 2 with basal white band touching lateral foveae and a little narrower than apical dark band; tergite 3 having basal corners dark and confluent with apical dark band thus enclosing very broad whitish band; tergite 4 similar to 3, but dark color more brownish and the white less clear; tergites 5 and 6 testaceous suffused with pale brown; pygidial plate clear testaceous, with margin reddish. Legs black, front and middle knees, anterior side of front tibiae, spot at apex of middle tibiae and all tarsi yellowish white. Scape and pedicel of antennae white, mark at apex of scape above and upper side of pedicel fuscous; flagellum brownish yellow, more whitish toward base beneath, first five joints fuscous above, the dark color extending as an apical ring on inner side of each joint. Labrum testaceous except on each side. Mandibles dark red on nearly apical half, shading through testaceous into white at base. Tegulae

testaceous hyaline, with basal white spot. Wings whitish hyaline, nervures pallid, but subcosta fuscous except on basal third and margins of stigma more dilute fuscous.

Head as wide as long; cheeks rounded, about half as wide as eyes. Posterior ocelli their distance apart from nearest eye and slightly more than half as far from occipital margin. Facial foveae about their own width from margin of eyes and reaching from slightly above level of antennal sockets not much more than halfway to level of anterior ocellus. Antennae inserted a little below level of middle of eyes, flagellum moderately clavate. Face below level of antennae strongly convex; disk of clypeus large, a little broader than high, lateral extensions strongly inflexed and not much visible in frontal aspect. Mandibles with moderately broad shaft, narrowed and moderately incurved to blunt apex. Proboscis approximately as long as in *callicerata*. Pterostigma about as long and as wide as first submarginal cell; marginal cell slightly longer beneath than beyond stigma, with metacarpus slightly longer than apical truncation; second submarginal narrowed two-thirds above and receiving stub of first recurrent nervure shortly behind base. Head and thorax shining, with face and mesonotum polished; vertex weakly tessellate and dullish; puncturation minute and sparse, punctures of mesoscutum numerous but well separated. Pubescence whitish, rather thin and short; face less hairy than in *callicerata*; hair of mesonotum about as dense as in *callicerata*, but shorter and coarser or mosslike. Abdomen oval, depressed, nearly twice as long as wide; pygidial plate distinctly longer than wide at base, sides converging to moderately wide, truncate apex; disk plane, lateral margins slightly carinate. Length: 4.9 mm; anterior wing: 3.2 mm.

Holotype female.—Three miles west of Geronimo, Graham Co., Arizona, on *Pectis papposa*, Sept. 18, 1966 (Rust, Torchio, Wood, and Yousef).

Type in collection of the University of California, Riverside.

Perdita heterothecae Cockerell

One female from Utah differs in its larger size and in having the abdominal markings comparatively broad and bandlike, that on tergite 2 broadly touching the lateral foveae at outer ends. It agrees closely in sculpture and the face markings.

Record.—One female, 5 miles north of Blanding, San Juan Co., Utah, on *Grindelia*, Aug. 24, 1967 (Timberlake).

Perdita ignota ignota Cockerell

New record.—One male, Rio Grande, Zacatecas, Mexico, on yellow composite, Oct. 4, 1966 (G. E. and A. S. Bohart).

This specimen has the lateral face marks narrowly transverse, about three times broader than high, and similar marks can be seen in some specimens from Arizona and New Mexico. The subspecies *jaliscana* has the lateral marks reduced to a small spot adjacent to the clypeus.

Perdita rossi Timberlake

New record.—One male, 8 females, 31 miles south of El Crucero, Baja California, Territorio Sur, Nov. 6, 1965 (W. Ewart and R. C. Dickson).

Subgenus *Pygoperdita* Timberlake

Perdita mormonica Timberlake

New record.—One female, 20 miles east of Escalante, Garfield Co., Utah, on composite, June 5, 1966 (G. E. Bohart).

This specimen is similar to the type, but lacks the dark stripes on the clypeus and the abdomen is more infuscated, with pale bands more distinct although still strongly nubilous. The bands on tergites 2 to 4 are interrupted medially and are bent backward at outer ends to pass behind an infuscated mark at each basal corner of the segments.

Subgenus *Perdita* F. Smith

Zonalis Group

To help distinguish several new species of the group from each other and similar species, the following supplementary key has been prepared.

SUPPLEMENTARY KEY TO ZONALIS GROUP

1. Females 2
Males 17
2. Punctures of mesoscutum more or less widely and irregularly spaced and set with very fine erect hair 3
Punctures of mesoscutum comparatively close (but not dense), with corresponding density of pubescence 11
3. Frons more or less closely punctured, at least on each side adjacent to foveae 4
Frons almost impunctate; mesoscutum delicately tessellate with very sparse punctures; face marks white including in some cases supraclypeal and subantennal marks; abdomen pale yellow, spot on each side of tergite 1, and four narrow bands fuscous
impunctifrons Timberlake
4. Mandibles less slender, inner margin more or less strongly dilated 5
Mandibles comparatively long and slender, the slight inner dilation ending obliquely before the apex; small median mark on clypeus, lateral and supraclypeal marks pallid; clypeus otherwise and ridged part of supraclypeal area black; abdomen yellow, with five fuscous bands, including one at base of tergite 1 *affecta*, n. sp.
5. Frons smoothly tessellate, strongly shining, and sparsely punctured in median area between foveae or in area above level of foveae 6
Frons more strongly tessellate, more dullish and more closely or more extensively punctured 8
6. Pronotum yellow except for mark on flanks 7
Pronotum with dark band across disk, broadening on flanks; abdomen yellow with five dark bands including one at base of tergite 1 *similis* Timberlake, var.
7. Dark mark on flanks of pronotum large, narrowed above nearly to upper level of tubercles; clypeus, lateral and supraclypeal marks, legs except hind tibiae, and abdomen except four dark bands, yellow; mandibles abruptly narrowed on inner margin before apex
similis Timberlake
Larger, more robust species, with markings orange yellow; dark mark on flanks of pronotum small and opposite tubercles; marked as in *similis* except for additional small mark on subantennal plates; mandibles strongly dilated and narrowed gradually on inner margin to apex *toschiae* Timberlake
8. Frons with punctures sparser in middle, or with a small impunctate space just above ridge between antennal sockets 9
Frons closely and almost evenly punctured between foveae and more sparsely above level of foveae, the punctures distinctly stronger than those of mesonotum; clypeus, lateral marks, large supraclypeal mark, pronotum except long mark on flanks, legs except hind tibiae and tarsi, and abdomen except four broad dark bands, all yellow . . . *socia* Timberlake
9. Mesoscutum polished; mandibles with inner dilation abruptly narrowed before apex 10
Mesoscutum delicately tessellate and rather sparsely punctured; mandibles rather short, and narrowing gradually to apex on inner margin (worn condition); base of mandibles, labrum, clypeus, lateral marks, two supraclypeal spots, scape of antennae except dark spot on apex, and band on posterior margin of pronotum, continuous with mark on tubercles, yellow; legs yellow, hind tibiae fuscous, front and middle tibiae brownish beneath; abdomen with five dark bands *stottleri* Cockerell, type
10. Base of mandibles, clypeus, lateral marks, supraclypeal mark, scape of antennae, and disk of pronotum yellow; abdomen with five dark bands, yellow band on tergite 1 moderately wide and interrupted only by dark line in median crease *dubia dubia* Cockerell
Similar but supraclypeal mark in most cases absent; scape of antennae dark at apex above; pronotum dark, but interrupted band on hind margin of disk and tubercles yellow;

- abdomen with five dark bands, the yellow band on tergite 1 more or less narrow, broken or evanescent; markings paler yellow than in *dubia**dubia parilis* Timberlake
11. Flanks of pronotum normal12
 Flanks of pronotum well impressed14
12. Abdomen yellow with four or five black bands13
 Abdomen black, with five whitish bands, increasing in width toward apex, and all narrowly interrupted or nearly so; face marks small, restricted to clypeus and lateral marks; legs dark, but usually yellow on anterior side of femora and front and middle tibiae; mesonotum moderately tessellate on anterior border of scutum and strongly punctured
irregularis, n. sp.
13. Frons closely punctured in area between foveae and antennal sockets and more sparsely punctured in middle and above level of foveae; mesonotum rather closely punctured and with erect white hair; supraclypeal area black with two yellow marks; pronotum with dark cross band; legs yellow, hind tibiae dark, and in many cases front and middle tibiae streaked with brown and more rarely apex of hind femora with a dark spot
stottleri Cockerell
- Frons finely punctured almost to level of anterior ocellus; mesoscutum with close, strong punctures and conspicuous white hair; clypeus and lateral marks yellow, but two spots at summit of clypeus, supraclypeal area and subantennal plates black (in paratype clypeus all yellow and two yellow marks present on supraclypeal area); legs entirely yellow; abdomen pale yellow with five dark bands, the distal bands narrow ...*ampla*, n. sp.
14. Pronotum yellow, with dark mark on flanks; frons and mesonotum closely punctured15
 Pronotum with dark cross band which broadens on flanks16
15. Mesonotum polished, moderately closely punctured, with erect hair not at all concealing surface; clypeus, lateral marks, large supraclypeal mark, and in some cases subantennal spots yellow; legs yellow, hind tibiae partly dark; abdomen yellow with four dark bands
oregonensis Timberlake
- Mesoscutum distinctly but not strongly tessellate, more closely punctured, with hair coarser, denser, partly depressed and partly concealing surface; markings similar, but legs entirely yellow and tergite 1 of abdomen with basal dark band or with a dark spot on each side of basal declivity*vestita* Timberlake
16. Punctures of frons very fine and sparse; mesoscutum with punctures rather widely spaced on middle of disk and with thin, rather coarse erect hair; clypeus, lateral marks and large supraclypeal mark yellow; legs entirely yellow; abdomen yellow, with four dark bands and a mark on each side of tergite 1*taeniata*, n. sp.
- Punctures of frons distinct and moderately close on each side adjacent to foveae; punctures of mesoscutum moderately close; subantennal plates and supraclypeal area black; clypeus and lateral marks yellow, the lateral marks failing to cover entire anterior end of parocular area; legs yellow, hind tibiae fuscous except basal fourth, front and hind femora broadly streaked with brown, and middle femora brown on basal half of anterior side; abdomen pale yellow with five broad fuscous bands, the yellow band on tergite 1 interrupted*confinis*, n. sp.
17. Mesosternum with a yellow spot on each side of anterior border, and face entirely yellow below level of antennae18
 Thorax entirely dark except for usual marks on tubercles or other parts of pronotum24
18. Flanks of pronotum not impressed19
 Flanks of pronotum well impressed; posterior corners of disk of pronotum prominent21
19. Mesonotum finely and more or less sparsely punctured and hairy; legs yellow, except on outer side of hind tibiae, and pronotum yellow with a dark band narrowed on the flanks. .20
 Mesonotum comparatively strongly and closely punctured and hairy; tibiae heavily marked with black, and hind femora with small dark mark at apex; dark band on pronotum broad*irregularis*, n. sp.
20. Mesonotum polished, with widely spaced punctures and thin hair; legs yellow, or hind tibiae in many cases infuscated on outer margin; margin of metapleura and propodeum above middle and hind coxae narrowly yellow; abdomen yellow with five dark bands
similis Timberlake

- Mesoscutum weakly tessellate, somewhat more closely punctured and hairy; legs yellow, hind tibiae with dark streak on outer margin; margin of metapleura and propodeum dark above coxae; yellow marks on mesosternum larger than in *similis* *stottleri* Cockerell
21. Mesoscutum more or less distinctly tessellate 22
 Mesoscutum polished, sparsely punctured and thinly hairy; yellow on sides of face extending broadly above level of antennae; pronotum yellow, with dark band; legs entirely yellow; abdomen yellow, with five dark bands *oregonensis* Timberlake
22. Pronotum yellow, with two transverse marks or band across disk; cheeks broadest opposite anterior end of eyes and yellow on anterior half 23
 Pronotum with dark cross band, more or less narrowed on flanks; cheeks widest opposite middle of eyes and with yellow orbital streak; legs entirely yellow; abdomen yellow, with proximal part of bands on tergites 2 to 4 not reaching lateral margins; mesoscutum delicately tessellate, with sparse minute punctures and thin hair . . . *subvestita* Timberlake
23. Mesoscutum rather strongly tessellate and moderately closely punctured; anterior half of underside of head and cheeks, face to or barely above level of antennae, pronotum except interrupted dark line on disk, prosternum, propleura, large marks on anterior border of mesosternum and legs bright yellow; abdomen yellow with four dark bands, the yellow band on tergite 1 interrupted *vestita* Timberlake
 Similar to *vestita* in color and markings, except band on disk of pronotum broad and entire; mesoscutum faintly tessellate, with widely spaced punctures *taeniata*, n. sp.
24. Frons minutely tessellate, dullish, but shining in some aspects and obscurely punctured . . . 25
 Frons very minutely granular tessellate and opaque, or shining only in strongly oblique aspect 27
25. Mesoscutum with sparse punctures, widely spaced on middle of disk, and thin erect hair; pronotum dark, with marks on disk and tubercles yellow 26
 Mesoscutum shining, with moderately close strong punctures and erect hair; pronotum yellow, with dark crossband; face yellow below level of antennae, but anterior part of subantennal plates dark; abdomen dark with yellow band, narrowly interrupted, and emarginate behind on each side on tergite 2 and following segments, with distal bands increasing in width; legs yellow with tibiae marked on outer margin and a spot at apex of hind femora *irregularis*, n. sp.
26. Face yellow below level of antennae, but anterior end of subantennal plates in many cases dark; legs yellow, with hind tibiae dark except beneath, dark streak on front femora and on front and middle tibiae; abdomen dark, with yellow band on tergites 2 to 6, increasing in width on distal segments and apex of tergite 7 broadly testaceous yellow; wings subhyaline *dubia dubia* Cockerell
 Similar but light markings paler, in some cases creamy white; dark bands at junction of tergites 5 and 6 and 6 and 7 evanescent, and in some cases also that on tergites 4 and 5; tergite 1 in some cases with interrupted light band; wings more whitish, with paler nervures *dubia parilis* Timberlake
27. Frons with minute punctures on each side between foveae and antennal sockets 28
 Frons virtually impunctate; mesonotum dark green, with widely spaced minute punctures; face more or less completely yellow below level of antennae; pronotum dark, with tubercles and mark on each side of hind margin of disk yellow; abdomen yellow, with tergite 1 mainly dark and dark bands at junction of following segments, but these in many cases evanescent on tergites 5 or 6 and 7; wings slightly dusky hyaline, nervures testaceous brown, subcosta fuscous *zonalis* Cresson
28. Abdomen black, with yellow band, more or less distinctly interrupted on tergites 2 to 5 and a broader entire band on tergite 6; face yellow below level of antennae, except subantennal plates black; pronotum entirely dark in most cases except for yellow tubercles; legs dark, but femora and tibiae narrowly yellow beneath on hind legs and broadly beneath or on anterior side on front and middle legs; mesonotum dark green, with punctures minute and widely spaced but more numerous than in *zonalis*. . . . *rivalis* Timberlake
 Similar, but abdomen black except for entire and enclosed yellow band on tergites 2 to 5; pronotum dark except for mark on tubercles; punctures of mesoscutum more minute and sparser than in *zonalis*. *repens*, n. sp.

Perdita affecta, n. sp.

In previous keys to the *zonalis* group (1958 and 1968, Univ. Calif. Publ. Entom., 14:304-315 and 49:40-43) this species runs to *similis* or *toschiae* and is distinguished from those species in the preceding key.

Female.—Head and thorax dark green; mandibles except reddened apical third, triangular lateral face marks, much higher than wide and reaching to anterior end of foveae, and supra-clypeal mark broader than high, and indented on dorsal margin, yellow. Clypeus black, except for small median yellow spot on disk, and smaller, nubilous or evanescent yellowish mark far to each side on disk or on lateral extensions. Subantennal plates and ridged area between antennal sockets also black. Pronotum green, with collar, band across posterior margin of disk, continuous with mark on tubercles yellow; dark band across disk only slightly wider than yellow part. Abdomen yellow, with five fuscous bands, decreasing successively in width distad, the yellow bands on tergite 1 to 4 even, entire and reaching lateral margins; apical half of tergite 5 and pygidial plate testaceous. Legs yellow, front femora broadly fuscous behind except at apex, middle tibiae suffused with fuscous behind, and small spot at apex of hind femora, and hind tibiae and tarsi fuscous. Antennae fuscous, scape and pedicel broadly yellow beneath and flagellum narrowly yellowish. Labrum testaceous yellow. Proboscis fuscous. Tegulae broadly yellow at base and testaceous hyaline outwardly. Wings nearly clear hyaline, nervures testaceous, margins of stigma and subcosta brownish fuscous.

Head slightly broader than long; cheeks rounded, only slightly more than half as wide as eyes. Posterior ocelli slightly farther apart than distance from either to nearest eye or occipital margin. Frons depressed; facial foveae narrow, only slightly wider than interval between them and eyes, and reaching from upper level of antennal sockets not much more than halfway to level of anterior ocellus. Antennae inserted below middle of face, middle joints of flagellum slightly longer than thick. Face below level of antennae strongly convex; disk of clypeus considerably broader than high, and well rounded across summit; lateral extensions strongly inflexed, but partly visible in frontal aspect. Mandibles long, strongly curved, slightly dilated on inner margin, the dilation ending gradually at beginning of apical fifth of shaft. Proboscis of normal length for group, galeae reaching base of stipites. Pterostigma nearly as long and about three-fourths as wide as first submarginal cell; marginal cell slightly longer beyond than beneath stigma and metacarpus about one and one-half times longer than apical truncation; second submarginal cell narrowed more than half above. Head and thorax shining, frons minutely and smoothly tessellate, and moderately dullish; face below antennae and mesonotum polished. Frons finely and closely punctured, but more sparsely just below level of ocelli; punctures of mesoscutum sparse and almost uniformly and widely spaced, those of scutellum closer. Pubescence whitish, fine, erect; short on face and mesonotum and longer and denser on cheeks, sides and under-surface of thorax; hair of front coxae long and moderately dense. Abdomen oval, depressed, about twice as long as wide; apical fimbria short and thin; pygidial plate plane, about as long as wide at base and narrowed to rounded and slightly notched apex. Length: 5 mm; anterior wing: 3.6 mm.

Holotype female.—Three miles southeast of Tuba City, Navajo Indian Reservation, Coconino Co., Arizona, at flowers of *Artemisia filifolia*, Aug. 29, 1967 (J. C. Hall).

This and many specimens of three other species of *Perdita* were taken at the flowers of the *Artemisia*, but none were collecting pollen.

Type in collection of the University of California, Riverside.

Perdita ampla, n. sp.

The female of *ampla* is similar to *stottleri* and may prove to be a form of *townsendi*.

Female.—Head and thorax dark green, supra-clypeal area and subantennal plates black. Mandibles except red apices, labrum, clypeus, and triangular lateral marks intruding between foveae and eyes above, yellowish white; a black spot on each side of summit of clypeus and clypeal and lateral marks separated by a black line. In one paratype black marks on summit of

clypeus absent and supraclypeal area with two oval white marks, oblique and converging above. Pronotum yellowish with green crossband broadening on flanks. Abdomen yellowish white, with five almost even black bands, including one at base of tergite 1; two distal bands narrower than others and not quite reaching lateral margins; yellow band on tergite 1 interrupted medially. Legs entirely pale yellow, except front coxae black, and three apical joints of hind tarsi pale brown. Scape clear yellowish white like face marks, except small dark spot at apex; pedicel also white beneath, but flagellum brownish yellow beneath and broadly fuscous above. Proboscis fuscous. Tegulae subhyaline, white at base. Wings whitish hyaline, nervures pale testaceous, margins of stigma and subcosta darker testaceous.

Head slightly wider than long; cheeks rounded, moderately receding, about two-thirds as wide as eyes. Posterior ocelli about half their distance apart from occipital margin and somewhat more distant from nearest eye. Facial foveae strongly impressed, about three times as wide as narrow interval between them and eyes, and reaching about two-thirds of distance from level of middle of antennal sockets to level of anterior ocellus. Antennae inserted below middle of face, flagellum moderately clavate, with middle joints slightly longer than thick. Face below level of antennae strongly convex; disk of clypeus nearly twice as broad as high and broadly rounded across summit; lateral extensions inflexed but partly visible in frontal aspect. Mandibles evenly curved on outer margin, moderately dilated within and abruptly narrowed before apex. Proboscis long, galeae reaching base of stipites, maxillary palpi about three-fourths as long as galeae. Pterostigma approximately three times longer than wide and nearly as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, metacarpus twice as long as apical truncation. Head and thorax shining, face below level of antennae and mesonotum polished, frons and vertex minutely tessellate and moderately dullish. Punctures of frons fine, shallow, moderately close, and those of mesonotum similar, more sharply defined and about the same in density; face below level of antennae weakly and very sparsely punctured. Pubescence white, erect, moderately long and dense on frons and cheeks, and longer on sides of thorax and lateral ridges of propodeum; hair of mesonotum shorter, moderately coarse, becoming denser and depressed on posterior margin of scutum; hair of front coxae long and moderately dense. Abdomen oval, depressed, nearly twice as long as wide; pygidial plate about as long as wide at base, with sides arcuately converging to rounded and distinctly notched apex; apical fimbria short and thin. Length: 5.5–6.5 mm; anterior wing: 4.3–4.4 mm.

Holotype female.—Newcomb, San Juan Co., New Mexico, on *Chrysothamnus nauseosus*, Sept. 21, 1965 (G. E. Bohart).

Paratypes.—New Mexico, San Juan Co.: 4 females collected with the type; McKinley Co.: 1 female, Tohatchi, on *Senecio*, Sept. 21, 1965 (Bohart).

Type and one paratype in collection of the University of California, Riverside; other paratypes in collection of George E. Bohart.

Perdita confinis, n. sp.

The type of *confinis* is a female recorded by me as *stottleri* in 1968, but it differs from *stottleri* in the well-impressed flanks of the pronotum.

Female.—Head and thorax dark green; base of mandibles, labrum, clypeus, rather small and raggedly margined lateral marks, collar of pronotum, posterior border of disk, narrowly confluent with mark on tubercles, pale yellow; a black mark between anterior end of lateral marks and clypeus. Abdomen yellowish white, with five broad black bands including one at base of tergite 1; dark band at junction of tergites 4 and 5 narrower than others; white band on tergite 1 moderately narrow and interrupted. Legs pale yellow, hind tibiae fuscous except at base, hind tarsi brownish fuscous on outer margin; brown blotch on anterior and posterior side of front femora, on posterior side of middle femora and on dorsal margin of hind femora. Small spot at apex of scape, pedicel and flagellum above fuscous, scape and pedicel otherwise pale yellow, and flagellum narrowly brownish yellow beneath. Proboscis fuscous. Tegulae testaceous subhyaline, anterior basal mark white. Wings nearly clear hyaline, nervures testaceous, subcosta only slightly darker on distal half.

Head slightly broader than long; cheeks rounded, moderately receding and three-fourths as

wide as eyes. Posterior ocelli their distance apart from nearest eye and slightly closer to occipital margin. Antennae inserted below middle of face, with middle joints of flagellum about as long as thick. Face below level of antennae strongly convex; disk of clypeus nearly twice as broad as high; lateral extensions strongly inflexed but partly visible in frontal aspect. Mandibles rather weakly dilated on inner margin and abruptly narrowed close to blunt apex (possibly somewhat worn at apex). Flanks of pronotum well impressed. Pterostigma about three times longer than wide and three-fourths as wide as first submarginal cell; marginal cell much longer beyond than beneath stigma, with metacarpus more than twice as long as apical truncation. Head and thorax polished and shining, except frons and vertex tessellate and moderately dullish. Frons closely punctured adjacent to foveae on each side, otherwise nearly impunctate; punctures of face below level of antennae restricted mostly to parocular area on each side; punctures of mesonotum moderately close but becoming widely spaced in large area on middle of scutum. Pubescence white, erect, moderately long and fine, thin on face, moderately abundant on mesonotum, dense on cheeks, long and thin on sides of thorax and long and dense on lateral ridges of propodeum; hair of front coxae moderately long and dense. Abdomen elongate oval, depressed, about two and one-half times longer than wide; pygidial plate as long as wide at base, sides strongly arcuate to slightly notched apex. Length: nearly 5 mm; anterior wing: 3.6 mm.

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

Type in collection of the University of California, Riverside.

Perdita dubia Cockerell

(Figs. 1365, 1366, 1401)

I have not been able to see the type of *dubia*, but material collected seven miles north of Redstone, Pitkin County, Colorado, agrees exactly with Cockerell's description. This locality is only about twenty miles south in a straight line from Glenwood Springs the type locality. Both sexes were taken at flowers of *Gutierrezia*. Comparison of this material with *parilis* has convinced me that the two nominal forms are too closely allied to be separated more than subspecifically. I now believe that *fraterna* based on the male from Colorado, must be the same as *dubia*.

Perdita dubia dubia Cockerell, new status

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

Perdita fraterna Timberlake, 1929, Jour. New York Ent. Soc., 39:123, ♂; Timberlake, 1953, Univ. Calif. Publ. Entom. 14, figs. 394, 395, 481 (new synonymy).

The male of *dubia* differs from *parilis* in the brighter yellow markings, more extensive dark markings of abdomen, and in the less whitish wings. In most cases tergite 1 of the abdomen is entirely dark, and the dark banding is evident at junction of tergites 5 and 6 or even 6 and 7. In *parilis* there may be a light crossband on tergite 1 and the abdomen may be mainly or entirely light beyond the base of tergite 5. The only structural difference noted between *dubia* and *parilis* is in the shape of the subgenital plate, as shown in figures 481 and 491 in Part III of my revision. Figure 481 was based on the holotype of *fraterna*. In specimens from the Redstone locality the plate is somewhat longer than shown in figure 481 and is slightly more constricted toward base. In the male recorded as *fraterna* from near Camp Verde, Arizona, the plate is about as long as depicted in figure 491 but less dilated toward apex and truncate instead of rounded across apex. There is evidence, therefore, that there is much local variation in the shape of the plate.

The female of *dubia*, which is new, differs from *parilis* in the deep yellow markings, and in having the supra-clypeal mark well developed and the disk of the pronotum mainly or entirely yellow, although the flanks are dark.

Female.—Head and thorax dark green; base of mandibles, labrum, clypeus, triangular lateral mark reaching anterior end of foveae and transverse supraclypeal mark yellow. Flanks of pronotum dark, but disk either entirely yellow and narrowly confluent with yellow on tubercles, or dark color of flanks narrowly extending from each side onto disk for a short distance. Abdomen yellow, with bands on basal declivity of tergite 1 and at junction of tergites 1 and 2 to 4 and 5 black; extreme base of tergite 6 also black. Black band on base of tergite 1 reaching lateral margins across its apex and extending medially to extreme base, but leaving lateral margins partly yellow. Yellow band on tergite 1 broad, but very narrowly interrupted by black line in median crease. Legs yellow, hind tibiae black, hind tarsi fuscous; an oblique mark or broad streak on posterior side of front femora and streak on front and middle tibiae brown. Scape of antennae, except dark spot at apex above, and underside of pedicel yellow; antennae otherwise fuscous, with flagellum broadly brown beneath. Mandibles shading into red at apex. Tegulae testaceous hyaline, with base yellow. Wings nearly clear hyaline, nervures testaceous brown, margins of stigma and subcosta fuscous.

Head slightly broader than long; cheeks moderately wide and receding. Posterior ocelli their distance apart from occipital margin and somewhat closer to nearest eye. Facial foveae parallel-sided, although pointed at each end, close to margin of eyes and reaching from level of antennal sockets somewhat more than halfway to level of anterior ocellus. Antennae inserted below middle of face, with middle joints of flagellum as long as thick. Face below level of antennae gently convex; disk of clypeus nearly twice as broad as high, with lateral extensions strongly inflexed and partly visible in frontal aspect. Mandibles moderately dilated on inner margin and abruptly narrowed before apex without formation of inner tooth. Pterostigma about two-thirds as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed somewhat less than one-half above. Head and thorax shining, mesonotum polished but frons and vertex strongly tessellate and dull. Puncturation fine and sparse; frons with moderately close punctures on each side between foveae and antennal socket and scattered punctures across area just above level of foveae; mesonotum with punctures well separated. Cheeks very finely and closely punctured except narrowly on orbits and broadly at temples. Pubescence whitish, fine, erect and thin, but longer and denser on cheeks and underside of thorax; mesoseutum with praescutellar band of appressed hair. Abdomen broadly oval, about twice as long as wide, with thin apical fimbria. Pygidial plate about as long as wide at base, with sides converging to moderately narrow, rounded apex, which is very weakly notched. Length: 4.5–5 mm; anterior wing: 3.7 mm.

New record.—Nine males, 2 females, 7 miles north of Redstone, Pitkin Co., Colorado on *Gutierrezia sarothrae*, Aug. 26, 1967 (J. C. Hall).

Perdita dubia parilis Timberlake, new status

Perdita parilis Timberlake, 1958, Univ. Calif. Publ. Entom., 14:342, ♀, ♂.

Perdita fraterna Timberlake, 1958, *ibid.*: 306, 312, 329, excluding figures.

The characters used in the key to distinguish *fraterna*, and the description of the female were based on material collected near Camp Verde, Arizona, whereas the figures were based on the holotype.

The male from Camp Verde locality agrees closely with *parilis* but has the subgenital plate truncate instead of rounded at apex as noted above. The female, however, differs from other specimens of *dubia* or *parilis* in having the frons more smoothly tessellate and more shining. A similar female is from three miles north of Malta, Cassia County, Idaho, on *Chrysothamnus*, August 15, 1955 (R. A. Mackie). Possibly such specimens may belong elsewhere, but this cannot be proved with limited material. In males collected east of Jacob Lake, Coconino County, Arizona, the subgenital plate is similar to the one depicted in figure 491 but much less constricted toward base.

New records.—Arizona, Coconino Co.: 1 male, 2 miles west of Denison (15 miles west of

Winslow), on *Gutierrezia*, Sept. 27, 1964; 4 males, 2 females, 7.6 miles east of Jacob Lake, on *Gutierrezia*, Aug. 30, 1967 (Timberlake).

Perdita impunctifrons Timberlake

New record.—Two females, Cajon Canyon, 7.7 miles northwest of Cajon, San Bernardino Co., California, July 5, 1964 (R. R. Snelling).

Perdita irregularis, n. sp.

(Figs. 1367, 1368, 1402)

The female of *irregularis* has the abdominal light bands interrupted medially, or almost so, and would fall near *swezeyi* and *rivalis* in the 1958 key. One male has interrupted bands and would go to *rivalis* in the key, but the other two of three specimens have light marks on the mesosternum and run to *oregonensis* in the key.

Female.—Head and thorax dark blue green, with dark part of clypeus, supraclypeal area and subantennal plates black. Labrum black on basal half and testaceous or partly whitish apically. Clypeus dark, with an abbreviated median white stripe, broken into two small spots (type), or with a broad transverse white band to far sides, but broken by longitudinal dark stripes into three parts, the outer parts showing the black tentorial spot near their middle. Lateral marks white, narrowly triangular, leaving anterior border of parocular area black, and ending acutely at level of antennae. Collar of pronotum and narrow posterior band on disk white, continuous with mark on tubercles (type) or broken in middle and on each side before tubercles. Abdomen black with white band on tergites 1 to 5, bands successively wider distad, all interrupted medially, or almost interrupted, that on tergite 1 more widely interrupted than others, and that on tergite 5 covering most of segment. Pygidial plate and venter testaceous, base of sternite 5 narrowly black. Legs fuscous; apex, dorsal margin and inferior margin on anterior side of front femora, anterior side of middle and hind femora, all trochanters, anterior side of front and middle tibiae and front tarsi white. Antennae black, scape white on inner side and flagellum dull yellowish beneath. Mandibles white at base, shading through rufotestaceous to red at apex. Proboscis fuscous. Tegulae testaceous hyaline, large mark at base white. Wings slightly dusky hyaline, nervures and margins of stigma testaceous brown, subcosta infuscated except toward base.

Head as broad as long; cheeks rounded, about three-fourth as wide as eyes. Posterior ocelli slightly less than half their distance apart from occipital margin and nearly their distance apart from nearest eye. Facial foveae moderately narrow, close to margin of eyes and reaching from level of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted just below middle of face and below middle of eyes; middle joints of flagellum as long as thick; antennal sockets nearly equidistant from each other and margin of eyes. Face below level of antennae rather strongly convex; disk of clypeus much broader than high, lateral extensions inflexed but partly visible in frontal aspect; supraclypeal area broader than high below level of antennal sockets. Mandibles thick, tapering, subacute, without indication of inner tooth or abruptly narrowing before apex (possibly worn). Proboscis normal for group, galeae almost reaching base of stipites. Flanks of pronotum normal. Pterostigma almost three-fourths as wide as first submarginal cell; marginal cell slightly longer beyond than beneath stigma, with metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed less than one-half above. Head and thorax shining; face below level of antennae polished, with scattered fine punctures on clypeus; frons tessellate, moderately dull, with close minute punctures opposite foveae; mesoscutum polished on disk, with close strong punctures, but minutely tessellate on anterior broader; scutellum like disk of scutum. Pubescence whitish, fine, erect, thin on face, moderately long and abundant on mesonotum, and longer and denser on cheeks and sides of thorax. Abdomen elongate, ovate, depressed, widest on third and fourth segments, nearly bare except for very thin apical fimbria. Pygidial plate slightly longer than wide, with sides straight and converging to narrowly obtuse apex. Length: 5.75–6.5 mm; anterior wing: 4–4.4 mm.

Male.—Head and thorax dark blue green; mandibles except red tips, broad anterior border of postgenae, inferior orbits narrowly to middle of eyes, labrum, face below level of antennae, pronotum except for dark band from flank to flank and two marks on anterior border of mesosternum bright yellow; the yellow on sides of face ending obliquely from outer margin of antennal sockets to margin of eyes just below foveae, but the green intruding narrowly between the yellow and sockets to or slightly below their level. Abdomen yellow, with six black bands, broader than light intervals; yellow band on tergite 1 narrow and interrupted, others entire (allotype); tergite 6 yellow with basal margin black and apical depression testaceous; tergite 7 also black at base forming incipient seventh dark band. Venter yellow, with basal margin of sternites very narrowly black. Legs yellow, front and middle tibiae beneath and on posterior margin (on posterior margin only in paratypes), posterior tibiae except beneath, and spot at apex of hind femora above, black; hind tarsi fuscous. Antennae yellow, becoming more brownish yellow on flagellum, both pedicel and flagellum broadly fuscous above. Proboscis fuscous, galeae and glossa brownish testaceous. Tegulae and wings as in female.

Head slightly broader than long; cheeks rounded, about three-fourths as wide as eyes. Posterior ocelli nearly their distance apart from nearest eye and slightly closer to occipital margin. Antennae inserted just below middle of face, with middle joints of flagellum as long as thick. Face below level of antennae rather strongly convex; supraclypeal area as broad as high; disk of clypeus rounded above and as broad as high, with lateral extension strongly inflexed and partly visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis, flanks of pronotum and wing characters about as in female. Sculpture and pubescence similar, but frons minutely tessellate, moderately dull and obscurely punctured; hair of mesonotum longer and thinner than in female, but that of cheeks and underside of head long and rather dense. Abdomen elongate ovate, depressed, moderately shining and nearly bare; tergite 7 broadly rounded at apex as usual in group. Subgenital plate about twice as long as wide, moderately widened to subtruncate apex. Genital armature ovate, slightly longer than wide, with dorsal lobes of caulis moderately wide and truncate; basal orifice very large and oblique, with inflexed margins very narrow; parameral lobes very short and broad, narrowed to rounded apex on ventral side; sagittae unusually short, broad, and abruptly narrowed to acute apex, slightly surpassing apex of parameral lobes when in normal position. Length: 4–7.5 mm, anterior wing: 3.5–3.7 mm.

Paratype.—Differing from allotype in having anterior third of subantennal plates green, in lacking yellow marks on mesosternum, and having yellow bands on tergites 2 to 6 narrowly interrupted, or nearly so, with that on tergite 1 lacking. Length about 4.5 mm, anterior wing 3.4 mm.

Holotype female and allotype, 3 miles south of Gallup, McKinley Co., New Mexico, on *Chrysothamnus nauseosus*, Sept. 13, 1968 (Timberlake).

Paratypes.—One female and three males, taken with the types.

Types in collection of the University of California, Riverside.

Perdita repens, n. sp.

(Figs. 1369, 1370, 1403)

The male of *repens* differs from other members of the *zonalis* group in having the thorax dark, except for the tubercles, and the abdomen black with narrow enclosed yellow band on tergites 2 to 5. The name *repens* means unexpected or unlooked for, and is not from the verb *reperere*, to creep.

Male.—Head and thorax dark blue green. Mandibles except red tips labrum, and face below level of antennae, except subantennal plates, yellow (in some specimens upper half of plates yellow). Supraclypeal mark strongly notched above, and in one specimen notched on anterior border. Lateral marks ending obliquely, and extending on orbits slightly above level of antennal sockets. Inferior orbits yellow very narrowly almost to middle of eyes. Thorax dark except for large yellow mark on tubercles. Abdomen black, with enclosed yellow band at base of tergites 2 to 5; band on tergite 2 considerably abbreviated, and those on tergites 2 and 3 in one specimen interrupted medially, and in two specimens band on tergite 5 reaching lateral margins and a

band present also on tergite 6. Apical depression of tergite 6 slightly testaceous and apex of tergite 7 distinctly testaceous. Venter of abdomen testaceous yellow. Legs yellow, but all coxae dark, except at apex of front and hind pair; front femora broadly black behind except at apex; middle femora less broadly black behind, front and middle tibiae with broad black streak behind; hind femora except at base and behind, or in some cases the yellow extending to or beyond middle on the more broad part of posterior side; hind tibiae dark except very narrowly beneath, and hind tarsi dusky. Antennae fuscous, scape broadly yellow beneath and flagellum brown beneath. Tegulae testaceous. Wings dusky hyaline, nervures testaceous brown, subcosta fuscous.

Head slightly broader than long; cheeks receding, about one-half as wide as eyes. Posterior ocelli slightly less than their distance apart from nearest eye or occipital margin. Antennae inserted somewhat below level of middle of face; scape falling short of reaching level of anterior ocellus, and joints of flagellum mostly about as long as thick. Face below level of antennae strongly convex, disk of clypeus broader than high and lateral extensions inflexed and about one-half visible in frontal aspect. Mandibles rather thick, but acute at apex and reaching far margin of labrum. Proboscis moderately elongate, galeae reaching base of stipites. Pterostigma about three times longer than wide and nearly as wide as first submarginal cell; marginal cell equal beneath and beyond stigma, with metacarpus slightly longer than apical truncation; second submarginal cell narrowed about one-half to two-thirds above. Head and thorax shining, except frons and vertex strongly granular tessellate and dull; thorax polished, but basal area of propodeum minutely and delicately tessellate. Frons obscurely punctured on each side below, and mesonotum with sparse minute punctures, a little sparser than in *rivalis*. Pubescence fine, long, erect and whitish, dense on cheeks and underside of head, thin on face and still thinner on mesonotum. Abdomen broadly ovate, depressed, shining, almost impunctate and very thinly hairy. Subgenital plate slightly longer than wide, truncate at apex, almost hairless on disk and with a few hairs on posterior margin of lateral apodemes. Genital armature much as in *rivalis*, but the dorsal submedian lobes of caulis more acute at apex; parameral lobes as seen from side descending almost straight and perpendicular to axis of caulis and fimbriate only at apex. Length: 5 mm; anterior wing: 3.3–3.7 mm.

Holotype male.—Three miles east of peak of Mt. Hamilton, Santa Clara Co., California, on *Aplopappus aborescens*, Aug. 21, 1962 (J. Powell).

Paratypes.—Eight males collected with the types (Powell).

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

Perdita taeniata, n. sp.

(Figs. 1371, 1372, 1404)

This species is allied to *vestita* but is distinguished from it and other similar species in the preceding key.

Female.—Head and thorax dark green; mandibles except red tips, labrum, clypeus, supra-clypeal and lateral marks, scape of antennae, anterior and posterior margin of pronotum, including tubercles, yellow. Supraclypeal mark strongly rounded above; lateral marks triangular, reaching middle of eyes and intruding between foveae and margin of eyes. Abdomen yellow, with four even, narrow dark bands at junction of tergites 1 and 2 to 4 and 5, the first two blackish or fuscous and reaching lateral margins, and the other two more brownish and ending a short distance from lateral margins. Basal half of tergite 1 with quadrate fuscous mark on each side and a very thin median dark line. Legs yellow, with front coxae dark, and apical joint of middle tarsi and last three joints of hind tarsi slightly dusky. Antennae, except scape, fuscous above, flagellum beneath and apical joint entirely brownish yellow. Tegulae subhyaline, broadly yellow at base. Wings whitish hyaline, nervures and margins of stigma testaceous.

Head slightly broader than long; cheeks rounded, about as broad as eyes. Posterior ocelli about half their distance apart from occipital margin, and somewhat less than that distance from nearest eye. Facial foveae close to margin of eyes, moderately wide at anterior end, and reaching from level of middle of antennal sockets about two-thirds of distance to anterior

ocellus. Antennae inserted below middle of face, scape nearly reaching anterior ocellus, middle joint of flagellum as long as thick. Face below antennae gently convex; disk of clypeus much broader than high, well rounded across summit; lateral extensions inflexed, but narrowly visible to base of mandibles in frontal aspects. Proboscis elongate, galeae reaching base of stipite. Mandibles rather slender, tapering and abruptly narrowed on inner margin without forming inner tooth. Flanks of pronotum strongly impressed, but disk not prominent at posterior corners. Pterostigma about three times longer than wide and three-fourths as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus about twice as long as apical truncation; second submarginal cell narrowed about one-third to radius. Abdomen oval, depressed; pygidial plate slightly longer than wide at base, sides convexly arcuate and converging to narrow and weakly notched apex. Head and thorax shining; frons and vertex smoothly tessellate, and very sparsely and minutely punctured; mesonotum almost polished on disk, and smoothly tessellate on anterior part of scutum, with punctures fine and moderately close but becoming well separated on posterior two-thirds of scutum. Pubescence pale ochreous, moderately fine and erect, very thin on face, moderately thin on mesonotum, and longer but not much denser on cheeks, and on side and underparts of thorax; hair of front coxae long and moderately dense. Length: nearly 6 mm, anterior wing: 4.1 mm.

Male.—Head and thorax dark green; anterior half of underside of head, mandibles except red tips, labrum, face below level of antennae, antennae in large part, pronotum except dark bank across disk, large mark on each side of anterior part of mesopectus, and legs yellow. Yellow of face ending very broadly and obliquely on each side from upper margin of antennal sockets to margin of eyes at foveae. Flagellum of antennae narrowly brown above, the dark color gradually diminishing toward apex. Flanks of pronotum very narrowly dusky in deep part of impression. Proboscis yellow, galeae slightly brownish. Apical joint of hind tarsi slightly dusky; claws red at apex. Abdomen yellow, with base of tergite 1 and band at junction of tergites 1 and 2 to 3 and 4 fuscous; a dark band at base of tergite 5 concealed by preceding segment, and apical depression of tergite 4 testaceous brown; yellow band on tergite 1 even, moderately wide and narrowly interrupted at middle; dark bands at junction of tergites 2 and 3 and 3 and 4 much narrower than yellow intervals and not quite reaching lateral margin. Tegulae and wings as in female.

Head distinctly wider than long; cheeks about as wide as eyes, widest opposite end of anterior third of eyes and narrowed about one-third opposite summit of eyes. Posterior ocelli about twice their distance from occipital margin and their distance apart from nearest eye. Face depressed; antennae inserted just below middle of face, reaching base of wings, flagellum moderately clavate, with middle joints as long as thick. Face below antennae very gently convex, disk of clypeus considerably broader than high, lateral extension broadly inflexed and only slightly visible in frontal aspect. Mandibles slender, falcate, strongly attenuate toward apex and nearly reaching base of each other. Flanks of pronotum deeply impressed. Proboscis and wings as in female. Frons and vertex smoothly tessellate, moderately dulled and sparsely punctured. Mesonotum shining, smoothly tessellate on anterior part of scutum, otherwise almost polished, with widely spaced fine punctures becoming a little closer anteriorly. Pubescence whitish, rather fine, thin and moderately long on frons, vertex and mesonotum, a little longer on cheeks, and dense on mesopectus. Abdomen oval, about twice as long as wide and moderately convex above. Subgenital plate nearly twice as long as wide, slightly widened and rounded at apex, lateral margins slightly undulate, disk with short very fine setae, and lateral apodemes thinly fringed with long hairs. Caulis of genital armature having submedian dorsal lobes broadly obtuse at apex; parameral lobes much longer beneath than on dorsal side with exposed part rather broad and rounded at apex; but appearing narrow and subacute in lateral view; sagittae broad, depressed, acute at apex and weakly angulate and widest part before apex as seen in dorsal view. Length: about 5 mm; anterior wing: 3.8 mm.

Holotype female and allotype, Newcomb, San Juan Co., New Mexico on *Chrysothamnus nauseosus*, Sept. 21, 1965 (G. E. Bohart).

Paratype.—One female taken with types; and 1 female, Tohatchi, McKinley Co., New Mexico, on *Senecio longi*, Sept. 21, 1965 (Bohart).

Types in collection of the University of California, Riverside, and paratype in collection of G. E. Bohart.

Haliotoides Group

Perdita lenis Timberlake

New records.—One male, 24 miles east of Fort Stockton, Pecos Co., Texas, July 2, 1963 (J. G. and B. L. Rozen); 1 female, 20 miles east of Indio, Riverside Co., California, on *Physalis*, April 26, 1963 (E. L. Schlinger).

Octomaculata Group

Descriptions of six new species of this group have been prepared and the opposite sex of four other species is also made known. To help distinguish these new species or sexes from their closest allies, a supplementary key is offered, with indications of where the species would fall in the 1960 key to the group (Univ. Calif. Publ. Entom., 17:2-22).

SUPPLEMENTARY KEY TO OCTOMACULATA GROUP

- | | |
|--|-------------------------------|
| 1. Females | 2 |
| Males | 27 |
| 2. Yellow, or almost entirely yellow species (to couplets 4 to 6 in 1960 key) | 3 |
| Head and thorax mainly dark green (to couplet 38 and beyond in 1960 key) | 7 |
| 3. Mesonotum more or less evidently pubescent | 4 |
| Mesonotum and face virtually bare, except for a few erect hairs on scutellum; entirely yellow species, except for dark facial and abdominal foveae; mesonotum minutely tessellate and dullish | <i>luteola</i> Cockerell |
| 4. Yellow except for fuscous mark on each side of posterior part of mesopectus; hair of mesonotum erect and slightly longer than diameter of ocelli | 5 |
| Yellow, except for dark foveae or sometimes a black line on under edge of hind femora; hair of mesonotum decumbent or shorter than diameter of ocelli | 6 |
| 5. Similar to <i>luteola</i> except for dark marks on mesopectus and the fine, short, erect hair on mesonotum | <i>xanthodes</i> Timberlake |
| Similar, but duller than either <i>luteola</i> or <i>xanthodes</i> , and with denser erect hair on mesonotum | <i>xanthops</i> , n. sp. |
| 6. Entirely pale yellow except for dark foveae; mesonotum rather dullish, closely and minutely punctured and with rather coarse, decumbent or partly appressed mosslike hair | <i>beatula</i> Timberlake |
| Pale yellow, with anterior part of face and abdomen more whitish; a black line usually developed on under edge of hind femora; mesonotum minutely and delicately tessellate, minutely punctured and with short erect hair | <i>xanthochroa</i> Timberlake |
| 7. Abdomen mainly light with no more than four dark bands at junction of segments and tergite 5 mostly light (leading to couplets 35 and 36 in 1960 key) | 8 |
| If abdomen conspicuously light, having dark bands at least as broad as light, or having a dark band at junction of segments 5 and 6 | 10 |
| 8. Clypeus and supraclypeal area black, or face almost all dark | 9 |
| Clypeus and l-shaped lateral marks white; abdomen white, banded with black; mesonotum shining, with close minute punctures and short, fine erect hair | <i>indioensis</i> Timberlake |
| 9. Face dark except for small white spot on clypeus; abdomen with five broad white bands, mesonotum strongly tessellate, about as dull as frons, with rather obscure punctures and abundant erect white hair | <i>knowltoni</i> Timberlake |
| Clypeus and supraclypeal area black, large triangular lateral marks white; abdomen white with four or five black bands; mesonotum tessellate but more shining than frons, and both frons and mesonotum with distinct, moderately close punctures and short, erect hair | <i>chloris</i> Timberlake |
| 10. Abdomen with light bands entire, or very narrowly interrupted on usually not more than first segment (couplets 52 to 61 in 1960 key) | 11 |
| Light bands of abdomen interrupted medially | 21 |

11. Mesonotum weakly or delicately tessellate and distinctly shining12
 Mesonotum more or less strongly tessellate, in some cases about as dull as frons13
12. Mesonotum weakly tessellate, strongly shining, with sparse fine punctures and with thin, very fine erect hair; pronotum dark, with basal corners of disk and tubercles white; pygidial plate as long as wide, with sides converging to rounded apex
mesillensis Timberlake
 Mesonotum distinctly tessellate but shining, rather closely punctured and with conspicuous, short, erect, white hair; disk of pronotum entirely yellow, or with a dark band across disk and median dark spot on hind margin; pygidial plate very broad, with apex truncate or slightly emarginate*media* Timberlake
13. Mesonotum moderately dull and somewhat less dull than frons14
 Mesonotum more strongly tessellate and about as dull as frons (to couplet 66 in 1960 key) ..19
14. Light bands of abdomen, moderately wide and not reaching lateral margins at least on tergites 3 and 415
 Light bands of abdomen broader than dark intervals, or if narrow, bent backward at outer ends and reaching lateral margins, except in some cases on tergite 4.....16
15. Abdomen with five even, entire white bands, nearly as broad as dark intervals and not reaching lateral margins; clypeus except for two black marks on summit, lateral marks reaching anterior end of foveae, two small supraclypeal spots and underside of antennal scapes white*submedia*, n. sp.
 Abdomen with four or five white bands, tending to be notched medially or slightly interrupted and not quite reaching lateral margins; face dark except for small median mark on clypeus and small lateral marks; scape of antenna dark
melanostoma melanostoma Swenk and Cockerell
16. Light bands of abdomen comparatively broad and usually entire17
 Light bands of abdomen narrow, bent backward at outer ends and reaching lateral margins except in some cases on tergite 4, and tending to be narrowly interrupted at middle; clypeus white, except for two broad dark stripes on disk; also lateral marks not reaching above level of summit of clypeus; mesonotum nearly as dull as frons, closely and minutely punctured and with rather dense, fine erect hair*hirsuta* Cockerell
17. White bands of abdomen somewhat arcuate, curved backward to outer ends on tergites 1 to 5, or abbreviated on tergite 5; clypeus white, dark only at outer ends, or with two dark marks on summit of disk; scape of antennae broadly white beneath; pygidial plate broad but narrowed to rounded apex, with little or no evidence of median notch
percincta Timberlake
 White bands of abdomen broad and even, little or not at all arcuate18
18. White bands of abdomen broadened at outer ends on tergite 2 and bent backward close to outer ends on following segments and in some cases narrowly interrupted; apex of hind femora more or less broadly white; clypeus with two dark stripes on disk, or in some cases dark with median white mark; lateral mark narrowed on upper half or more or less reduced*scitula scitula* Timberlake
 White bands of abdomen broad and even, notched medially behind; clypeus white with two dark stripes on disk, and lateral marks more or less small; scape of antennae dark
melanostoma albocincta Timberlake
19. Larger specie, about 6 mm in length; white bands of abdomen reaching lateral margins; lateral face marks reaching anterior end of foveae; pronotum with interrupted white band on hind margin of disk20
 About 4.5 mm in length; white bands of abdomen broad and enclosed on tergites 3 and 4, narrowed at outer ends and reaching posterior end of foveae on tergite 2, and that on tergite 1 narrow and reaching lateral margins; clypeus white, with upper half of disk black triangularly notched in middle; lateral marks reaching level of antennae; thorax dark except white tubercles; mesonotum with recumbent, rather coarse white hair
sedulosa, n. sp.
20. Clypeus white, anterior border, triangularly widened on each side and two narrow discal stripes black; white bands of abdomen broad, narrowed medially or notched behind and

- reaching lateral margins on tergites 1 to 4, tergite 5 with two transversely oval marks
electa Timberlake
- Clypeus black with broad median yellowish white mark narrowed above, and more or less white on posterior border of lateral extension or on lateral margins of disk; abdomen with broad nearly even white band on tergites 1 to 5; mandibles unusually stout and abruptly narrowed at apex *retusa* Timberlake
21. Light bands of abdomen narrowly interrupted (to couplet 78 in 1960 key, U.C. Publ. Entom., 17:2-22) 22
- Light bands of abdomen more broadly interrupted and in form of slender transverse marks on each side of segment (to couplet 92 in 1960 key, *ibid.*) 24
22. Light bands of abdomen broader, those on tergites 2 and 4 very narrowly interrupted or entire, and those on tergites 1 and 3 more broadly interrupted; clypeus black, with small median white spot; lateral marks in form of orbital stripes but in some cases produced anteriorly toward clypeus; wings rather strongly dusky *ensenadenis* Timberlake
23. Bands of abdomen present on tergites 1 to 4 (or traces on tergite 5) and reaching lateral margin except on tergite 4 (or tergites 3 and 4 in some cases), and that on tergite 1 very narrow or in some cases broken or abbreviated; median mark on disk of clypeus and small lateral marks not reaching above level of summit of clypeus white; clypeus and labrum distinctly punctured, punctures of labrum rather large *ordinata* Timberlake
- Similar but bands of abdomen broader, each half elongate oval in shape, with narrow extension backward to lateral margins on tergites 3 and 4; clypeus white, with two black stripes on disk, lateral marks reaching as high as summit of clypeus, supraclypeal mark represented by two white dots; wings almost clear hyaline, nervures pale testaceous
claripennis Timberlake
24. Abdominal markings at most not quite reaching lateral margins, except in some cases on tergite 1; mesonotum dull, more or less densely pubescent 25
- Abdominal marks all lateral and reaching lateral margins except on tergite 4; mesonotum strongly tessellate, moderately dull, with thin, rather long erect hair; clypeus, except two dark stripes on disk and lateral marks reaching anterior end of foveae, white
aplopappi Timberlake
25. Abdominal marks lateral, more widely separated than their transverse length 26
- Abdominal marks linear, much longer transversely than their distance apart; frons, vertex and mesonotum brassy green, minutely granular tessellate, very dull, and with very short dense hair on mesonotum; clypeus black, median stripe on disk narrowed gradually above and lateral marks extending narrowly above to level of antennae, white; wings dusky, nervures testaceous brown *gratiosa*, n. sp.
26. Abdominal marks moderately narrow, all enclosed although close to lateral margins, those on tergite 2 touching lateral foveae, those on tergites 3 and 4 a little oblique and those on tergite 1 narrowly separated; head and thorax olive green; frons and mesonotum very finely tessellate, dull, with very short dense hair on mesoscutum *discreta* Timberlake
- Abdominal marks comparatively broad, all lateral, not quite reaching lateral margins, except on tergite 1, those on tergite 2 ending broadly against foveae but not passing beyond posterior end of foveae; head and thorax dark green; median stripe on clypeus usually confluent above with mark on each side of disk, and small lateral marks yellowish white; frons and mesonotum dull, with short dense hair on scutum; wings subfuliginous, stigma almost uniformly dark *jonesi* Cockerell
27. Yellow species (to couplet 104 in 1960 key, U.C. Publ. Entom., 17:2-22) 28
- Ground color of head and thorax dark green 30
28. Thorax entirely yellow 29
- Thorax yellow, with quadrate fuscous mark on each side of posterior part of mesopectus; head about as long as wide; face below level of antenna moderately shining; facial foveae punctiform about half as large as ocelli; mesoscutum with thin, short, erect hair
xanthops, n. sp.
29. Head slightly broader than long; upper half of frons and vertex dullest, rest of face much more shining; mesonotum slightly more shining than vertex and virtually bare;

- facial foveae small and punctiform *luteola* Cockerell
- Similar, but frons and vertex perfectly dull, face below antennae slightly shining, and mesonotum almost as dull as frons and with thin erect hair *xanthodes* Timberlake
30. Yellow of face extending above level of antenna in middle as well as on each side, or straight across 31
- Yellow of face extending above level of antennae only on each side, although supraclypeal mark bulging between antennal sockets; pronotum yellow, with dark crossband broadened on flanks; abdomen yellow, but margins of tergites 1 to 6 dark, light bands on tergites 1 to 4 broader than dark intervals and enclosed; legs yellow, hind tibiae and tarsi dark
otiosa, n. sp.
31. Face yellow straight across for short distance above level of antennae (to couplets 160 to 165 in 1960 key, U.C. Publ. Entom., 17:2-22) 32
- Yellow of face extending above level of antennae only in the middle and on each side (to couplet 168 in 1960 key, *ibid.*) 36
32. Mesonotum distinctly tessellate, more or less dull, but not as dull as frons. 33
- Mesonotum weakly tessellate, much more shining than dull frons and vertex; yellow of face reaching level of foveae, but the green in some cases descending on each side almost to antennal sockets; yellow bands of abdomen very broad and more or less obscurely enclosed; pronotum yellow, with narrow dark crossband; legs yellow, hind tibiae and tarsi dark *mesillensis* Timberlake
33. Pronotum dark, with cuneate mark on each side of disk and tubercles yellow 34
- Pronotum yellow, with green band from flank to flank; head much broader than long; green of frons descending in broad curve on each side, the yellow regularly extended to foveae and slightly in middle; abdomen with broad yellow bands reaching lateral margins; legs yellow, streaked behind with fuscous on femora and tibiae, hind tibiae except beneath and hind tarsi fuscous *ewarti*, n. sp.
34. Hind femora dark except at apex 35
- Hind femora dark except broadly yellow on upper anterior side and broadly at apex; front and middle tibiae with broad dark blotch behind; abdomen yellow with broad dark bands, the yellow bands reaching lateral margins, that on tergite 1 very broad except at outer ends *retusa* Timberlake
35. Small species, about 3.5 mm in length; abdomen yellow with narrow dark bands, those on apical segments becoming faint; yellow of face terminating nearly evenly above, with green descending only slightly on each side of middle; mesonotum strongly tessellate
aridella Timberlake
- About 4.5 mm in length; abdomen dark, with five yellow bands reaching lateral margins and subequal to dark intervals; face yellow to level of foveae, the green descending in short broad lobe on each side; mesonotum distinctly more shining than frons
congrua, n. sp.
36. Yellow bands of abdomen broad but enclosed on segments following the first or second ... 37
- Abdomen yellow with narrow dark bands at junction of segments and including narrow dark band at base of tergite 1; green of frons descending on each side to antennal sockets, the yellow on sides of face ending acutely just below foveae; mesonotum nearly as dull as frons *peroincincta* Timberlake
37. Green of frons descending to level of upper margin of antennal sockets, the yellow of supraclypeal area emitting a small nipple-shaped spur into the green, and the yellow at sides of face ascending broadly and notched by foveae; yellow bands of abdomen enclosed beyond second segment *snowii* Cockerell
- Green of frons descending to, or almost to, antennal socket on each side, the yellow with broad spearhead-shaped spur in middle above antennae and ascending very broadly on each side and notched by foveae; yellow bands of abdomen broad, widened at middle on tergites 3 and 5 and reaching lateral margins distinctly only on tergite 1
lasiogastra Timberlake

Perdita abdominalis Timberlake

New record.—One male 22 miles northwest of Cabo San Lucas, Baja California, Mexico, on *Aploppus*, Nov. 9, 1965 (Ewart and Dickson).

Perdita gratiosa, n. sp.

This species has the mesonotum very dull, bronzy green, with short dense erect hair, and four abbreviated, very narrow and interrupted white bands on the abdomen.

Female.—Head and thorax dark green, frons and mesonotum bronzy green, labrum, clypeus and supraclypeal area black. Small spot at base of mandibles, ampulla-shaped median mark on clypeus, streak on posterior margin of lateral extensions of clypeus and rather small lateral marks yellowish white. Lateral marks with narrow orbital extension to level of antennae and transverse or quadrate anterior part, touching sides of clypeus. Thorax entirely dark. Abdomen black, with narrow, abbreviated and interrupted white band near base of disk of tergites 1 and base of tergites 2 to 4; interruption narrow on tergite 1, but broader on following segments, or about equal to half transverse length of resultant marks, and on tergite 2 the interruption equal to space between outer ends of marks and lateral margins of segment; on tergites 3 and 4 the marks end more distantly from lateral margins. Pygidial plate rufotestaceous. Legs black, apex of front femora and anterior side of front tibiae testaceous yellow. Antennae black at base, flagellum fuscous above, but paler toward apex and broadly yellowish brown beneath. Mandibles infuscated beyond basal white spot, more strongly on outer margins and becoming red on apical half. Proboscis black at base, galeae broadly on outer margins and palpi infuscated, but palpal joints whitish at apex. Tegulae infuscated at base shading into pale testaceous on outer margin. Wings dusky hyaline, paler apically, nervures and margins of stigma brown, and subcosta except at base darker brown.

Head slightly longer than wide; cheeks moderately receding and more than half as wide as eyes. Posterior ocelli slightly closer to nearest eye than distance apart. Facial foveae linear, slightly more than their width from margin of eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae reaching base of scutellum, flagellum slender, joints 6 to 9 as long as, or slightly longer than wide. Clypeus moderately convex, with lateral extensions strongly and broadly inflexed, but partly visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis moderately elongate, labial palpi as long as galeae and maxillary palpi half as long. Pterostigma more than three times as long as wide and three-fourths as wide as first submarginal cell; marginal cell much longer beyond than beneath stigma, with metacarpus twice as long as apical truncation; second submarginal cell narrowed somewhat more than half above. Head and thorax moderately dull, but frons, vertex and mesonotum very dull with excessively minute and dense granular tessellation, without evident punctures. Clypeus and supraclypeal area smooth and shining, with small, close, shallow punctures on clypeus. Pubescence pale ochreous, short erect, rather thin on face, moderately dense of cheeks and underparts, but very short and dense on mesonotum; hair of front coxae shorter and thinner than usual. Abdomen normal; pygidial plate as long as wide, moderately narrowed to rounded apex, with median notch. Length, with head stretched forward: 6 mm; anterior wing: 4.3 mm.

Holotype female, Samalayuca, Chihuahua, Mexico, Oct. 6, 1966 (G. E. and A. S. Bohart).

Type in collection of the University of California, Riverside.

Perdita congrua, n. sp.

(Figs. 1373, 1374, 1405)

P. congrua is closely allied to *retusa* and *aridella*, but intermediate in size and distinguished by the characters given in the preceding key.

Male.—Head and thorax dark green; anterior margin of subgenal region and inferior orbits to middle of eyes, labrum, mandibles except red tips, and face to level of foveae clear bright

yellow. Upper margin of yellow on face uneven, the green descending for a short distance in a broad curve on each side. Thorax dark, except cuneate mark on each side of disk of pronotum and tubercles yellow. Abdomen fuscous, with five even yellow bands, about equal to dark intervals and reaching lateral margins, that on tergite 1 only moderately widened at middle and with a small median notch. Legs yellow; anterior femora with dark blotch covering posterior side except at apex, middle femora dark except broadly on dorsal margins and at apex; middle tibiae with a short dark streak on posterior margin, hind femora dark except at apex, hind tibiae dark except beneath, and small joints of hind tarsi dusky. Scape of antennae entirely and pedicel beneath clear bright yellow, flagellum brownish yellow, narrowly more fuscous above, and pedicel distinctly fuscous above. Tegulae testaceous hyaline, with bright yellow spot. Wings slightly dusky hyaline, nervures testaceous brown, margins of stigma and subcosta fuscous.

Head slightly wider than long; cheeks rounded, almost as wide as eyes. Posterior ocelli slightly less than their distance apart from both occipital margin and nearest eye. Antennae inserted slightly below middle of face, with antennal sockets distinctly closer together than their distance to margin of eyes. Face below antennae gently convex, disk of clypeus as broad as high, with lateral extensions gradually reflexed and broadly visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Flanks of pronotum not impressed. Pterostigma rather small, shorter than first submarginal cell and about two-thirds as wide; marginal cell somewhat longer beyond than beneath stigma, with metacarpus distinctly longer than apical truncation; second submarginal cell narrowed one-half to radius. Head and thorax moderately shining, with frons and vertex strongly tessellate and dull; face almost impunctate, punctures of mesonotum minute and well separated. Pubescence whitish, fine, erect; thin and rather short on face, longer on underside of thorax and longer and denser on underside of head. Abdomen narrowly ovate, recurved, widest at junction of segments 2 and 3; apical lobe of tergite 7 short and broadly truncate. Subgenital plate triangular; nearly as long as wide at base, narrowly rounded at apex and with fine short setae on apical part of disk. Genital armature with capsule subdepressed, much longer than wide with dorsal lobes flaring obliquely outward to form base of parameral lobes; these appearing slender in dorsal view, but with a thin high vertical wall strongly emarginate near middle, thus forming an oval apical expansion as seen from side; sagittae broad and subangulate at middle and very acute at apex and moderately thick dorso-ventrally as seen from sides. Length: 4.5 mm; anterior wing: 3.4 mm.

Holotype male, 19 miles northeast of Marathon, Brewster Co., Texas, on *Gutierrezia*, September 15, 1965 (Timberlake).

Type in collection of the University of California, Riverside.

Perdita ewarti, n. sp.

(Figs. 1375, 1376, 1406)

P. ewarti runs near *retusa* in my keys but is somewhat smaller, with the pronotum yellow except for a green crossband, mesonotum more shining, hind femora dark only on the posterior side, and the genital armature very distinctive.

Male.—Head and thorax dark green; anterior part of undersurface of head, inferior orbits narrowly to or above middle of eyes, mandibles except red tips, labrum and face to above level of antennae yellow. Upper margin of yellow on face uneven, reaching foveae on orbits, nearly as high in middle, but green of frons descending nearly to antennal sockets, or reaching sockets in one specimen. Pronotum yellow with green crossband, constricted on upper part of flanks, then gradually expanded opposite tubercles. Abdomen yellow, with seven fuscous or black bands, including one at base of tergite 1, the yellow bands in most cases reaching lateral margins, but in one specimen almost or very narrowly enclosed. Venter entirely yellow. Legs yellow, with fuscous streak on front and middle femora and tibiae, mark on tibia slender and that on middle femora more or less oblique; hind femora black on posterior side except broadly at apex, and hind tibiae and tarsi dark except on anterior side of tibiae. Scape of antennae entirely clear yellow, flagellum brownish yellow, becoming rather narrowly fuscous above. Tegulae testaceous hyaline, with large yellow mark at base. Wings dusky hyaline, nervures testaceous brown, margins of stigma and subcosta fuscous.

Head distinctly broader than long; cheeks rounded, half as wide as eyes. Posterior ocelli somewhat less than their distance apart from both occipital margin and nearest eye. Face gently convex; antennae inserted below middle of face, with sockets about equidistant from each other and nearest eye. Disk of clypeus about as broad as high, with lateral extensions broadly and strongly inflexed. Mandibles tapering, acute and reaching far margin of labrum. Proboscis moderately long, galeae reaching base of stipes in repose. Flanks of pronotum not impressed. Pterostigma about two-thirds as wide as first submarginal cell; marginal cell as long as stigma, considerably shorter beneath than beyond stigma, with metacarpus nearly twice as long as apical truncation; second submarginal narrowed two-thirds above. Head and thorax moderately shining except frons and vertex densely and minutely tessellate and dull. Pubescence short and thin on face and mesonotum, longer, denser, and whiter on cheeks and postgenal area and underside of thorax. Abdomen depressed oval, about twice as long as wide; apical lobe of tergite 7 small and narrowly rounded at apex. Subgenital plate broader than long, obtusely angulate on each side and at apex, disk with short fine setae hardly fringing the margins. Capsule of genital armature oval, depressed, widest just beyond middle; parameral lobes very broad at base, narrowed toward apex and strongly curved upward at apex (appearing bent outward at apex in dorsal view), sagittae moderately slender, broadened and angulated at middle of fused part and then strongly narrowed to apex as seen from above, and thin in lateral view. Length: 5 mm; anterior wing: 3.5 mm.

Holotype male, 30 miles north of El Crucero, Baja California, Territorio Sur, Mexico, on *Aplopappus sonoriensis*, Nov. 6, 1965 (Ewart and Dickson).

Paratypes.—Four males, same data as holotype.

Types in collection of the University of California, Riverside.

Perdita hirticeps apicata Timberlake

Perdita hirticeps apicata Timberlake, 1960, Univ. Calif. Publ. Entomol. 17:59, ♀:♂.

Perdita hirticeps candidipennis Timberlake, 1960, *ibid.*: 60, ♀ (new synonymy).

With the distribution of *hirticeps* now known to extend across northwestern Arizona to northern part of Utah, it is no longer expedient to try to distinguish *candidipennis* from *apicata*.

New record.—One female, 5.2 miles southeast of Colorado City, Mohave Co., Arizona, on *Stephanomeria*, Aug. 31, 1967 (J. C. Hall).

Perdita mesillensis Timberlake

Perdita mesillensis Timberlake, 1968, Univ. Calif. Publ. Entomol., 49:84, ♂.

Perdita nitidella Cockerell, 1896, Proc. Acad. Sci., Phila., 48:51, 86, ♀ (excluding ♂); Timberlake, 1968, Univ. Calif. Publ. Entomol., 49:85, ♀ (excluding ♂), new synonym.

Specimens from the vicinity of Las Cruces, New Mexico, now identified as the female sex of *mesillensis*, run to *nitidella* in Cockerell's keys (1896 and 1898) and agree with his description of the female, but I am showing elsewhere that the true female of *nitidella* must be *phymatae*, which is very different. The female of *mesillensis* is similar in many ways to *media* but has a more shining mesonotum and a much different pygidial plate.

Perdita ordinata Timberlake

P. ordinata was described from the male in 1962 and has since been found to be widely distributed but collected only sparingly. I now have the putative female which has been collected with the male at the same place and day but on a different flower. The five females now at hand were all found on flowers of *Dithyrea*

wislizeni at two widely separated localities. At the second locality in Washington County, Utah, a male *Perdita* was also taken on *Dithyrea*, but on comparison it proved to be identical with *P. hirsuta* Cockerell. The putative female is similar to *ensenadensis* and *claripennis* and is distinguished by the characters given in the preceding key.

Female.—Head and thorax dark bluish green, labrum, dark part of clypeus and supraclypeal area black. Median ampulla-shaped mark on clypeus, more or less pointed above, small mark or narrow line on lateral margins of disk, and small lateral mark at anterior corners of face white. Base of mandibles, collar of pronotum, small spot on posterior corner of disk (in some cases absent) and tubercles white. Abdomen black, with narrow band on tergite 1 to 4, white; all bands narrowly interrupted medially, but that on tergite 1 very narrow and more widely interrupted than others, and those on tergites 2 and 3 curved backward at outer ends and reaching lateral margins; in one specimen traces of band also present on tergite 5. Pygidial plate testaceous. Legs black, apex of front and middle femora very narrowly, front and middle tibiae broadly in front and their basitarsi, pale yellow. Antennae black, flagellum yellowish brown beneath. Mandibles shading through testaceous to red at apex. Tegulae subhyaline, fuscous at base. Wings nearly clear hyaline, nervures testaceous brown, margins of stigma and subcosta slightly darker.

Head as broad as long; cheeks evenly rounded, two-thirds as wide as eyes. Posterior ocelli distinctly closer to nearest eye than their distance apart and somewhat more than their diameter from occipital margin. Face depressed, with antennae inserted below the middle. Facial foveae linear, their own width from margin of eyes, and reaching from upper level of antennal sockets nearly two-thirds of distance to level of anterior ocellus. Face below level of antennae gently convex; disk of clypeus considerably broader than high, with lateral extensions strongly inflexed and not visible in frontal aspect. Mandibles tapering, acute. Proboscis of usual length in group, galeae reaching base of stipites; maxillary palpi nearly as long as galeae. Head and thorax strongly tessellate, frons dull, impunctate, and mesonotum nearly as dull and with well-separated minute punctures. Clypeus with shallow, comparatively close punctures on black part. Pubescence whitish, fine, erect, abundant, but thin and short on mesonotum, thin and a little longer on face, and longer and denser on cheeks and underparts. Abdomen normal for group, apical fimbria thin. Pygidial plate about as long as wide at base, sides converging to moderately narrow, rounded apex with weak median notch. Length: 4.5–5 mm; anterior wing: 3.4–3.5 mm.

New records.—Two females, 3 miles west of Bingham, Socorro Co., New Mexico, on *Dithyrea wislizeni*, Sept. 17, 1965, and 1 male, same day and place on *Baileya pleniradiata*; 1 female, 9 miles west of Bingham on *Dithyrea*, Sept. 11, 1968 (C. S. Papp); 2 females, 16.6 miles southeast of Hurricane, Washington Co., Utah, on *Dithyrea*, Aug. 31, 1967 (Timberlake).

Perdita otiosa, n. sp.

(Figs. 1377, 1378, 1407)

This small species from Baja California is evidently allied to *abdominalis*, but distinguished in the male sex by the broad enclosed light bands of the abdomen.

Male.—Head and thorax dark green; anterior border of postgenae, mandibles except red tips, labrum, face below level of antennae, collar of pronotum, and hind margin of pronotum from lower end of one flank to other, including tubercles, but narrowly interrupted at middle, yellow (reddened by cyanide in type). Supraclypeal mark bulging between antennal sockets, and lateral marks ending obliquely from outer lower margin of antennal sockets to margin of eyes just below foveae. Dark part of pronotum in form of narrow band on disk, but greatly widened on flanks and terminating just above level of lower margin of tubercles. Abdomen yellow, with fuscous band at junction of segments, also at base of tergite 1 and apex of tergite 6, and continuous with dark lateral margins of segments to enclose yellow bands which on tergites 2 to 4 are subequal to dark intervals. Dark lateral margins of tergite 1 broadening basad, the basal band with acute median extension, but the yellow part remaining very broad; tergite 7 entirely light. Legs yellow, basal half of hind coxae and hind tibiae fuscous, but hind tarsi less deeply infuscated.

Antennae yellow, with pedicel and flagellum narrowly fuscous above. Proboscis fuscous, but galeae testaceous. Tegulae subhyaline, with basal yellow mark. Wings dusky hyaline, nervures and margins of stigma testaceous brown, subcosta brown, becoming yellowish toward base.

Head as broad as long; cheeks rounded, about one-half as wide as eyes. Posterior ocelli one half their distance apart from occipital margin, and slightly less than same distance from nearest eye. Face rather depressed, with antennae inserted just below middle; antennal sockets about equidistant from each other and margin of eyes. Flagellum of antennae slender, middle joints as long as thick. Face below level of antennae gently convex; disk of clypeus somewhat broader than high, with lateral extensions well inflexed but partly visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis normal for group, galeae reaching base of stipites. Pterostigma about three times longer than wide and three-fourths as wide as first submarginal cell; marginal cell barely longer beyond than beneath stigma, with metacarpus less than twice as long as apical truncation; second submarginal cell narrowed slightly less than one-half above; and first recurrent nervure received by first submarginal cell close to apex. Frons and vertex minutely tessellate, moderately dull and virtually impunctate; face below level of antennae delicately tessellate and shining, with a few minute punctures on clypeus and supra-clypeal areas. Mesonotum tessellate and dullish, but more shining than frons, and with sparse minute punctures. Pubescence fine, erect, and rather long, but short and thin on face, long but thin on mesonotum, and moderately decumbent on cheeks and underside of head. Abdomen ovate, widest across third segment, shining and nearly bare, except for thin hair on apical segments. Tergite 7 with small triangular, narrowly obtuse apical lobe. Subgenital plate triangular, broad at base, subacute at apex, with thin, very short pile on apical part of disk. Genital armature with general form much like that of *abdominalis*, but sagittae strongly angulate at widest part and parameral lobes wider at base. Length: about 3.6 mm; anterior wing: 2.7 mm.

Holotype male.—Twenty-two miles south of Todos Santos, Baja California, Dist. Sur, Mexico, at light, Nov. 9, 1965 (W. Ewart and R. Dickson).

Type in collection of the University of California, Riverside.

Perdita percincta Timberlake

(Figs. 1379, 1380, 1408)

Perdita percincta Timberlake, 1968, Univ. Calif. Publ. Entomol. 49:86, ♀.

A few specimens of *percincta* collected in northern part of Arizona in 1967 includes the male, which was previously unknown. The male is similar to *snowii* and *lasiogastra* and is distinguished from them in the preceding key.

Male.—Head and thorax dark green. Anterior margin of gular region, broadened at proboscial fossa, but only slightly broadened at margin of eyes, mandibles except red tips, labrum and face below level of antennae bright yellow. Yellow of face with median triangular extension to level of foveae, and on each side of face narrowed obliquely to anterior end of foveae, the green descending to touch antennal sockets and to extreme upper exterior corner of subantennal plates. Thorax dark, except collar of pronotum, small mark on each side of hind border of disk, tubercles and posterior margin of flanks yellow. Abdomen yellow with brownish fuscous band at base of tergite 1 and at junction of tergites 1 and 2 to 5 and 6, the bands narrow, with part on apical depression of tergites more brownish, and the slight anterior swelling on each side and the broadening at outer sides of basal portion blacker. Legs black, with front coxae, apex of middle and hind coxae, all trochanters, front femora except broadly behind, middle femora except at apex, front tibiae except narrowly beneath, middle tibiae except broadly behind, front and middle tarsi, and knees of hind legs yellow. Scape of antennae entirely and pedicel beneath clear yellow, flagellum brown above and broadly yellowish brown beneath, and pedicel more fuscous above. Proboscis fuscous, galeae and glossa pallid. Tegulae testaceous hyaline, base pale yellow. Wings hyaline, nervures testaceous, margins of stigma and subcosta brown.

Head as broad as long; cheek receding, rounded and half as wide as eyes. Posterior ocelli slightly closer to nearest eye than their distance apart and still closer to occipital margin. Facial fovea minutely punctiform and faint. Antennae inserted just below middle of face, scape falling

considerably short of reaching level of anterior ocellus, and middle joints of flagellum as long as thick. Face below level of antennae gently convex; disk of clypeus not much wider than high, with lateral extensions broadly inflexed and not much visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis moderately elongate, galeae subequal to stipites. Pterostigma about one-half as wide as first submarginal cell; marginal cell with part beyond stigma distinctly longer than part beneath and metacarpus about twice as long as apical truncation; second submarginal cell narrowed about two-thirds above. Frons and vertex strongly tessellate and dull, impunctate; mesonotum tessellate and dull but more shining than frons, and with punctures minute and widely spaced. Face below level of antennae alutaceous, slightly dullish, with sparse obscure punctures on clypeus; supraclypeal area and rounded ridge extending onto frons more shining than other parts. Pubescence fine, erect whitish, thin on face and mesonotum and moderately dense on occiput, cheeks and underside of thorax. Abdomen elongate oval, widest at junction of tergites 2 and 3; tergite 7 strongly produced, its apical lobe obtuse. Subgenital plate semiquadrate, with apical angle slightly rounded, disk minutely and sparsely setose. Capsule of genital armature broadly ovate, the dorsal submedian lobes obtuse and well separated; parameral lobes appearing slender in dorsal view, and moderately wide on basal half in lateral view and narrowed apically; fused part of sagittae broad and angulate on each side and acute at apex as seen from above, and thin in lateral view. Length: 3.75 mm; anterior wing: 3.6 mm.

New records.—One male, 3 miles southeast of Tuba City, Coconino Co., Arizona, on *Gutierrezia microcephala*, August 29, 1967, and 1 female same place and day on *Wislizenia refracta*; 2 females, 10.8 miles north of Cedar Ridge, Coconino Co., on *Aster* sp., August 30, 1967 (J. C. Hall).

Perdita phymatae Cockerell

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

Perdita nitidella Cockerell, 1895, Proc. Acad. Sci., Phila., 47:16 ♂; Cockerell, 1896, Proc. Acad. Sci., Phila., 48:48, 86 [excluding female], new synonymy.

P. phymatae was described in 1895 and is known as a rather common species distributed through New Mexico, Arizona, and Utah, but up to the present time its male has not been recognized. On the other hand, the female of *nitidella* had remained little known although in 1968 I assigned certain females from New Mexico to it that agreed with Cockerell's account of what he thought was the female of that species. I remarked, however, that these females were much more shiny than the male *nitidella* and I now believe that they are more properly placed as the female of *mesillensis*, and that *nitidella* belongs with *phymatae* as they have the same distribution and have been taken together in several widely scattered localities.

Perdita sedulosa, n. sp.

The female of *sedulosa* is distinguished from *electa* and *retusa* on the preceding key. In Cockerell's key *sedulosa* runs to *bigeloviae* but is smaller, much duller and more densely hairy, with different face markings, and having abdominal light bands mostly enclosed.

Female.—Head and thorax dark green; upper half of disk of clypeus, except for median triangular mark extending almost to summit, and supraclypeal area black. Mandibles except reddish tips, labrum, anterior half of clypeus, including triangular median mark reaching further upward, but excluding outer ends of lateral extensions, and small lateral face marks white. Lateral marks oblique extending from sides of disk of clypeus to margin of eyes and ending on orbits at level of antennae, wide on orbits and narrowed and rounded toward clypeus and leaving small area at anterior corners of face black. Tubercles broadly white, thorax otherwise dark.

Abdomen brownish fuscous, with yellowish white band on tergite 1 to 4; band on tergite 1 rather narrow, even and reaching lateral margins; other bands even, entire and enclosed, although that on tergite 2 almost reaching lateral margins at posterior end of lateral foveae. Tergite 5 pale brownish, suffused with paler color across base, tergite 6 fulvous. Venter pale yellowish, becoming fulvous at apex. Legs fuscous, apex of coxae, trochanters, apex of all femora, outer and anterior side of front and middle tibia, base of hind tibiae and front and middle tarsi yellowish white. Antennae fuscous, paler toward apex, scape and pedicel white beneath, flagellum whitish beneath but gradually changing to yellowish brown toward apex, with apical joint almost entirely yellowish brown. Proboscis fuscous at base, galeae and glossa pallid. Tegulae testaceous hyaline, base white. Wings dusky hyaline, nervures testaceous, margins of stigma and subcosta more brownish.

Head slightly wider than long; cheeks receding, rounded and half as wide as eyes. Posterior ocelli rather less than their distance apart from nearest eye and occipital margin. Facial foveae hardly wider than interval between them and eyes and reaching from upper level of antennal sockets about halfway to level of anterior ocellus. Antennae inserted below middle of face and normal for group. Face below level of antennae gently convex; disk of clypeus slightly broader than high, with lateral extensions broadly inflexed and not visible in frontal aspect. Mandibles and proboscis normal for group. Pterostigma hardly more than half as wide as first submarginal cell; marginal cell with parts beneath and beyond stigma equal, metacarpus slightly longer than apical truncation; second submarginal cell narrowed about one-half above. Head and thorax shining, except frons, vertex and mesonotum strongly and minutely tessellate and dull; face impunctate, except for shallow sparse punctures on clypeus; mesonotum with very minute, close punctures, several times their diameter apart. Pubescence whitish, very short and thin on face, comparatively long on cheeks and occiput, long and thin on sides of thorax, short, erect, coarse and rather thin on mesonotum, becoming longer at apex of scutellum; hair of front coxae moderately long and dense. Abdomen about twice as long as wide; apical fimbria moderately long and thin; pygidial plate rounded, somewhat wider than long, and distinctly notched at apex. Length: 4.5 mm; anterior wing: 3.1 mm.

Holotype female, 3 miles west of Bingham, Socorro Co., New Mexico, on *Baileya pleniradiata*, Sept. 12, 1961 (Timberlake).

Type in collection of the University of California, Riverside.

Perdita sejuncta Timberlake

New record.—One female, Samalayuca, Chihuahua, Mexico, October 6, 1966 (G. E. and A. S. Bohart).

Perdita submedia, n. sp.

The female of *submedia* runs best to *melanostoma* and *hirsuta* in the 1960 key (Univ. Calif. Publ. Entom., 17:8, couplet 57) and is distinguished from them and other species in the preceding key. It has the face marks white, clypeus with two black marks on upper half of disk, the supraclypeal mark divided, and five broad, entire and enclosed white bands on the abdomen.

Female.—Head and thorax dark green, with dark parts of clypeus and supraclypeal area black. Clypeus, lateral marks and narrowly interrupted transverse supraclypeal mark white; summit of clypeus with two large black marks, narrowed anteriorly and not quite reaching halfway to anterior margin; lateral marks much higher than wide and ending bluntly against anterior end of foveae. Collar of pronotum, transverse mark on each side of hind margin of disk and tubercles white. Abdomen black with five entire and even white bands, not quite reaching lateral margins, less broad than dark intervals, especially on tergites 1 and 2, and that on tergite 5 slightly abbreviated. Pygidial plate testaceous. Venter dark. Legs black, apex of all femora, front and middle tibiae except broad dark blotch behind and beneath, not reaching base or apex, front and middle basitarsi and base of hind tibiae white; small joints of front and middle tarsi testaceous, and hind tarsi dilute fuscous. Antennae black, scape and pedicel narrowly yellowish white beneath, flagellum brownish yellow beneath. Labrum pale testaceous, narrowly pale brown

at base. Proboscis fuscous, but galeae and glossa testaceous. Mandibles white at base shading through testaceous to red on apical half. Tegulae testaceous subhyaline and broadly white at base. Wings slightly dusky, nervures testaceous brown, margins of stigma and subcosta a little darker, but all nervures much more pallid at base of wing.

Head as broad as long; cheeks rounded, about half as wide as eyes. Posterior ocelli slightly less than their distance apart from nearest eye and occipital margin. Facial foveae strongly impressed, much wider than narrow interval between them and eyes and reaching from upper level of antennal sockets about halfway to level of anterior ocellus. Antennae normal for group and inserted below middle of face. Face below level of antennae gently convex; disk of clypeus much broader than high, with lateral extensions broadly and gradually inflexed and well exposed in frontal aspect. Mandibles rather long, slender and tapering to acute apex. Proboscis normal for group, galeae reaching base of stipites, maxillary palpi about three-fourths as long as galeae. Pterostigma about three times longer than wide and half as wide as first submarginal cell; marginal cell as long as stigma, slightly longer beyond than beneath it, and with metacarpus distinctly longer than apical truncation; second submarginal cell narrowed more than one-half above. Frons, vertex and mesonotum strongly and finely tessellate, with mesonotum slightly less dull than frons; punctures of frons minute, moderately close and obscure, those of mesonotum more distinct but fine and about equally well spaced. Pubescence whitish, fine and erect, moderately short and thin on face and mesonotum and longer and denser on cheeks and underside of head; hairs of front coxae moderately long and dense, each hair bent over at tip. Abdomen ovate, about twice as long as wide; apical fimbria long and moderately dense; pygidial plate as long as wide at base with sides arcuately converging to narrow and distinctly notched apex. Length: 4.5 mm; anterior wing: 3.2 mm.

Holotype female, 13.7 miles north of Chambers (3 miles south of Wide Ruin), Apache Co., Arizona, on *Chrysothamnus*, August 29, 1967 (Timberlake).

Perdita swenki Crawford

New records.—One female, Leeman, Outagamie Co., Wisconsin, August 24, 1964 (A. R. Moldenke); 1 male, Montauk Point, Long Island, New York, August 24, 1960 (T. Gidaspow).

Perdita xanthodes Timberlake

New records.—One female, Victorville, San Bernardino Co., California, May 24, 1964 (J. E. Slansky); 1 male, 13 miles southeast of Lancaster, Los Angeles Co., California, April 30, 1968 (J. C. Hall); 1 male, Parawan, Iron Co., Utah, on *Gutierrezia microcephala*, September 7, 1964 (A. G. Raske).

Perdita xanthops, n. sp.

(Figs. 1381, 1382, 1409)

This species is similar to *luteola* and *xanthodes* but differs from both in having a fuscous mark on each side of the mesopectus, and the mesonotum has a rather thin, short, erect pale ochreous pubescence.

Female.—Pale orange yellow, except for dark foveae of face and second tergite of abdomen, and except large fuscous mark on each side of posterior part of mesopectus. Legs yellow, hind tarsi pale brownish. Antennae yellow, flagellum except basal joint, brownish above and brownish yellow beneath, but joints 2 to 4 with fuscous ring above at base. Mandibles yellow, but red at apex. Base of proboscis fuscous. Tegulae subhyaline, yellowish at base. Wings nearly clear hyaline, nervures testaceous yellow, subcosta only slightly more brownish.

Head somewhat broader than long; cheeks rounded nearly as broad as eyes. Posterior ocelli about their distance apart from nearest eye and occipital margin. Facial foveae well impressed; their own width from margin of eyes and reaching from level of middle of antennal sockets somewhat more than halfway to level of anterior ocellus. Antennae normal for group, inserted below middle of face; antennal sockets distinctly more distant from nearest eye than their distance apart. Face below level of antennae gently convex; disk of clypeus distinctly broader than high, and lateral extensions broadly inflexed and partly visible in frontal aspect; supra-

clypeal area slightly inclined toward clypeus and broader than long, when measured to lower margin of antennal sockets. Mandibles normal, tapering, acute. Proboscis of normal length for group; maxillary palpi about three-fourths as long as galeae. Pterostigma nearly four times as long as wide, and hardly more than half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus moderately longer than apical truncation; second submarginal cell narrowed more than one-half above. Head and thorax shining, but frons, vertex and mesonotum very minutely tessellate, very dull on frons and vertex, and less dull on mesonotum, and face below level of antennae strongly shining; frons impunctate, but mesonotum with well separated, minute setigerous punctures. Face nearly bare, but mesonotum with thin, erect, pale ochreous hair, somewhat longer than diameter of ocelli; hair of occiput, cheeks and sides of thorax considerably longer but hardly denser than hair of mesonotum; hair of front coxae fine, moderately long and dense. Abdomen about twice as long as wide, with thin apical fimbria; pygidial plate as long as wide at base, narrowed more than half to apex, with shallow median notch. Length: 4.5 mm, anterior wing: 3 mm.

Male.—Paler yellow than female, foveae of face and second tergite small and dark and mesopectus with two fuscous blotches; apical border of tergites 1 to 5 slightly darker or testaceous. Hind tibiae very slightly infused with brownish behind except broadly at base and apex, and small joints of hind tarsi very faintly tinged with brown. Antennal scape concolorous with face, flagellum more orange yellow, joint 2 to 4 with a brown ring above. Apical third of mandibles red. Proboscis yellow. Tegulae and wings as in female.

Head slightly wider than long; cheeks rounded, about three-fourths as wide as eyes. Posterior ocelli slightly closer to nearest eye and occipital margin than their distance apart. Facial foveae punctiform, but nearly half as large as ocelli. Antennae inserted just below middle of face. Disk of clypeus only slightly broader than high, with lateral extensions inflexed and hardly visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Flanks of pronotum not impressed. Venation similar to that of female, but marginal cell slightly longer beneath than beyond stigma, metacarpus hardly longer than apical truncation. Sculpture and pubescence similar to condition in female (hair of mesonotum partly worn or rubbed). Abdomen oval, about two and one-half times longer than wide; apical lobe of tergite 7 about as long as wide at apex. Subgenital plate similar to that of *luteola*, but lateral margins more sinuate. Caulis of genital armature broader than in *luteola*, parameral lobes narrower and sagittae more obtuse at apex. Length: about 4 mm; anterior wing: 2.8 mm.

Holotype female and allotype, 19 miles north of Baggs, Carbon Co., Wyoming, August 16, 1963 (N. and B. Marston).

Types received from G. I. Stage and now in collection of the University of California, Riverside.

Ventralis Group

Perdita brevihirta Timberlake

New record.—One female, 13 miles southwest of Dubois, Fremont Co., Wyoming, on *Chrysothamnus nauseosus*, August 17, 1954 (G. E. Bohart).

This Wyoming specimen agrees closely with Arizona material.

Perdita kanabensis, n. sp.

(Figs. 1383, 1384, 1410)

This is a new species closely allied to *subfasciata*, *snellingi*, and *colei* and a new key distinguishing these forms will be appended. I believe that it is possible that the two nominal species known from California may ultimately be found to intergrade with each other and with *subfasciata*, but *kanabensis* seems to be distinct.

The female of *kanabensis* is distinguished by the very fine, short, erect and thin hair of the mesonotum and rather dark fuscous subcosta and margins of stigma. The male differs from other forms in the hyaline wings, with dark nervures, and in having the posterior legs partly dark.

Female.—Head and thorax dark green, labrum, clypeus and middle of supraclypeal area black; middle of disk of mesoscutum slightly blackish. No light markings, abdomen entirely black. Legs black, extreme apex of front femora, front tibiae except broadly behind, streak on anterior side of middle tibia and front and middle tarsi, yellow. Antennae dark, scape black, flagellum fuscous above and broadly brownish beneath. Mandibles testaceous, shading into red at apex. Tegulae subhyaline, basal spot testaceous. Wings hyaline, nervures testaceous, margins of stigma and subcosta fuscous.

Head rotund, slightly broader than long; cheeks strongly receding, one-half as wide as eyes. Posterior ocelli slightly less distant from nearest eye than their distance apart and somewhat closer to occipital margin. Face subdepressed, more convex below level of antennae. Facial foveae elongate oval, more pointed above and reaching from slightly above level of antennal sockets about halfway to level of anterior ocellus. Antennae inserted slightly below middle of face, middle joints of flagellum a little thicker than long. Disk of clypeus broader than high, lateral extensions broadly inflexed and not much visible in frontal aspect. Mandibles stout, gently curved, and tapering but obliquely truncate at apex and strongly concave on inner side. Proboscis moderately long, galeae nearly reaching base of stipites. Pterostigma large, about as long and as broad as first submarginal cell; marginal cell much longer beneath than beyond stigma, metacarpus somewhat longer than apical truncation; second submarginal cell narrowed less than one-half above. Head and thorax shining, finely and delicately tessellate and with very sparse minute punctures; clypeus, supraclypeal area and anterior corners of face polished. Pubescence fine, whitish, very thin and short on face and mesonotum, and thin but much longer on cheeks and underside of thorax; hair of front coxae long and moderately dense. Abdomen oval, depressed, widest across third segment; apical fimbria moderately long and thin. Pygidial plate triangular, about as long as wide at base, apex obtuse, disk plane. Length: 3.6–4 mm; anterior wing: 3.3–3.4 mm.

Male.—Head and thorax dark blue green. Anterior half of underside of head, with mark on cheeks somewhat triangular or more or less broad, reaching to middle of eyes, or in some cases with very narrow extension to summit of eye, mandibles except red tips, labrum and face to level of foveae yellow. The upper margin of yellow on face more or less wavy, the green descending on each side either slightly or in some cases as far as antennal sockets. Pronotum yellow, but disk mainly dark, except collar, more or less large triangular mark on posterior corners, in many cases with connecting line on posterior margin, and the dark color sending a short slender spur or triangular mark on flanks. Prosternum, posterior half of propleura, and large T-mark on mesosternum, with arm reaching broadly to tubercles, yellow. Abdomen more or less brownish fuscous, yellow beneath, and with yellow band at base of tergites 2 to 5 or 6; these bands broad and reaching lateral margins except on tergite 2, but more or less nubilous on more apical segments, and in some cases narrow or concealed by preceding segment on tergite 2. Legs yellow, hind femora except toward base and hind tibia fuscous on outer margin. Antennae yellow, pedicel fuscous above, flagellum duller, more brownish yellow, basal joints shaded with fuscous above, but successively less so toward apex. Proboscis yellow. Tegulae and wings as in female, except for yellow spot at base of tegulae.

Head slightly broader than long, with cheeks rounded and as broad as eyes, or in some cases head moderately enlarged, more quadrate, distinctly broader than long with cheeks wider than eyes. Posterior ocelli about their distance apart from occipital margin and much farther from nearest eye in large-headed specimens and somewhat less distant in normal specimens. Facial foveae punctiform. Antennae inserted just below middle of face, scape reaching hardly more than halfway to level of anterior ocellus, flagellum clavate, with joints except last broader than long. Face below level of antennae gently convex; disk of clypeus broader than high, lateral extensions moderately inflexed and visible in frontal aspect. Mandibles thick at base, tapering, very acute at apex and nearly reaching to base of each other. Flanks of pronotum impressed, with deep crease on anterior side of upper half of flanks continued across anterior part of disk. Head and thorax shining, with frons and vertex minutely and delicately tessellate, and mesonotum more obscurely tessellate. Punctuation very sparse and minute. Pubescence thin, moderately long, fine and erect, comparatively dense on underside of head and thorax, with face except vertex nearly bare. Abdomen oval, about twice as long as wide; apex of tergite 7 rather broadly trun-

cate. Subgenital plate and genital armature similar to some parts of *subfasciata*, with perhaps the most significant difference in the greater expansion of sagittae. Length: 3-3.5 mm; anterior wing: 2.8 mm.

Holotype female and allotype, Kanab, Kane Co., Utah, on *Eriogonum corymbosum*, Sept. 21, 1966 (Rust, Torechio, Word, and Yousef).

Paratypes.—Eight males taken with the type; and 1 female, 15 miles north of The Gap, Coconino Co., Arizona, on *Cleomella*, Sept. 21, 1966 (Rust, Torchio, Wood, and Yousef). There is no evidence that the females were collecting pollen from these flowers.

Types and one paratype in collection of the University of California, Riverside; remainder of paratypes in collection of G. E. Bohart.

To distinguish *kanabensis* from its closest allies, the following key has been prepared:

KEY TO SPECIES ALLIED TO KANABENSIS

1. Females 2
Males 6
2. Tubercles white; mandibles white or whitish at base; wings whitish hyaline, nervures pallid; abdomen with three or four pale yellow or whitish bands 3
Tubercles dark; mandibles testaceous or rufotestaceous at base; abdomen in some cases entirely dark 4
3. Mesoscutum minutely tessellate, dullish, with thin, erect, rather coarse whitish hair; head slightly broader than long *snellingi* Timberlake
Mesoscutum smooth, shining, and a little less conspicuously hairy; flagellum brighter ferruginous *colei* Timberlake
4. Head slightly broader than long, as in *snellingi* and *colei* 5
Head about as broad as long; mandibles fuscous, reddened at apex; banding of abdomen variable, more or less broken or evanescent; mesonotum minutely tessellate, dullish, with pubescence slightly shorter and thinner than in *snellingi* *subfasciata* Cockerell
5. Pubescence of mesonotum usually slightly longer and more conspicuous than in typical *snellingi*; bands of abdomen more or less broken or evanescent, wings whitish hyaline, nervures pallid (previously recorded as *snellingi* from Inyo County, California) *snellingi* var.
Pubescence of forea and mesonotum short, fine, very thin and inconspicuous; abdomen entirely dark; wings more hyaline, subcosta and margins of stigma fuscous *kanabensis*, n. sp.
6. Legs entirely yellow; wings more whitened, with margins of stigma or subcosta only slightly infuscated 7
Hind femora on outer margin at least broadly at apex and outer margin of hind tibiae fuscous; wings hyaline, margins of stigma and subcosta moderately infuscated; green of frons terminating more or less even at level of foveae or narrowly descending on each side to antennal sockets; yellow of mesosternum extending broadly to tubercles *kanabensis*, n. sp.
7. Green of frons at least in most cases not descending much if any below level of foveae on each side; yellow of mesosternum extending broadly to tubercles; flanks of pronotum yellow, with a dark spur from disk 8
Green of frons descending in a broad lobe on each side to or nearly to antennal sockets, with median yellow lobe on frons in most cases rather small; flanks of pronotum mainly dark except tubercles and posterior margin below tubercles, and disk dark except in some cases small spot at posterior corners; yellow of mesosternum not reaching to tubercles (one specimen has distinct anterior process on cheeks, not seen elsewhere in this group) *snellingi* Timberlake
8. Dark part of frons and vertex weakly but distinctly tessellate and shining 9
Dark part of frons and vertex more weakly and faintly tessellate; yellow of face terminating at general level of foveae; dark mark on disk of pronotum triangular, with apex of tri-

- angle on posterior margin more or less broadly truncate, and dark spur onto flanks very narrow and oblique; yellow on cheeks extending broadly to middle of eyes, with a narrow extension nearly to summit *colei* Timberlake
9. Yellow markings much as in *colei*, but yellow of frons terminating arcuately above level of foveae; hind margin of disk of pronotum in most cases yellow clear across and dark spur on flanks very narrow or evanescent *subfasciata* Cockerell
- Yellow of face terminating at level of foveae and in some cases with narrow extension of the green to antennal sockets; disk of pronotum in many cases dark except collar and large mark on posterior corners, with dark extensions on flanks more or less broad and in some cases descending to or below middle (Inyo County material formerly recorded as *snellingi*; numerous males have minute spines on mandibles, not seen in other forms of this group) *snellingi* Timberlake, var.

***Perdita washingtoniae*, n. sp.**

This is a small species allied to *rhois* and *acaciae* found collecting pollen from the *Washingtonia* palm just below the border in Baja California. In the key to the *ventralis* group (1962) it goes to *acaciae* and differs in having the lateral face marks with an orbital extension almost to foveae, legs yellow except small joints of hind tarsi dusky, and the abdominal dark bands less broad, less curved forward at outer ends and restricted to tergites 1 to 3 or 4.

Female.—Head and thorax dark green, frons and vertex reddish orange. Mandibles except reddish tips, labrum, clypeus and lateral marks yellow. Lateral marks subtriangular anteriorly, broad on orbits, rounded against anterior half of sides of disk of clypeus and with thin orbital extension to anterior end of foveae. Collar of pronotum and large mark on tubercles yellow. Abdomen yellow, with straight, narrow apical dark band on tergites 1 to 3, not quite reaching lateral margins, not fully covering apical margin, that on tergite 2 well removed from lateral foveae. In paratype bands broader, that on tergite 2 curving forward at outer ends to reach posterior end of lateral foveae, with fragmented anterior hook at outer ends on tergite 3, and with a very narrow, more abbreviated band on tergite 4. Legs yellow, small joints of hind tarsi dusky. Antennae black above, including triangular mark at apex of scape, scape otherwise, pedicel beneath broadly and flagellum beneath except apical joint yellow. Tegulae testaceous hyaline, inner margin yellow. Wings whitish hyaline, nervures pale testaceous.

Head broader than long; cheeks rounded, about half as wide as eyes. Posterior ocelli a little less than their distance apart from occipital margin and nearest eye. Facial foveae elongate oval, about four times longer than wide, one-half or more of their own width from margin of eyes and reaching from upper level of antennal sockets about halfway to level of anterior ocellus. Antennae inserted well below middle of face, middle joints of flagellum as long as thick. Face below level of antennae evenly convex; supra-clypeal area transverse with a triangular prominence between antennal sockets; subantennal plates obliquely triangular with inner and outer margins subequal; disk of clypeus about as broad as high, very large and reaching much closer than usual to antennal sockets, gradually inflexed laterally and thus partly visible in frontal aspect. Mandibles with inner tooth strong as in *acaciae*. Proboscis moderately long as in *acaciae*. Head and thorax moderately shining, minutely tessellate and punctate, punctures sparse on frons and vertex and moderately closer on mesonotum, where each is set with small scalelike depressed hair. Pubescence otherwise short, thin and erect, but becoming more depressed and denser on cheeks. Abdomen oval, about twice as long as wide, with apical fimbria long and moderately dense; pygidial plate with moderately narrow rounded apex presumably about as long as wide at base. Length: 4 mm; anterior wing: 3.1 mm.

Holotype female, Guadalupe Canyon, 1,000 feet, Baja California, Mexico, at flowers of *Washingtonia filifera*, collecting creamy white pollen, July 11, 1967 (M. E. Irwin).

Paratype.—One female collected with the type.

Types in collection of the University of California, Riverside.

Sphaeralceae Group

In this group ten additional new species here described and the opposite sex of two other species is made known for the first time. A new key to separate these new forms from each other and their closest allies has been prepared and an effort has been made to indicate in the new key where the species would fall in the 1964 key (Univ. Calif. Publ. Entom., 28:126-158).

SUPPLEMENTARY KEY TO SPHAERALCEAE GROUP

1. Females 2
Males28
2. Face entirely dark, or at most with small mark on upper part of clypeus (to couplet 11 in 1964 key) 3
Face marked with yellow or white, or head entirely yellow except for foveae (to couplet 43)13
3. No light markings on head, thorax and abdomen (to couplets 14 and 21) 4
Head or abdomen with light markings 7
4. Head and thorax dark green, without black on notum 5
Head and thorax dark blue green, clypeus, supraclypeal area, disk of mesocutum, scutellum and metanotum black; mesonotum weakly tessellate, shining, with fine, thin erect hair; wings whitish hyaline, nervures pallid *salviae* Timberlake
5. Wings dusky hyaline, nervures dark; head slightly broader than long 6
Wings nearly clear hyaline, nervures pale testaceous, subcosta pale brown; head slightly longer than wide; head and thorax finely tessellate, moderately dull; anterior part of mesoscutum with fine minute punctures, face impunctate; mandibles rufotestaceous
pumila Timberlake
6. Mandibles rufotestaceous; mesonotum with moderately strong tessellation and widely spaced minute punctures; punctures on face below antennae moderately close and those on clypeus coarse; antennae dark, flagellum slender, with joints mostly as long as thick; legs dark, small spot at base of front tibiae and line on anterior side whitish; pygidial plate much longer than wide and slightly obtuse at apex. *cochiseana*, n. sp.
Mandibles, antennae and legs dark; mesonotum smoothly tessellate, shining and with minute, widely spaced punctures; punctures on face below level of antennae close, with those on clypeus only slightly coarser; flagellum moderately clavate, joints mostly thicker than long; pygidial plate nearly as in *cochiseana*, but more widened toward base
exigua becki, n. subsp.
7. Abdomen with light bands 8
Dark except for small white mark at summit of clypeus; scape of antennae dark, flagellum ferruginous; legs dark but front tibiae yellowish except behind; head much broader than long; frons, vertex and mesonotum shining and minutely punctured *sidae* Cockerell
8. Thorax entirely dark (to couplet 35-37) 9
Tubercles white or yellow (to couplet 40)12
9. Abdomen with broad light bands, becoming broader caudad; mandibles simple, acute or blunt at apex10
Tergites 2 to 4 of abdomen with narrow, even band; mandibles slender, acute and with distinct inner tooth11
10. Light bands of abdomen dull yellow, that on tergite 2 well defined, broad and enclosed, those on following segments much broader; tergites 4 and 5 light, except for dark mark at basal corners and transverse subapical mark on each side; head and thorax shining dark green; mandibles only slightly tapering, blunt at apex *distincta* Timberlake
Abdomen with pale yellow bands, becoming successively broader caudad, and in many cases notched or narrowly interrupted medially; head and thorax dark green, disk of mesoscutum, scutellum and metanotum black; mandibles tapering, acute
eximia Timberlake
11. Head and thorax dark green, clypeus, disk of mesoscutum, scutellum and metanotum black;

- abdomen fuscous, with even, interrupted white band, not reaching lateral margins, on tergites 2 to 4; wings whitish hyaline, nervures pallid *mitis*, n. sp.
- Head and thorax blue green, without black; abdomen fuscous, more or less ferruginous on tergites 4 (or 5) to 6; tergites 2 to 4 with a white band notched medially or in some cases slightly interrupted; pygidial plate large and broad, with rounded apex
vanduzeei Cockerell
12. Head and thorax dark green; clypeus, disk of mesoscutum, scutellum and metanotum black; collar of pronotum and tubercles white; mandibles slender, white, becoming rufotestaceous at apex, and with inner tooth; abdominal bands whitish, abbreviated and narrowly interrupted on tergites 2 to 4; wings clear hyaline, nervures pale, stigma large, whitish, with brown margins *stigmatis*, n. sp.
- Head and thorax blue green, clypeus black, except at summit; tubercles yellow; abdomen black, with yellow band on tergites 2 to 5, reaching lateral margins only on tergite 2; wings dusky hyaline, nervures testaceous brown, subcosta blackish; mandibles only slightly tapering, blunt at apex *macneilli* Timberlake
13. Head and thorax dark green or blue, or changing to black on notum 14
Entirely or almost entirely yellow species (to couplet 122) 27
14. Mesonotum tessellate, more or less dull (to couplet 56) 15
Mesonotum polished, or at most weakly tessellate and strongly shining (to couplet 73) 18
15. Disk of mesoscutum, scutellum and metanotum black (to couplet 66) 16
Head and thorax dark green, without black; clypeus except large mark across summit and small lateral marks yellow, thorax entirely dark; abdomen fuscous with large oblique yellow mark on each side of tergites 2 to 4, and small spot on lateral margins of tergites 1 and 5; antennae dark, flagellum slender; head and thorax with short erect whitish pubescence; pygidial plate narrowly triangular, acute at apex *viridicollis*, n. sp.
16. Wings slightly whitish hyaline, nervures pale testaceous, outer margin of stigma and subcosta pale brown; pygidial plate obtuse or narrowly truncate at apex; punctures of face below level of antennae and those of frons about alike in size and distinctness 17
Wings slightly dusky hyaline, nervures pale testaceous brown, margins of stigma and subcosta brown, pygidial plate subacute or very narrowly obtuse at apex; punctures of face below level of antennae somewhat larger and more shallow than those of frons; abdomen mostly dull yellowish on basal tergites with darker margins, and dilute brownish fuscous on tergites 4 and 5, or more uniformly brownish, with median yellowish spot on tergite 1
adustiventris Timberlake
17. Clypeus and supraclypeal area fuscous or black; lateral face marks large, whitish and intruding strongly between foveae and margin of eyes; abdomen yellowish brown, or in some cases moderately infuscated with small yellowish mark on tergite 1
koebeleri koebeleri Timberlake
Similar, but mark on each side of clypeus and in some cases its anterior margin pale yellow or whitish, or more rarely labrum and clypeus pale, except two submedian brown stripes on disk of clypeus more or less confluent; abdomen usually more infuscated, or with yellowish bands more or less distinct on tergites 1 to 2 or 3 .. *koebeleri concinna* Timberlake
18. Mandibles dentate or abruptly narrowed on inner margin before apex (to couplets 74-77) .. 19
Mandibles simple (to couplet 78) 24
19. Mesonotum rather closely punctured and hairy; or if punctures widely separated pubescence coarse, mosslike, partly depressed and conspicuous 20
Mesonotum shining black on disk, very sparsely punctured and thinly pubescent or almost bare 21
20. Pygidial plate broad and rounded at apex; lateral face marks much higher than wide, oblique above and intruding between foveae and margin of eyes; tergites 2 to 5 of abdomen with broad whitish band *obliqua* Timberlake
Pygidial plate longer than wide and narrowed to rounded apex; lateral face marks small, not much higher than wide and not reaching level of antennae; abdomen dull yellow, with subapical spot on each side of tergites 1 to 4 and spot at basal corners of tergites 2 to 5 fuscous *dammersi* Timberlake

21. Head as broad as long, with face below level of antennae convex from side to side22
 Head longer than wide; clypeus strongly produced, very prominent and entirely dark; lateral face marks small, oblique, at anterior corners of face; abdomen with enclosed yellow band on tergites 2 and 3 and more or less ferruginous at apex*lycii* Timberlake
22. Head no broader than long; clypeus rather closely and strongly punctured; lateral face marks acute above; mesonotum polished; abdomen with whitish bands curving backward at outer ends and reaching lateral margins23
 Head broader than long, face very sparsely punctured; disk of clypeus black, but mark on each side of it and lateral marks ending obtusely at level of antennae yellowish white; mesonotum minutely and faintly tessellate, strongly shining and impunctate; abdomen with whitish band, usually enclosed on tergites 1 to 4 or 5; tergite 6 and sometimes 5 testaceous yellow*subglabra*, n. sp.
23. Abdominal bands entire except on tergites 1 and 5; clypeus in most cases white, with two brown or fuscous stripes on disk, or these may become enlarged and confluent; supra-clypeal area in some cases with two white spots*leucosticta* Timberlake
 Similar but clypeus more or less entirely dark and abdominal bands narrowly interrupted
florissantella Cockerell
24. Face sparsely punctured25
 Face strongly and closely punctured26
25. Clypeus, except two irregular or incomplete submedian stripes, and small transverse lateral marks white; transverse mark near lateral margin of tergite 5 and band on tergites 1 to 4 white, reaching lateral margins except on tergite 1, narrowly interrupted, and those on tergite 2 to 4 widened at outer ends; pubescence very thin on cheeks, face and notum but rather dense on occiput*imberbis* Timberlake
 Abbreviated median stripe and upper border of disk of clypeus and lateral marks reaching level of antennae white; bands of abdomen yellow, successively more widely interrupted on tergites 1 to 4 and extending broadly to lateral margins except on tergite 1; pubescence nearly as in *imberbis*; pygidial plate more narrowly obtuse at apex
florissantella Cockerell
26. Frons closely punctured between antennal sockets and foveae; lateral and posterior border of disk of clypeus, confluent with median stripe, incomplete supra-clypeal mark, and lateral marks reaching anterior end of foveae white; tergites 1 to 4 each with white band, more broadly interrupted on tergite 3 and reduced to lateral marks on tergite 4; mesonotum polished, very sparsely punctured and with thin, short, erect hair; pygidial plate rounded at apex*oreophila* Timberlake
 Frons with close strong punctures to level of anterior ocellus; clypeus and supra-clypeal area black, lateral face marks white, shaped almost exactly as in *oreophila*, or in form of orbital stripes, reaching anterior end of foveae, widened anteriorly to touch sides of clypeus, but leaving anterior corners of face dark; abdomen with four white bands, narrowly interrupted except on tergite 3; mesonotum polished, with moderately close punctures and fine erect hair; pygidial plate with broad notched apex*puncticeps*, n. sp.
27. Small species, about 4-5 mm in length; head and thorax variegated with green, mesonotum dark except on lateral margins of scutum*luciae* Cockerell
 About 7.5 mm in length; entirely yellow except for foveae and short transverse black mark on each side of apical part of tergites 1 to 3; frons and vertex opaquely alataceous and impunctate, face below level of antennae and mesonotum shining and sparsely punctured; wings subhyaline, nervures testaceous yellow; pygidial plate triangular, much longer than wide and acute at apex*parryellae*, n. sp.
28. Face partly dark below level of antennae29
 Face yellow or white at least to level of antennae36
29. Abdomen without light markings (to couplet 154)30
 Abdomen with interrupted white bands (to couplet 168)34
30. Face with supra-clypeal mark as well as clypeal and lateral marks31
 Marks restricted to clypeus and sides of face33
31. Face marks yellow or white, with lateral marks not going above level of antennae32

- Face marks yellow, with lateral marks narrowly triangular, very acute above and reaching well above level of antennae; subantennal plates varying from entirely dark to yellow with face becoming entirely yellow below level of antennae *obliqua* Timberlake
32. Face marks white, with lateral marks ending very broadly at or slightly below level of summit of supraclypeal mark; subantennal plates varying from dark to white; abdomen in some cases with two transverse white marks on tergites 2 and 3; tergite 7 sharply acute at apex; mesonotum almost polished, and nearly impunctate *tortifoliae* Cockerell
- Face marks yellow, with lateral marks subtriangular, nearly reaching level of antennae, or shorter and subquadrate; head and thorax blue-green, mesonotum tessellate and dullish; wings dusky, nervures dark, central pale streak of stigma narrow; tergite 7 narrowly truncate at apex *krombeini* Timberlake
33. Face marks white, lateral marks more or less quadrate, no higher than wide, and not extending above level of summit of clypeus; wings whitish hyaline, nervures pallid, margins of stigma and subcosta pale ferruginous; tergite 7 broadly subtruncate at apex
salviae Timberlake
- Face marks yellowish white, with large black mark across summit of clypeus; lateral marks transverse much broader than high; wings whitish hyaline, nervures testaceous, subcosta and margins of large whitish stigma fuscous; apex of tergite 7 rather narrowly rounded *stigmatis*, n. sp.
34. Face marks restricted to clypeus, supraclypeal and lateral marks 35
- Face nearly all, or in some cases, entirely white below level of antennae; head and thorax dark blue, frons tessellate and dull; abdomen with white bands, that on tergite 1 abbreviated and narrowly interrupted, those on tergites 2 and 3 bent backward at outer ends, and those on tergites 5 and 6 emarginate behind on each side. *leucosticta* Timberlake
35. Lateral marks of face more or less quadrate, reaching level of middle of subantennal plates; abdomen with white band on tergites 1 to 5, successively somewhat more widely interrupted, that on tergite 1 reduced to two submedian lines, that on tergite 2 straight, basal, and with more or less separate small subapical part on each side reaching to lateral margin; hair of cheeks and anterior margin of mesepisternum coarse and more or less dense; hair of cheeks and anterior margin of mesoepisternum coarse and more or less depressed; hair of hind tibiae coarse and mostly about as long as width of tibia
imberbis Timberlake
- Lateral marks subtriangular with angle toward clypeus strongly rounded; abdomen with five narrow white bands, except occasionally none on tergite 5, that on tergite 1 reduced to two transverse marks and that on tergite 2 much abbreviated (or clypeus dark across summit and supraclypeal and abdominal markings absent); hair of cheeks and anterior margin of mesepisternum fine and erect and hair of hind tibiae fine and partly longer than greatest width of tibia *veris* Timberlake
36. Face yellow above level of antennae in middle as well as at sides, or light marks of thorax not restricted to pronotum and tubercles 37
- Head and thorax shining dark green, disk of mesoscutum and scutellum black; face below level of antennae yellowish white; abdomen dark, with narrow, interrupted white band, not reaching lateral margins on tergites 2 to 4; head broader than long, with face below level of anterior ocellus strongly convex *sonorensis* Cockerell
37. Face yellow straight across above level of antennae 38
- Yellow of face going above level of antennae only on each side, but thorax marked with yellow on scutellum, metanotum and pleura; pronotum yellow except for dark band across disk; head and thorax otherwise brilliant emerald green; abdomen yellow with six black bands, yellow band on tergite 1 rather narrow and interrupted *speciosa*, n. sp.
38. Yellow of face terminating more or less evenly at or somewhat above level of foveae (to couplet 239) 39
- Yellow of face reaching level of foveae but the green descending on each side about halfway to level of antennal sockets; abdomen dark with broad yellowish white band on tergites 2 to 5, enclosed on tergites 2 and 3, and emarginate behind on each side on tergite 4 and 5; tergite 1 with two contiguous marks at summit of basal declivity, tergites 6 and

- 7 entirely testaceous yellow; wings clear hyaline, nervures and stigma whitish, subcosta pale brown *ambigua* Timberlake
39. Clypeus distinctly produced or dentate on each side of labrum40
Clypeus inflexed and obtusely folded against sides of labrum41
40. Head, thorax, abdomen, legs and antennae almost uniformly dull yellow or brownish yellow, base and posterior face of propodeum often fuscous; clypeus broad and low, anterior processes large, triangular and porrect *dentata* Timberlake
Thorax black, marked with yellow on pronotum and mesopectus; head more or less quadrate, mostly yellow except for vertex; cheeks broad and simple; anterior processes of clypeus in some cases rather long and sharp; abdomen yellow, but all yellow parts more or less tinged with brown *atrata* Timberlake
41. Comparatively robust species, mesonotum more or less conspicuously hairy42
Small species frequenting flowers of *Prosopis* or *Salix* with face impunctate and hairless, mesonotum very thinly and weakly punctured and hairy
248 in 1964 key (Univ. Calif. Publ. Entom., 28:155)
42. Mesonotum with sparse minute punctures and thin erect hair43
Mesonotum more or less closely punctured and conspicuously hairy ..244 in 1964 key (ibid.)
43. Tergite 7 narrowed to moderately wide, slightly emarginate apex, with corners of apex slightly produced; face yellow to above level of foveae or nearly to level of anterior ocellus; cheeks yellow almost to summit of eye; pronotum yellow, with dark band across disk44
Tergite 7 with apex less broad, slightly truncate or almost rounded; yellow of face terminating at lower level of foveae, with the green descending on each side about halfway to antennal sockets; yellow of cheeks barely reaching beyond middle of eyes; yellow T-mark of mesosternum with arms recurved and usually well separated from yellow of tubercles; pronotum dark on disk and on posterior part of upper half of flanks; front and middle legs partly dark as well as hind tibiae and tarsi *adustiventris* Timberlake
44. Yellow T-mark of mesosternum normally well developed with arms extending to tubercles; flanks of propodeum in many cases more or less yellow *koebeleri koebeleri* Timberlake
Yellow T-mark not reaching tubercles, or more or less evanescent or absent, and flanks of propodeum entirely dark *koebeleri concinna* Timberlake

Perdita adustiventris Timberlake

(Figs. 1385, 1386, 1411)

Perdita adustiventris Timberlake, 1964, Univ. Calif. Publ. Entom., 18:166, ♀.

This species was described from one female from Parker Dam, California. New material includes the male taken near Parker Dam and from Angel de la Guarda Island, Baja California. The female from Angel de la Guarda Island differs from the type in having a dull yellowish band on tergites 1 to 3, almost reaching the lateral margins.

Male.—Head and thorax dark blue green. Undersurface of head to posterior end of proboscis cavity, cheeks to middle of eyes, face to, or almost, to level of foveae, pronotum, except most of disk and posterior half of flanks above level of middle of tubercles, and broad-limbed T-mark on mesosternum yellow. Margin of green on frons bluntly bilobed. Arms of T-mark curving backward and ending far from tubercles except in one specimen. Collar of pronotum, small spot on posterior corner of disk and tubercles yellow. Abdomen fuscous, with median spot on tergite 1 and broad enclosed band on tergites 2 to 3 or 4 dull yellow, or segments beyond second yellowish at base with broad dark apical band on tergites 3 to 5. Venter pale, unmarked. Legs yellow, broad streak behind or above on femora, streak on posterior side of front and middle tibiae and hind tibiae and tarsi fuscous; middle tarsi yellow, tinged with brown. Antennae yellow, pedicel and joints of flagellum more or less narrowly brown or fuscous above. Mandibles except red tip and labrum yellow. Proboscis testaceous yellow. Tubercles testaceous subhyaline and yellow at base. Wings hyaline, nervures testaceous, margins of stigma and subcosta brown.

Head subquadrate, broader than long; cheeks rounded, moderately receding and about as broad as eyes; inner orbits of eyes nearly parallel. Posterior ocelli their distance apart from occipital margin and at least one-half more distant from nearest eye. Facial foveae nearly punctiform. Antennae inserted at middle of face; middle joints of flagellum as long as thick. Face below level of antennae only slightly convex; supraclypeal area broader than long; disk of clypeus rounded above, somewhat broader than high and subequal to lateral extensions, which are moderately inflexed and visible in frontal aspect. Mandibles stout, acute at apex and reaching slightly beyond far margin of labrum. Proboscis moderately elongate, galeae reaching base of stipites. Pterostigma nearly as wide as first submarginal cell; marginal cell distinctly longer beneath than beyond stigma, with metacarpus slightly longer than apical truncation. Head and thorax moderately shining, frons and vertex rather strongly and minutely tessellate, but face below antennae smooth and shining; mesonotum weakly tessellate. Face impunctate, mesonotum with a few minute punctures on anterior part of scutum. Pubescence fine and short, very sparse on mesoscutum, thin on cheeks and underside of head, and more abundant on underside of thorax, but face bare. Abdomen oval, depressed, about twice as long as wide, hardly surpassing apex of wings, shining, impunctate and nearly bare. Sides of tergite 7 converging to narrowly truncate or slightly rounded apex. Subgenital plate triangular, a little broader than long and acute at apex. Genital armature very small, as in *koebeleri*; caulis nearly as broad as long with dorsal lobes truncate at apex; parameral lobes arising from sides of caulis, slender, incurved, nearly bare, and in lateral view strongly acuminate; sagittal rods fused, slender, slightly and ovally expanded before acute apex; volsellae well exposed in dorsal view and with conspicuous dark tubercles at apex. Length: 4 mm; anterior wing: 3 mm.

New records.—California, San Bernardino Co.: 1 male, 1.7 miles west of Parker Dam, on *Eucnide urens*, April 16, 1967 (G. I. Stage). Mexico, Baja California: 1 female, 3 males, Angel de la Guarda Island, on *Mentzelia hirsutissima*, March 3, 1966 (G. S. Daniels); 2 males, Bahia de los Angeles, on same flower, March 6 and 24, 1966 (Daniels).

Perdita calloleuca calloleuca Cockerell

New records.—Arizona, Coconino Co.: 7 males, 23 females, 3 miles southeast of Tuba City, on *Wislizenia refracta*, Aug. 29, 1967 (Hall and Timberlake); 116 males, 86 females on *Artemisia filifolia*, same day and locality (J. C. Hall); 1 female, Vermillion Cliffs, on *Eriogonum*, Aug. 30, 1967 (Hall). Apache Co.: 4 females, 16 miles southeast of Round Rock, on *Chrysothamnus*, Aug. 28, 1967 (Timberlake); 1 female, 3 miles south of Wide Ruin, on *Chrysothamnus*, Aug. 29, 1967 (Timberlake).

Females from near Tuba City in some cases have clypeus nearly all light, with only a small dark mark on each side of summit, to form the end of the broad oblique stripes descending from frons on each side of face. On the other hand, the females from Apache County have the clypeus mainly dark with a more or less narrow and abbreviated median pale stripe, and in one specimen the clypeus is entirely black with lateral marks and pale triangular supraclypeal mark projecting onto frons between antennal sockets normal. None of the females recorded above were collecting pollen.

Perdita cochiseana, n. sp.

The female of *cochiseana* is entirely dark or with insignificant pale marks on legs and runs near *pumila* in the 1964 key (Univ. Calif. Publ. Entom. 28:127).

Female.—Head and thorax dark green, slightly bronzy on frons and vertex and without markings. Abdomen blackish unmarked. Legs blackish, front tibiae with a yellowish streak on anterior side not reaching apex; and a testaceous dot at base of front and middle tibiae. Antennae black. Mandible rufotestaceous, redder at apex and dusky at base. Tegulae testaceous subhyaline, fuscous at base. Wings dusky hyaline, nervures and stigma testaceous, subcosta fuscous.

Head distinctly broader than long; cheeks strongly receding, one-half as wide as eyes. Posterior

ocelli approximately their distance apart from nearest eye and somewhat closer to occipital margin. Antennae inserted opposite middle of eyes; antennal sockets about twice as far from eyes as their distance apart; middle joints of flagellum about as long as thick. Facial foveae very short and linear, about their own width from margin of eyes and traversing about the anterior third of space between levels of antennal sockets and anterior ocellus. Face below antennae gently convex; disk of clypeus much broader than high, with lateral extensions broadly inflexed and partly visible in frontal aspect. Mandibles stout, tapering, subacute and reaching slightly beyond middle of labrum. Proboscis short, galeae reaching less than halfway to base of stipites; palpi not observed in type. Pterostigma about three times longer than wide and nearly as wide as first submarginal cell; marginal cell as long as stigma, distinctly longer beneath than beyond stigma, with metacarpus only slightly longer than apical truncation; second submarginal cell narrowed three-fourths above and first recurrent nervure received near apex of first submarginal cell. Tarsal claws small, with small inner tooth. Head and thorax moderately shining, distinctly, but minutely and smoothly tessellate. Punctures of mesoscutum very fine and widely scattered on disk, closer on anterior third, and those of frons sparse and obscure; punctures of parocular area of face fine and widely spaced and those of clypeus closer and larger. Pubescence thin, short, erect and whitish, but tolerably abundant on underside of head and thorax, but frons, vertex and disk of mesonotum almost bare. Hair of front coxae long but rather thin and scopal hair of hind legs thin and hardly longer than greatest width of tibia. Abdomen oval, but much more than twice as long as wide, and widest across third segment; apical fimbria long but thin. Pygidial plate narrow, much longer than wide, apex acute and lateral margins distinctly elevated. Length: 3.75 mm; anterior wing: 2.2 mm.

Holotype female, Douglas, Cochise Co., Arizona, on *Euphorbia*, Aug. 26, 1964 (C. D. Michener). Type in collection of the University of Kansas, Lawrence.

Perdita exigua becki, n. subsp.

This is a very small entirely dark bee, that by its associated male proves to be a form of *exigua*. It runs to *fremonti* and *chihuahua* (couplet 24) in the 1964 key (Univ. Calif. Publ. Entom. 28:128), but differs in the distinctly tessellate although strongly shining mesonotum.

Female.—Head and thorax dark bluish green, labrum and disk of clypeus except posterior margin blackish. Abdomen black, pygidial plate ferruginous. No light markings on face, thorax or abdomen. Legs and antennae blackish, entirely dark, flagellum more brownish than scape, especially beneath. Tegulae testaceous subhyaline, darker toward base. Wings with slight brownish tinge, nervures brownish, margins of stigma a little darker, subcosta fuscous.

Head as broad as long, inner orbits of eyes slightly converging in front; cheeks rounded, strongly receding, about half as wide as eyes. Posterior ocelli about their own diameter from occipital margin, and slightly more than their distance apart from nearest eye. Facial foveae about four times longer than wide, close to margin of eyes and reaching from upper level of antennal sockets about halfway to level of anterior ocellus. Antennae inserted below middle of face; distance between outer margins of antennal sockets subequal to distance to nearest eye. Face below level of antennae gently convex; disk of clypeus about as broad as high, with lateral extensions broadly inflexed and hardly visible in frontal aspect. Mandibles simple, tapering, acute and reaching far margin of labrum. Proboscis short, galeae about half as long as stipites; maxillary palpi 6-jointed and very slightly longer than galeae. Flanks of pronotum normal. Pterostigma about three times as long as wide and two-thirds as wide as first submarginal cell; marginal cell almost equally long beneath and beyond stigma, with metacarpus slightly longer than apical truncation; second submarginal cell narrowed one-half above. Head and thorax shining; frons and vertex minutely tessellate and slightly dull, mesoscutum weakly tessellate and shining. Punctures of anterior part of face minute and moderately close, becoming coarser and sparser on clypeus, those of frons and anterior border of mesoscutum sparse and obscure, but those on disk of scutum distinct and widely spaced. Pubescence fine, white and erect, thin on face and mesonotum and denser on cheeks and underside of thorax; hair of front coxae rather long and dense. Scopal hair of hind legs thin and about twice as long as greatest width of tibia.

Abdomen depressed, about twice as long as wide, widest at junction of third and fourth segments; apical fimbria long, thin and white. Pygidial plate about as long as wide at base, with apex narrowly rounded to nearly acute. Length: about 3.75 mm, anterior wing: 2.5 mm.

Male.—Not differing materially from the male of typical *exigua*, except that the apex of the subgenital plate appears to be more expanded dorsoventrally and diamond shaped.

Holotype female and allotype, Atomic Proving Grounds, Mercury, Nye Co., Nevada, Aug. 7, 1964 (D. Elden Beck).

Paratypes.—Four females taken with the types; and 8 females taken at the type locality, Aug. 5, 11, and 20, 1965 (Beck).

The male of *exigua* recorded in 1964 from west of Ely, Nevada, belongs here and agrees in the shape of the subgenital plate.

Types in collection of the U. S. National Museum, Washington; and paratypes in collection of the University of California, Riverside, and some returned to G. E. Bohart from whom they were received.

Perdita distincta Timberlake

Perdita distincta Timberlake, 1964, Univ. Calif. Publ. Entom., 28:174, ♂.

Known previously from one male from Baker County, Oregon, new material of *distincta* includes the female, which is most similar to *eximia* but easily distinguished by the characters given in the preceding key.

Female.—Head and thorax dark blue green, without light markings, clypeus and supraclypeal area black. Mandibles pale yellow on basal half, grading into red at apex. Antennae fuscous, flagellum dull yellow beneath. Proboscis fuscous, galeae pale brownish. Tubercles fuscous. Abdomen brownish fuscous, with broad rather suffused banding of dull yellow, clearer on basal segments. Tergite 1 dark, with two small yellowish spots, close together at summit of basal declivity, and apical depression narrowly yellowish. Tergite 2 dark, with narrow apical margin and enclosed band yellow. Tergite 3 yellow, with basal corners and preapical band not quite reaching lateral margins dark. Tergite 4 similar to 3, with mark on basal corners small and preapical dark band mainly reduced to a transverse, oval mark on each side. Tergites 5 and 6 yellow with suffused dark mark at basal corners. Legs black at base, apex of front and middle femora, their tibiae and tarsi yellow except tibiae slightly infuscated behind; hind legs mainly dark, but base of tibiae dull yellowish on outer margin and tarsi brownish yellow. Tegulae subhyaline, base yellow. Wings slightly dusky hyaline, nervures pale testaceous, margins of stigma and subcosta brown.

Head slightly broader than long; cheeks evenly rounded, about one-half as wide as eyes. Posterior ocelli about their distance apart from nearest eye and half as far from occipital margin. Facial foveae moderately narrow, close to margin of eye and reaching from level of middle of antennal sockets about halfway to level of anterior ocellus. Antennae inserted below middle of face, with middle joints of flagellum as long as thick. Face below level of antennae gently convex; disk of clypeus much broader than high, with sides broadly inflexed. Mandibles stout, tapering, blunt at apex and nearly reaching far margin of labrum. Proboscis moderately long, galeae as long as stipites. Pterostigma about three times as long as wide and one-half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus somewhat longer than apical truncation; second submarginal cell narrowed about one-half above, and receiving first recurrent nervure very close to base. Head and thorax shining, but frons and vertex smoothly tessellate and dullish; disk of mesoscutum polished, weakly tessellate around margins and more broadly on anterior border. Base of propodeum minutely granular. Punctures on anterior part of face small but strong and widely spaced, those of frons and vertex minute, sparse and obscure; disk of mesoscutum almost impunctate, but margins and anterior border with sparse fine punctures, and those of scutellum distinctly larger. Pubescence rather short, fine erect and thin, but moderately dense on underside of head and thorax; hair of front coxae moderately long and dense. Abdomen broadly ovate, depressed; apical fimbria very thin. Pygidial plate much longer than wide and narrowed to obtuse apex. Length: 4.8 mm; anterior wing: 2.8 mm.

New record.—California, Sierra Co.: 1 male, 3 females, Sattley, June 25 and 28, 1964 (M. E. Irwin). The male is marked from *Eriogonum*.

Perdita imberbis Timberlake

(Figs. 1387, 1388, 1412)

Perdita imberbis Timberlake, 1968, Univ. Calif. Publ. Entom., 49:139, ♀.

This species was described from one female from Sierra County, California, and new material includes the male from Siskiyou County. The male is similar to *leucosticta* and *veris* and is distinguished from them in the preceding key.

Male.—Head and thorax dark green. Mandibles except reddish tips, labrum (in some cases testaceous), clypeus, lateral and supraclypeal marks, collar of pronotum, cuneate mark on each side of disk and tubercles white. Lateral marks quadrate, or nearly so, reaching about halfway between level of summit of clypeus and level of antennal sockets; supraclypeal mark varying from slightly to distinctly broader than high. Abdomen black, with five white bands all interrupted medially; that on tergite 1 represented by two transverse marks at summit of basal declivity; that on tergite 2 more narrowly interrupted than others, straight, basal, and with a more or less distinctly cut-off and more apical part at outer ends that barely reaches lateral margins of segment; those on tergites 3 to 5 well interrupted medially and reaching lateral margins, with those on tergites 4 and 5 broadly emarginate on each side behind and knobbed at inner end of each part, especially on tergite 5, but that on tergite 3 merely widened near outer ends instead of being emarginate. Tergite 6 testaceous across apical depression, this color also extending more or less basad on middle third of segment at each side. Tergite 7 testaceous and reddened at apex. Front and middle legs, except base of front coxae and posterior side of femora, and hind coxae at apex, hind trochanters, dorsal side of hind femora more or less completely and base of hind tibiae pale yellow; legs otherwise fuscous, front and middle tibiae somewhat suffused with fuscous behind. Antennae fuscous, scape white and flagellum dull yellowish beneath. Proboscis fuscous, with galeae and glossa testaceous. Tegulae testaceous subhyaline, base white. Wings dusky hyaline, nervures testaceous brown, margins of stigma and subcosta fuscous.

Head as broad as long; cheeks rounded, receding and three-fourths as wide as eyes. Posterior ocelli almost their distance apart from nearest eye and slightly closer to occipital margin. Antennae inserted below middle of face, scape reaching halfway to level of anterior ocellus, middle joints of flagellum as long as thick. Face depressed lengthwise, but gently convex from side to side below level of antennae; disk of clypeus slightly broader than high, with lateral extensions gradually inflexed and mainly visible in frontal aspect. Mandibles tapering, acute, and reaching far margin of labrum. Proboscis moderately elongate, maxillary palpi about three-fourths as long as galeae. Pterostigma small, about three times longer than wide and half as wide as first submarginal cell; marginal cell slightly longer beyond than beneath stigma, with metacarpus longer than apical truncation; second submarginal cell narrowed about three-fourths above. Head and thorax shining, but frons and vertex finely tessellate and moderately dull; and mesonotum weakly tessellate; face virtually impunctate and mesonotum almost impunctate except for sparse minute punctures on anterior border of scutum. Pubescence moderately fine, short, thin, erect and white, but coarser and appressed on upper part of cheeks, and coarser and longer on anterior border of mesepimeron below tubercles. Abdomen broadly ovate, convex above, bare except for short thin hair at apex. Tergite 7 narrowed into a short apical lobe which is rather narrowly truncate. Subgenital plate as long as wide at base and narrowed to moderately wide and rounded apex, which is strongly fringed. Caulis of genital armature short medially but lengthened at sides and there extended into parameral lobes which are slender and rounded at apex as seen from above, and moderately wide at base as seen from side and tapering to subacute apex; sagittae with rods separated beyond middle, ovally expanded as seen from above, and tapering from moderately wide base as seen from side and curved upward, with apex slender and very acute in any view; volsellae well exposed in dorsal view. Length: 4 mm; anterior wing: 2.8 mm.

New records.—California, Sierra Co.: 1 female, Sattley, June 25, 1964 (M. E. Irwin). Siskiyou Co.: 4 females, 11 males, 12 miles south of Macdoel, on *Erigeron*, July 1, 1967 (Joe Schuh).

Perdita koebelei concinna Timberlake

Perdita koebelei concinna Timberlake, 1964, Univ. Calif. Publ. Entom., 28:161, ♀ ♂.

Perdita masoni Timberlake, 1964, *ibid.*: 306, ♀ (new synonymy).

While most specimens of typical *koebelei* have the abdomen dark enough to run to couplet 51 in the 1964 key (*ibid.*) to the *sphaeralceae* group, many specimens of *concinna* would certainly go to *masoni* in couplet 60.

New records.—Arizona, Yuma Co.: 3 females, 34 miles south of Quartzsite, on *Mentzelia involucrata*, March 31, 1966 (George Salt and P. D. Hurd, Jr.). Mohave Co.: 1 male, 2.8 miles east of Willow Beach, on *Mentzelia tricuspis*, April 9, 1967 (Stage and Daniels), and 3 males on *Eucnide urens*; 2 males, Willow Beach, on *Eucnide*, and 3 males on *Mentzelia*, April 19, 1967 (Stage); 3 males, 13.7 miles southeast of Hoover Dam, on *Eucnide*, and 1 male on *Mentzelia*, April 26, 1967 (Stage).

Perdita mitis, n. sp.

This is a small blue-green species from Durango, Mexico, without light markings, which in my 1964 key to the *sphaeralceae* group runs to *vanduzeei*; it runs to *subfasciata* as does *vanduzeei* in Cockerell's keys (1896 and 1898). It is distinguished from *vanduzeei* and some other similar species in the preceding key.

Female.—Head and thorax blue green, without light marking, clypeus, disk of mesoscutum and scutellum black, labrum fuscous. Abdomen dilute fuscous or brownish, venter concolorous, pygidial plate testaceous. Tergites 2 to 4 each with rather wide and even white band, not reaching lateral margins and well interrupted medially; resultant transverse marks shortest on tergite 2, longest on tergite 3, with the interruption narrowed on tergite 3 where it about equals width of marks. Legs fuscous, extreme apex of front femora and streak on front tibiae not reaching apex white. Antennae darker than legs, scape black, flagellum brownish beneath. Mandibles white on basal third, shading through testaceous to red at apex. Proboscis dilute fuscous. Tegulae nearly clear hyaline, white at base. Wings white, nervures and stigma concolorous.

Head rotund, as broad as long; cheeks strongly receding, about two-thirds as wide as eyes. Posterior ocelli somewhat less than distance apart from occipital margin and closer to nearest eye. Facial foveae elongate oval, close to margin of eyes and reaching from level of antennal sockets about halfway to level of anterior ocellus. Antennae inserted slightly below middle of face scape falling far short of reaching level of anterior ocellus, and middle joints of flagellum as long as thick. Face below level of antennae strongly convex, with lateral extensions of clypeus broadly inflexed and not much visible in frontal aspect; disk of clypeus about as broad as high and strongly produced beyond level of anterior end of eyes. Mandibles slender, acute, with inner preapical tooth; shaft widest just before the tooth. Proboscis long, galeae reaching base of stipites and longer than maxillary palpi. Pterostigma about as long and nearly as wide as first submarginal cell; marginal cell a little longer beneath than beyond stigma, metacarpus equal to apical truncation. Head and thorax shining, frons, vertex and anterior part of mesoscutum smoothly tessellate but hardly dulled, disk of mesoscutum polished. Frons with a few, minute scattered punctures, mesonotum virtually impunctate, but cheeks very minutely and densely punctured. Pubescence white and mostly appressed; fine and short on sides of face below level of foveae; long and dense on cheeks and underside of thorax, moderately long and erect on sides of propodeum; and short, comparatively coarse, appressed and very thin on anterior border of scutum; disk of mesoscutum bare. Abdomen oval, about twice as long as wide; apical fimbria moderately dense and long. Apex only of pygidial plate exposed, moderately wide and rounded. Length: 4.5 mm; anterior wing: 3.4 mm.

Holotype female, 36 miles southwest of Ciudad Lerdo, 3,600 feet, Durango, Mexico, Aug. 16, 1963 (Naumann and Willis).

Type in collection of the University of Kansas, Lawrence.

Perdita obliqua Timberlake

New Record.—One female, 2 miles south of La Paz, Baja California, Sur, July 21, 1966 (E. G. and J. M. Linsley).

Perdita parryellae, n. sp.

(Figs. 1389, 1390, 1413)

This is a large, yellow species with small dark markings, which was found collecting pollen from the petal-less flowers of *Parryella* in northern Arizona. It should be easily recognized from the characters given in the preceding key. *Parryella* has thin, fine growth with flowers in long racemes, so that the bees are conspicuous when collecting pollen or flying about the bushes.

Female.—Head and thorax yellow; facial foveae, very small mark on margin of eyes at their summit, prosternum, and large mark on each side of posterior part of mesopectus black. Abdomen slightly paler yellow than thorax, with lateral foveae of tergite 2, small, transverse preapical marks on each side of tergites 1 to 3, situated well in from lateral margins, and extreme base of tergites 2 and 3 (and trace of line at base of tergite 4) black. Pygidial plate rufotestaceous. Legs yellow, small joints of hind tarsi infuscated. Antennae yellow, pedicel and flagellum narrowly black above, the dark color decreasing in intensity distad, with apical joints brownish; flagellar joints 2 to 4 with the black on their basal half extending down outer side of flagellum, and the three terminal joints becoming brownish except narrowly yellowish beneath. Mandibles yellow, but rufopiceous on apical third. Proboscis yellowish, but prementum black. Tegulae yellow, but testaceous hyaline on outer margin. Wings slightly dusky hyaline, nervures and stigma yellow.

Head slightly broader than long; cheeks receding, evenly rounded and half as wide as eyes. Posterior ocelli about three-fourths their distance apart from nearest eye and somewhat closer to occipital margin. Facial foveae broadly linear, nearly their width from margin of eyes and extending from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Antennae inserted slightly below middle of face, moderately clavate, with middle joints of flagellum as long as thick. Face below level of antennae gently convex; disk of clypeus a little broader than high, with lateral extensions broadly inflexed and partly visible in frontal aspect. Labrum twice as broad as long and gently rounded on anterior margin. Mandibles reaching far margin of labrum, simple, tapering and subacute. Proboscis short, galeae reaching halfway to base of stipites. Pterostigma about as long as first submarginal cell and three-fourths as wide; marginal cell longer beyond than beneath stigma, with metacarpus about twice as long as apical truncation; second submarginal cell narrowed slightly less than one-half above. Tarsal claws dentate on inner margin. Head and thorax shining, frons and vertex very minutely alutaceous and dull. Face below level of antennae finely, rather obscurely and closely punctured; frons and vertex impunctate; mesonotum polished, but minutely and weakly tessellate on anterior border of scutum and with fine, weak, sparse punctures; mesopleura minutely tessellate, dullish and minutely punctured. Pubescence whitish, short and thin on face and very short and thin on mesonotum, but hair of mesopectus and front coxae comparatively long and dense. Abdomen minutely lineolate, dullish impunctate, with moderately long and dense apical fimbria. Pygidial plate twice as long as wide at base, disk plane, apex acute. Length (extended condition): 7.5 mm; anterior wing: 4.7 mm.

Male.—Colored as in female, but dark markings more extensive. Facial foveae, line from posterior ocelli to nearest eye (obsolete in some specimens), rim of ocelli more or less complete, and mark on occiput black. Thorax in some cases almost entirely yellow, except median mark on propodeum, but lateral margins of basal area, small mark on each end of mesopectus, and three short lines on disk of mesoscutum (at parapsidal and median lines) usually more or less developed. Abdomen with two transversely quadrate marks on tergites 1 to 3, about as close to each other as their distance from lateral margins, mark on lateral margins of tergite 1 at level of summit of basal declivity (in some cases a small submedian spot at same level), median mark at base of tergite 1, and basal margin of tergite 2 to 4 or 5 or 6, black. Line at base of tergite 2 broken in five spots, and that on tergite 3 with a quadrate projection in middle and on each side

more or less developed. Lateral foveae of tergite 2 also black. Legs yellow, small spot at base of joints 2 to 5 of hind tarsi and arolium between all claws more or less infuscated. Antennae yellow, marked as in female but much less extensively so that flagellum becomes very narrowly or brokenly dark above. Other parts including wings virtually as in female.

Head rotund, slightly broader than long; cheeks receding, rounded and half as wide as eyes. Posterior ocelli equidistant from eyes and occipital margin. Facial foveae punctiform. Antennae inserted slightly below middle of face, flagellum hardly at all clavate, with middle joints slightly longer than thick. Face strongly depressed, but distinctly convex from side to side at level of clypeus. Clypeus, labrum and mouthparts about as in female, except mandibles more acute at apex. Flanks of pronotum not at all impressed. Wings as in female, but marginal cell tends to be longer to a greater degree beyond stigma, and second submarginal is narrowed more than half above. Sculpture and pubescence as in female, but hair of face denser, and hair of cheeks, under surface of head and thorax very dense. Abdomen elongate oval; tergite 7 broadly rounded at apex. Subgenital plate narrow, but strongly notched at apex into two blunt divergent lobes, with a rounded sinus between them; lateral apodemes long transversely projecting and acute; margins of plate and apodemes fringed with hair; base of plate very broadly expanded. Caulis of genital armature about as broad as long, with large basal orifice and bluntly rounded dorsal lobes; parameral lobes elongate oval in dorsal view, with very short fine hair beneath and on inner margin, and rather narrow and narrowed beyond the broad base in lateral view; sagittae fused, ovately fusiform, acute at apex; volsellae well exposed in dorsal view, and with numerous black tubercles at apex of superior pair and along upper margin of inferior pair. Length: about 6-7 mm; anterior wing: 4.5-4.7 mm.

Holotype female and allotype, 27.8 miles north of Holbrook, Navajo Co., Arizona, at flowers of *Parryella filifolia*, Aug. 28, 1967 (Timberlake).

Paratypes.—Four males taken with the types (Timberlake and Hall).

Types in collection of the University of California, Riverside.

Perdita puncticeps, n. sp.

P. puncticeps is a species of uncertain affinity but is placed in the *sphaeralceae* group with confidence. In the 1964 key (Univ. Calif. Publ. Entom. 28:126-128) to the group it runs out at couplet 99 and is distinguished from *florissantella* and *oreophila* in the preceding key.

Female.—Head and thorax dark blue, labrum, clypeus and supraclypeal area black. Anterior border of clypeus with three small, obscurely developed whitish marks. Face markings otherwise restricted to rather narrow creamy white lateral marks, reaching level of antennae and broadened anteriorly to touch lateral margins of clypeus but leaving anterior corners of face narrowly black. Collar of pronotum, small spot on posterior corners of disk and tubercles white. Abdomen fuscous, with moderately wide white band on tergites 1 to 4, narrowly interrupted at middle on tergite 3, straight and reaching lateral margins on tergite 1, arcuate and reaching lateral margins on tergite 2 and 3, and abbreviated on tergite 4. Pygidial plate testaceous. Legs fuscous, extreme apex of front and middle femora, anterior side of front tibiae and front tarsi white or whitish, middle tarsi testaceous, base of hind tibiae and hind tarsi testaceous brown. Antennae black, flagellum fuscous above and brownish beneath. Mandibles white at base, shading through testaceous to red at apex. Proboscis testaceous brown, fuscous at base. Tegulae with a narrow white band between fuscous base and testaceous hyaline outer border. Wings whitish subopaque, nervures and margins of stigma testaceous, disk of stigma pale, subcosta pale ferruginous except at base.

Head as broad as long; cheeks receding, half as wide as eyes. Posterior ocelli about three-fourths of their distance apart from nearest eye and nearly that distance from occipital margin. Antennae inserted distinctly below middle of face, scape reaching about three-fourths of distance to level of anterior ocellus; flagellum slightly clavate, middle joints as long as thick. Antennal sockets only slightly more distant from margin of eyes than their distance apart. Facial foveae strongly impressed, much wider than narrow interval between them and eyes reaching from

level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Face below level of antennae moderately convex from side to side; disk of clypeus about one and one-half times broader than high, with lateral extensions broadly inflexed and hardly visible in frontal aspect. Mandibles thick, tapering, acute and nearly evenly curved. Proboscis elongate, galeae as long as stipites, slender, attenuate, and twice as long as maxillary palpi. Pterostigma about three times as long as wide and three-fourths as wide as first submarginal cell; marginal cell equal beneath and beyond stigma, with metacarpus distinctly longer than apical truncation; second submarginal cell narrowed a little less than one-half above, first recurrent nervure interstitial with first intersubitus. Claws with small inner tooth. Head and thorax shining, mesonotum polished, frons and vertex minutely and smoothly tessellate. Face below antennae smooth, with strong shallow punctures on clypeus, mostly in two rows on each side of middle; frons strongly and closely punctured, the punctures a little smaller and deeper than clypeal punctures; vertex nearly impunctate. Mesonotum almost uniformly punctured, the punctures fine, but strong and mostly widely separated. Pubescence white, moderately fine and erect; rather short and thin on face, moderately abundant and a little longer on mesonotum, and longer and denser on vertex, occiput, cheeks and sides of thorax. Scopal hair of hind legs copious, but not dense, microscopically plumose, the longest hairs a little more than twice the greatest width of tibia. Hair of front coxae rather thin and moderately long. Abdomen nearly twice as long as wide, subdepressed, shining, and with fine, shallow punctures, becoming denser on apical segments. Apical fimbria thin, moderately long and finely plumose. Pygidial plate plane, about as long as wide at base, sides moderately converging to rounded and distinctly notched apex. Length: 5 mm; anterior wing: 3.3 mm; width of abdomen: 1.6 mm.

Holotype female, 2 miles east of North Palm Springs, Riverside Co., California, June 7, 1963 (E. I. Schlinger).

Type in collection of the University of California, Riverside.

Perdita quadrinotata Timberlake

New record.—Five males, 7.2 miles southeast of Tecamachalco, Puebla, Mexico, July 25, 1963 (G. W. Byers and party).

Perdita sidae Cockerell

A new record from Durango extends the known range of *sidae* into Mexico and gives me an opportunity to redescribe the female.

Female.—Head and thorax dark bluish green, without markings except for a small white spot at summit of clypeus (actually a miniature T-mark, with thick stem and slender arms). Clypeus otherwise red, labrum black. Abdomen fuscous, without markings, reflexed ventral part of tergites translucently pallid, pygidial plate ferruginous. Legs dark, apex of front femora, front tibiae except behind or beneath, and front tarsi whitish or testaceous. Scape of antennae black, flagellum ferruginous but slightly infuscated above at base. Mandibles piceous, more tinged with red at middle. Tegulae testaceous yellow, fuscous at base. Wings whitish, nervures and stigma pale testaceous.

Head much broader than long, or transversely oval; cheeks receding, about half as wide as eyes. Posterior ocelli about their distance apart from nearest eye and almost as far from occipital margin. Facial foveae obscure. Antennae short, inserted below middle of face, scape reaching about three-fourths of distance to level of anterior ocellus; flagellum strongly clavate, penultimate and preceding joints much thicker than long. Mandibles tapering, acute, nearly reaching far margin of labrum. Proboscis moderately long, galeae as long as stipites, closely pressed together, slender, tapering, acute at apex, and surpassing labial palpi. Pterostigma about as long and one-half as wide as first submarginal cell; marginal cell as long as stigma, much longer beyond than beneath it, with metacarpus much more than twice as long as apical truncation; second submarginal cell narrowed two-thirds above. Claws cleft, outer tooth slender, strongly curved, inner tooth broad at base but acute at apex. Head and thorax shining, very minutely and delicately tessellate; frons with close fine punctures, and those of mesoscutum equally fine more widely spaced. Pubescence white, short, coarse and erect (although mostly matted down in

specimen at hand) and abundant on face and mesonotum. Scopal hair of hind tibiae about as long as greatest width of tibia. Abdomen oval, depressed, somewhat more than twice as long as wide, apical fimbria whitish, moderately long and dense. Pygidial plate about twice as long as wide at base, with sides converging to narrowly rounded apex. Length: 4.9 mm; anterior wing: 3.5m m.

New record.—One female, Ceballos, Durango, Mexico, Oct. 5, 1966 (G. E. and A. S. Bohart).

Perdita speciosa, n. sp.

(Figs. 1391, 1392, 1414)

This species differs from all other known species of *Perdita* in having the head and thorax a brilliant emerald green, contrasting with bright yellow markings.

Male.—Head and thorax brilliant emerald green, marked with yellow as follows: anterior edge of subgenae, labrum, face below level of antennae (the yellow extending obliquely from outer margin of antennal sockets to margins of eye at foveae), pronotum except narrow band on anterior part of disk, posterior part of prosternum, scutellum, small spot on axillae, transverse mark on metanotum and broad band extending from base of wings across metapleura and flanks of propodeum to hind coxae. Mandibles yellow except extreme tip reddened. Proboscis fuscous, galeae and glossa testaceous. Legs entirely yellow. Antennae yellow, except pedicel and flagellum narrowly infuscated above. Abdomen clear yellow with six fuscous bands, including one at base of tergite 1, the four following at junction of tergites 1 and 2 to 4 and 5, and the sixth almost entirely restricted to base of tergite 6; that portion of bands at apex of tergites 1 to 4 with a strong bulge on each side and terminating at outer end of bulge except on tergite 1; yellow band on tergite 1 about as wide as following dark band and narrowly interrupted medially; following yellow bands broader than dark intervals. Venter entirely yellow. Proboscis fuscous, galeae, glossa, and palpi except basal joint testaceous. Tegulae broadly yellow at base, outer margin subhyaline. Wings subopaquely whitish; nervures testaceous, margins of stigma, nervures enclosing marginal cell and subcosta fuscous but subcosta yellow at base; disk of stigma yellowish.

Head distinctly broader than long; cheeks strongly receding about three-fourths as wide as eyes. Posterior ocelli somewhat less than their distance apart from occipital margin and nearest eye. Facial foveae indistinct. Face depressed; antennae inserted slightly below the middle, scape not reaching level of anterior ocellus, middle joints of flagellum about as long as thick. Antennal sockets closer to nearest eye than to each other. Supraclypeal area quadrate, slightly broader than high. Clypeus gently convex, disk much broader than high, lateral extensions feebly inflexed and visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis moderately long, galeae slender, acute and nearly as long as stipes; maxillary palpi six-jointed, nearly as long as galeae. Flanks of pronotum not impressed. Pterostigma about four times longer than wide and about two-thirds as wide as first submarginal cell; marginal cell much longer beyond than beneath stigma, metacarpus more than twice as long as apical truncation; second submarginal cell narrowed two-thirds to radius. Head and thorax shining; frons and vertex minutely granular tessellate and obscurely punctured; mesonotum delicately tessellate and with moderately close, fine punctures; yellow part of face alutaceous and dullish, but sides of thorax sculptured like scutum with slightly finer and closer punctures. Pubescence fine, erect, whitish; moderately abundant on face, thin on mesonotum, and longer and denser on sides and under surface of head and thorax. Abdomen elongate ovate, widest across second segment, and nearly bare. Tergite 7 narrowly rounded at apex. Subgenital plate broader than long and broadly rounded at apex; disk minutely pubescent. Capsule of genital armature large, thick dorsoventrally, with basal orifice large and side walls deeply emarginate; as seen from above convex and strongly bilobed with deep V-shaped impression from apex toward base; and as seen from side whole structure ovate; parameral lobes slender, inserted on sides of capsule and slightly curved down and inward; sagittae large, fused, fusiform, extending from near base of capsule well beyond apex of parameral lobes, and in lateral view straight, with basal rods extremely short, and apex curved downward, with small slender apical lobes exposed; only one pair of volsellae, in form of triangular process, very acute at apex and reaching slightly more than halfway to apex of parameral lobes; inner margin of volsellae rather broadly blackened

but without usual papillae. Length: 5 mm; anterior wing: 3.3 mm.

Holotype male, 3 miles southeast of Tuba City, Coconino Co., Arizona, at flowers of *Wislizenia refracta*, Aug. 29, 1967 (J. C. Hall).

Type in collection of the University of California, Riverside.

***Perdita stigmalis*, n. sp.**

(Figs. 1393, 1394, 1415)

This species runs near *macneilli* in the keys but the female is easily recognized by its small size, clear hyaline wings, with large, whitish, but dark-margined stigma. The male runs near *salviae* and is also distinguished by its dark-margined stigma.

Male.—Head and thorax dark blue green. Mandibles except reddish tips, labrum, clypeal and lateral marks creamy white. Upper border of disk of clypeus broadly fuscous, with two blunt lobes nearly reaching anterior margin, slightly wider than pale notch between them. Lateral marks broadly transverse, broader than high and slightly wider on orbits than at inner end. Thorax dark, except collar of pronotum pallid. Abdomen dilute fuscous, with brownish tinge, without pale markings, but first segment darker and in some cases segments 2 and 3 paler or more translucent; tergite 7 testaceous and yellowish. Legs fuscous, with extreme apex of front femora, front tibia except beneath, streak on anterior side of middle tibiae, anterior side of middle tibiae and front tarsi pale yellow; other tarsi dilute fuscous. Scape broadly pale yellow beneath, otherwise it and pedicel black, and flagellum infuscated above and dull yellow beneath. Proboscis fuscous. Tegulae hyaline, fuscous at extreme base. Wings hyaline, nervures testaceous, stigma whitish, margins of stigma and subcosta fuscous.

Head as broad as long; cheeks strongly receding, about as wide as eyes and widest opposite upper part of eyes. Posterior ocelli slightly more distant from occipital margin than their distance apart, and slightly less distant from nearest eye. Facial foveae minute and faint. Frons with a median shallow basin, the rounded posterior margin of which fails to reach level of anterior ocellus. Antennae inserted slightly below middle of face and opposite middle of eyes, with middle joints of flagellum as long as thick. Face below level of antennae strongly convex, disk of clypeus but little broader than high, lateral extensions broadly inflexed and partly visible in frontal aspect. Mandibles long, slender, acute, strongly curved and nearly reaching to base of each other. Proboscis moderately long, galeae nearly reaching base of stipites. Flanks of pronotum slightly impressed, and posterior corner of disk rounded and slightly prominent. Wings ample, reaching beyond apex of abdomen. Pterostigma large, about four times longer than wide, as long as first submarginal cell and fully as wide; marginal cell much longer beneath than beyond stigma, with metacarpus slightly longer than apical truncation; second submarginal cell narrowed less than half above. Head moderately shining, impunctate, with fine distinct tessellation on frons and vertex; thorax shining, impunctate, mesoscutum and scutellum polished except anterior border of scutum minutely tessellate, as also the sides of thorax. Pubescence white, thin, fine, rather long and erect, most abundant on cheeks and underside of head but frons and disk of mesoscutum mostly bare. Abdomen broadly oval, depressed, but little recurved at apex; sides of tergite 7 converging to moderately narrow ogival apex. Subgenital plate much longer than wide, with apex widened and bifurcate. Genital armature unusually small; capsule slightly longer than wide, with large basal orifice; parameral lobes short, very broad, about one-half as long as capsule, with apical third narrowed to blunt apex; sagittae slender, with rods discrete to apex, and strongly curved in lateral view; volsellae relatively large and well exposed in dorsal view. Length: 3.5 mm; anterior wing: 2.9 mm.

Female.—Head and thorax dark blue, labrum, clypeus, disk of mesoscutum and scutellum black. No face mark, except traces of marks on anterior edge of face in paratype. Thorax dark, except collar of pronotum and apex of tubercles whitish. Abdomen fuscous, with slightly interrupted and well abbreviated yellow band at base of tergites 2 to 4, pygidial plate ferruginous; venter dull yellowish. Legs fuscous, front knees and anterior side of front tibiae at base pale yellow. Antennae black, but flagellum fuscous above and yellowish beneath. Proboscis, tegulae and wings as in male. Mandibles white, shading into red on apical fourth.

Head as wide as long; cheeks receding and half as wide as eyes. Lateral ocelli a little closer to nearest eye and occipital margin than their distance apart. Facial foveae slender, feebly impressed, about their own width from margin of eyes and reaching from upper level of antennal sockets about halfway to level of anterior ocellus. Face below level of antenna strongly convex; disk of clypeus about one and one-half times wider than high; lateral extensions strongly inflexed and hardly visible in frontal aspect. Mandibles slender, gently curved, reaching far margins of labrum and with small preapical tooth on inner margin. Proboscis moderately long; maxillary palpi about four-fifths as long as galeae. Pterostigma and venation as in male. Sculpture and pubescence about as in male, disk of clypeus and that of mesoscutum polished and impunctate. Abdomen oval, depressed, widest across the third segment; apical fimbria thin and moderately long. Pygidial plate about as long as wide at base, with sides converging to rounded apex. Length: 4 mm, anterior wing: 3.5 mm.

Holotype male and allotype, 50 miles north of San Felipe, Baja California, Mexico, on *Encelia farinosa*, March 9, 1966 (Torchio and Barwell).

Paratypes.—12 males, 1 female, same data as types; 1 male, 40 miles south of Mexicali, Baja California, Mexico, on *Tamarix gallica*, March 9, 1966 (Torchio and Barwell).

Types in collection of the University of California, Riverside, and paratypes returned to G. E. Bohart.

Perdita subglabra, n. sp.

This is a small shining species with a dark clypeus and oblong lateral white marks hardly wider below than at upper end. In the 1964 key (Univ. Calif. Publ. Entom. 28:126-158) to the *sphaeraelceae* group it would run out at couplets 74-77, and these couplets have been revised and included in the preceding supplementary key to distinguish *subglabra*.

Female.—Shining dark blue green, with clypeus, supraclypeal area, disk of mesoscutum and scutellum black. Mandibles testaceous yellow, red at apex; labrum testaceous, and lateral extensions of clypeus dusky testaceous, becoming darker at outer ends. Lateral face marks white, oblong, almost reaching anterior end of foveae and not greatly wider at anterior end. Thorax dark, except collar of pronotum and tubercles white. Abdomen fuscous, with a longitudinal median mark on tergite 1 mostly restricted to basal declivity, and band on tergites 2 to 4 white. Band on tergite 2 broad, abbreviated, widely separated from lateral margins and rounded at outer ends; that on tergite 3 much less abbreviated, with a narrow vague extension from posterior corners of outer ends obliquely backward to lateral margins; and that on tergite 4 like preceding band but extending distinctly and broadly to outer margins of segment. Tergites 5 and 6 fulvo-testaceous, and venter pale testaceous without dark markings. Legs black, knees of front legs, anterior side of front and middle tibiae, front tarsi and part of middle and hind trochanters whitish; middle tarsi pale brown. Antennae fuscous, with scape broadly white beneath and flagellum dusky whitish beneath. Tegulae opaque whitish at base and broadly testaceous subhyaline on outer margin. Wings hyaline, nervures pale testaceous, margins of stigma and subcosta brown.

Head as broad as long; cheeks receding, about half as wide as eyes. Lateral ocelli their distance apart from nearest eye and somewhat closer to occipital margin. Facial foveae narrow, slightly less than their own width from margin of eyes, and reaching from level of middle of antennal sockets but two-thirds of distance to level of anterior ocellus. Antennae inserted just below middle of face; flagellar joints mostly as long as thick. Face below level of antennae moderately convex from side to side; subantennal plates small, about twice as long on outer margin as wide; disk of clypeus much broader than high, broadly rounded above, with lateral extensions broad and partly visible in frontal aspect. Mandibles rather slender, curved and abruptly narrowed on inner margin before apex. Proboscis rather short, galeae shorter than stipites; maxillary palpi about as long as galeae and with six joints. Pterostigma about as long and four-fifths as wide as first submarginal cell; marginal cell twice as long beneath as part beyond stigma, with metacarpus and apical truncation about equal; second submarginal cell

narrowed more than one-half above. Frons, vertex and mesonotum minutely and delicately tessellate and shining, virtually impunctate and almost hairless. Face below level of antennae more polished and with a few weak punctures. Cheeks shining, with thin antrorse hair, but temples, vertex and face bare. Front coxae and mesopectus with rather dense, moderately long white hair. Abdomen ovate depressed, nearly twice as long as wide, almost bare, apical fimbria very thin. Pygidial plate mostly concealed in type, probably about as long as wide at base, with sides converging to rounded apex. Length: 4.2 mm; anterior wing: 2.8 mm.

Holotype female, 1.7 miles west of Parker Dam, San Bernardino Co., California, on *Eucnide urens*, April 16, 1967 (G. I. Stage).

Paratype.—One female, Angel de la Guarda Island, Baja California, Mexico, on *Mentzelia hirsutissima*, March 3, 1966 (G. S. Daniels).

The paratype differs in having a definite light mark on each side of clypeus, a trace of mark on middle of disk, lateral face marks more definitely broadened at anterior ends, two short longitudinal marks almost confluent at summit of basal declivity of tergite 1, and enclosed bands on tergites 2 to 5, with ground color of tergite 5 dark instead of light.

Types in U. S. National Museum.

Perdita ambigua Timberlake

(Figs. 1395, 1396, 1416)

Perdita ambigua Timberlake, 1964, Univ. Calif. Publ. Entom., 28:311, ♀.

Because of the dull sculpture and the style of face and thoracic markings the male of *ambigua* was supposed at first to belong in the *octomaculata* group until the genital armature was examined. In the 1964 key (Univ. Calif. Publ. Entom. 28:126–158) to the *sphaeralceae* group it runs out at couplet 143 separating the species allied to *martini* from those allied to *exclamans*, but agrees better with the latter section in its small size and minute punctuation, but it has a more evident pubescence and is not particularly similar to any of the included species. It is in fact closely allied to *exigua*.

Male.—Head and thorax dark green, with subgenal area almost to posterior end of proboscis cavity, cheeks nearly to middle of eyes, mandibles except red tips, labrum, face to general level of foveae, antennae, tubercles, mesosternal T-mark and legs yellow. Flagellum of antennae slightly brownish above. Upper margin of yellow on face uneven, the green descending on each side below level of foveae and the yellow with a broad median lobe extending somewhat above foveae. Hind femora with a broad brownish fuscous stripe on posterior side from base nearly to apex; hind tibiae with a shorter, more nebulous and more brownish stripe behind, well separated from the base. Abdomen fuscous, with whitish markings; two small marks almost contiguous at middle of disk of tergite 1; broad enclosed basal band on tergites 2 and 3, that on 3 nubulous at outer ends with slight extension backward; broad basal band on tergites 4 and 5 reaching lateral margins and broadly and shallowly emarginate behind on each side, with the dark interval between band and pale apical depression of segments narrow, especially on tergite 5; tergite 6 and 7, and venter entirely pale. Tegulae testaceous subhyaline, with large yellow mark at base. Wings almost clear hyaline, nervures and stigma whitish, subcosta pale brown.

Head as broad as long; cheeks almost evenly rounded, about three-fourths as wide as eyes. Posterior ocelli somewhat less than their distance apart from nearest eye and about half as far from occipital margin. Facial foveae twice as long as wide, but small and close to margin of eyes. Antennae shorter than usual, inserted just below middle of face, with joints of flagellum except those at apex thicker than long. Face depressed, with only a slight longitudinal curvature; disk of clypeus gently convex, somewhat broader than high, well rounded across summit, with lateral extensions inflexed but partly visible in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis moderately elongate, galeae about equalling stipites and longer than maxillary palpi. Pterostigma small, but more than three times longer than wide, not quite half as wide as first submarginal cell and emitting radius well beyond middle; marginal

cell about equally long beneath and beyond stigma, metacarpus only slightly longer than apical truncation; second submarginal cell narrowed more than two-thirds above; discal pubescence of wings vestigial. Head and thorax tessellate, moderately dull, with mesonotum and mesopleura less dull than frons. Punctures of frons minute and very sparse, and those of mesoscutum obscure but little more evident. Pubescence white, thin, short and erect on face, much longer on occiput and on anterior border of mesoscutum; hair of cheeks and underside of head rather thin and moderately long and that of mesosternum more abundant, longer and recumbent. Abdomen broadly ovate, depressed, and very thinly hairy toward apex; tergite 7 broadly lobate at apex, with lateral margins forming angle somewhat greater than a right angle. Subgenital plate in general form of a triangle about as long as wide at base, but apex dilated and truncate, acutely produced on each side, and as seen from on end quadrate, much broader than high, and spinosely angled. Capsule of genital armature undivided, without the usual median impression, and produced laterally into parameral lobes which are moderately wide, curved inward and downward and invested with very fine and short pubescence at apex; sagittae fused except at base, ovally expanded toward subacute apex; and as seen from side thinly depressed, with apex abruptly bent downward and very thin; volsellae large and prominent in dorsal view. Length: about 4.5 mm; anterior wing: 2.6 mm.

New records.—Nevada, Lander Co.: 1 female, 1 male, 10 miles west of Austin, on *Chrysothamnus*, Aug. 24, 1955 (W. P. Stephen). California, Siskiyou Co.: 1 male, 9 miles south of Mt. Hebron, on *Cirsium lanceolatum*, Sept. 3, 1963 (Joe Schuh).

Perdita viridicollis, n. sp.

In the 1964 key (Univ. Calif. Publ. Entom. 28:126–158) to the *sphaeralceae* group *viridicollis* runs out at couplets 64–65 and is distinguished from *emarginata*, *linsleyi* and *eremophila* by having the clypeus dentately produced on each side of labrum, by the very short proboscis, with galeae about one-third as long as the stipites, by the transverse head and by the dark abdomen with oblique yellow mark on each side of tergites 2 to 4.

Female.—Head and thorax dark green; mandibles except red tips, labrum, small mark at anterior corners of face, and clypeus except dark mark more or less bifid, at summit of disk, yellow. Thorax entirely dark. Abdomen fuscous, with yellow lateral marks on tergites 1 to 4, very small and marginal on tergite 1 and more or less large, oblique (leaving basal corners of segments dark) and passing over onto ventral part of segments on tergites 2 to 4. Legs fuscous, knees of front and middle legs, anterior side of front tibiae and front and middle tarsi yellow. Antennae fuscous, flagellum brownish beneath. Tegulae subhyaline, yellow at base. Wings moderately dusky, nervures testaceous, margins of stigma dilute fuscous and subcosta fuscous.

Head much broader than long (transversely oval); cheeks strongly receding, less than half as wide as eyes. Lateral ocelli more than their distance apart by one-fourth from nearest eye and half their distance apart from ill-defined occipital margin. Facial foveae linear, slightly arcuate, close to margin of eyes and reaching from upper level of antennal sockets about three-fourths of distance to level of anterior ocellus. Face gently and almost evenly convex from vertex to clypeal margin. Antennae inserted distinctly below middle of eyes, with antennal sockets about twice their distance apart from margin of nearest eye. Disk of clypeus nearly twice as broad as high, with lateral extensions very broad, inflexed, partly visible in frontal aspect, and acutely produced on each side of labrum. Mandibles simple, tapering, acute and reaching far margin of labrum. Proboscis unusually short, galeae about one-third as long as stipites. Pterostigma about three times longer than wide and as wide as first submarginal cell; marginal cell as long as stigma, equally long beneath and beyond it, with metacarpus distinctly longer than apical truncation; second submarginal cell narrowed about two-thirds above. Head and thorax moderately dull, with minute tessellation on frons, vertex, notum of thorax and propodeum, with sides of thorax and face below level of antennae weakly tessellate and shining. Punctures on parocular areas of face minute but distinct, and those on disk of clypeus large, but shallow and less distinct; punctures of frons and mesonotum excessively minute and obscure,

numerous on frons, absent on vertex and sparse on mesonotum. Pubescence whitish, moderately fine and erect; short and abundant on face, but not at all concealing surface, short and thin on mesonotum, and longer on vertex, cheeks and sides of thorax. Hair of front coxae rather long and thin, and scopal hair of hind tibiae thin and about as long as greatest width of tibia. Abdomen subdepressed, ovate, widest across third segment; pygidial plate triangular, about twice as long as basal width and acute at apex. Length: 4-5 mm; anterior wing: 2.7-3.1 mm.

Holotype female, 18 miles north of Chilpancingo, 3,100 feet, Guerrero, Mexico, at euphorbiaceous flower, Aug. 7, 1962 (Univ. Kans. Mex. Exped.).

Paratypes.—Guerrero, Mexico: 5 females taken with the type; 1 female, 16 miles north of Chilpancingo, Aug. 4, 1962 (N. Marston).

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

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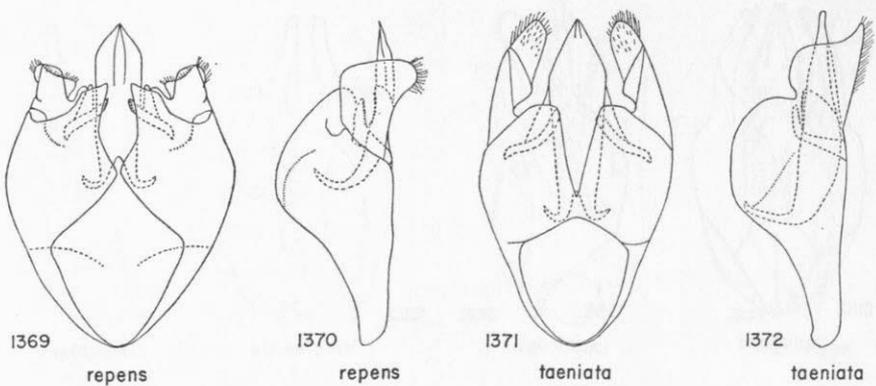
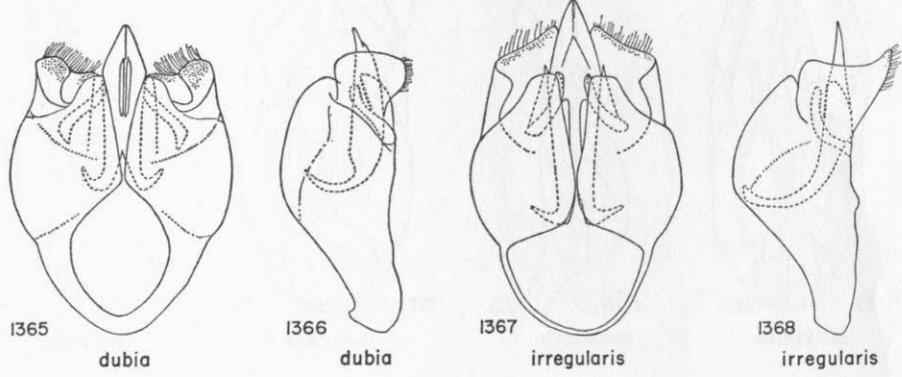
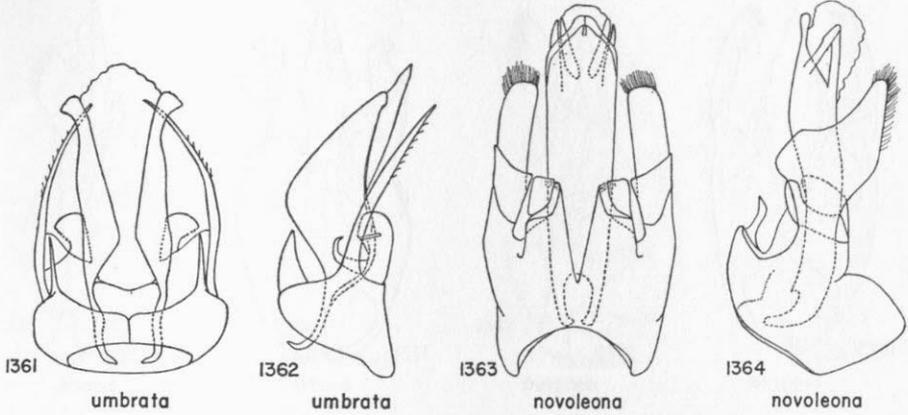
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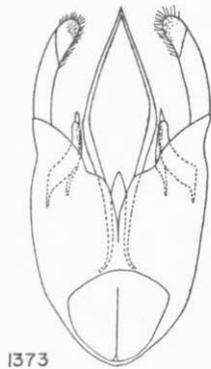
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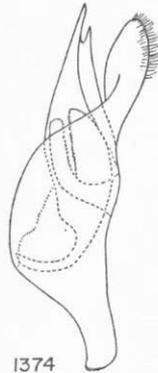
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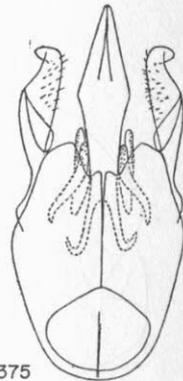
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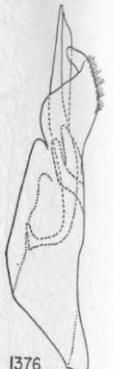
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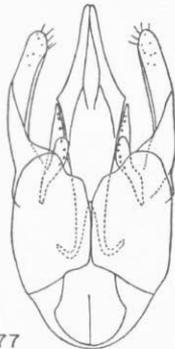
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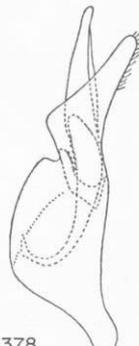
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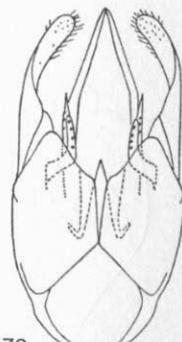
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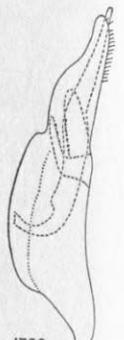
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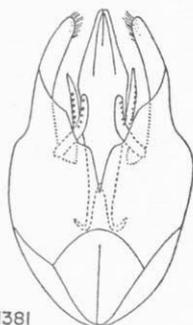
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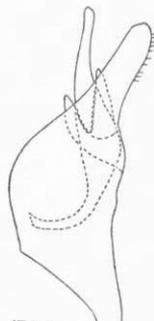
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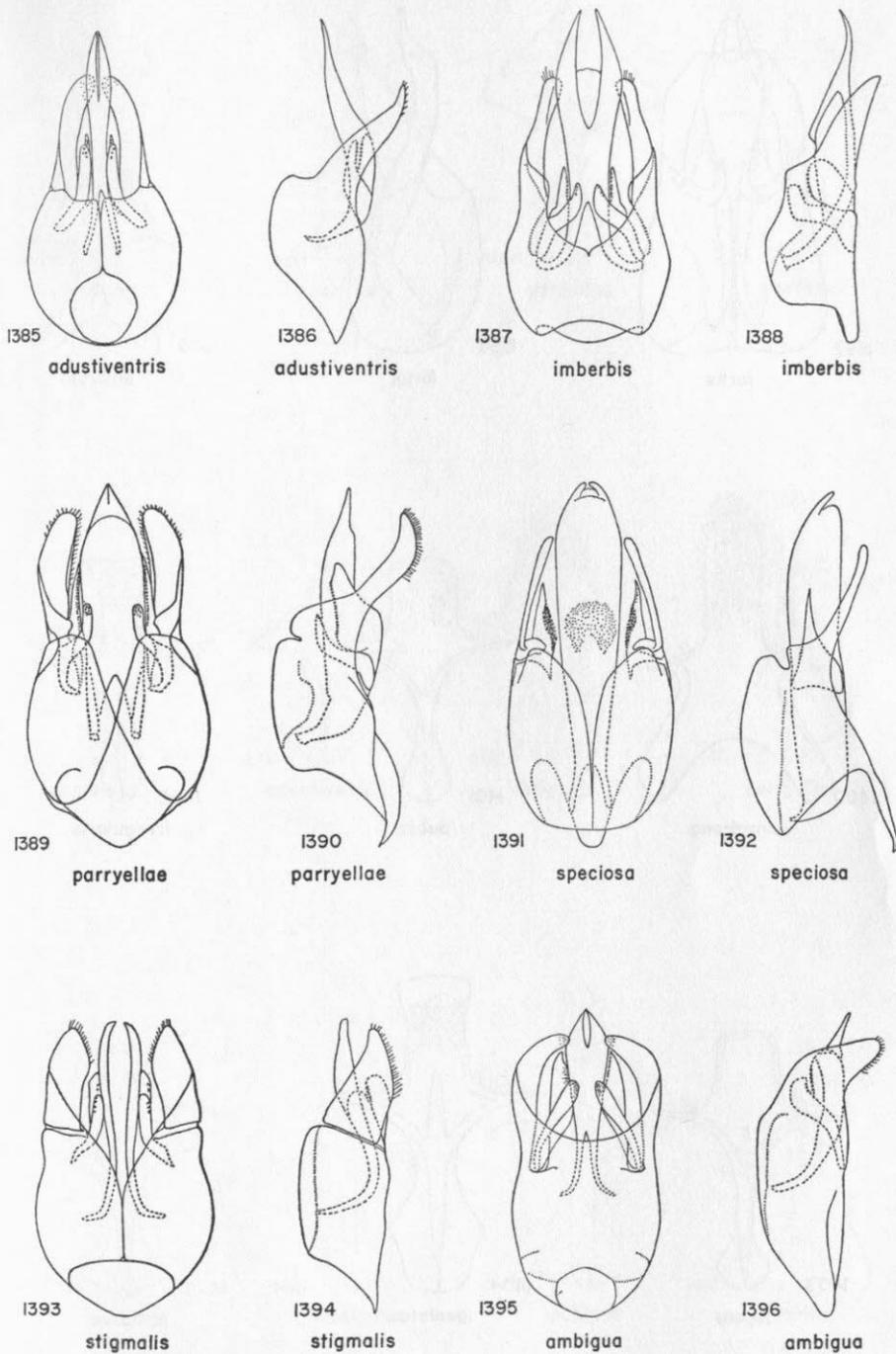
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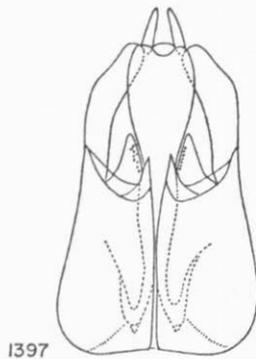
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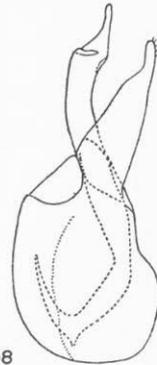
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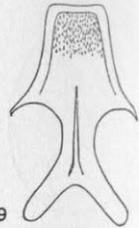
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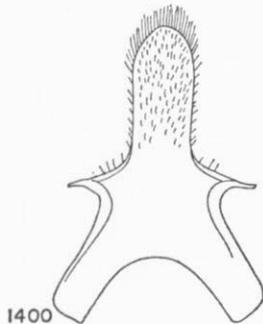
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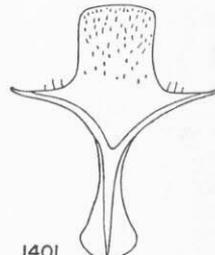
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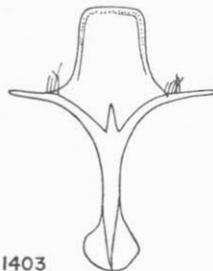
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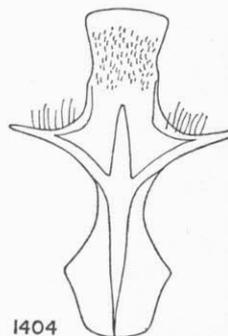
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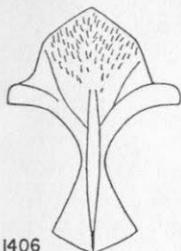
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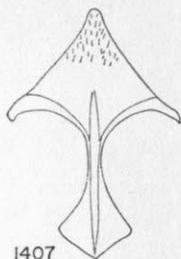
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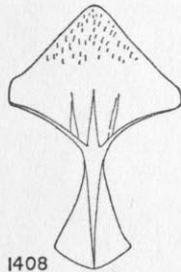
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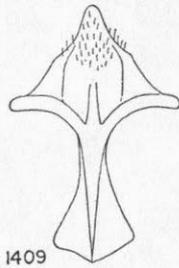
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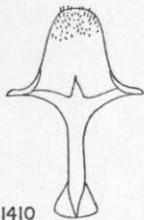
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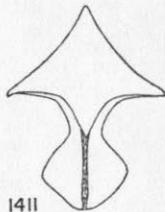
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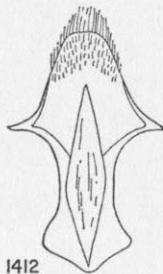
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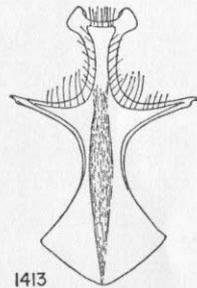
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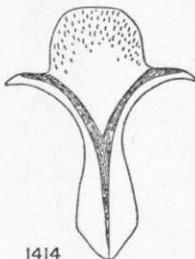
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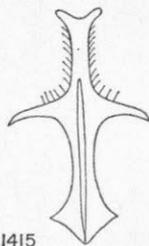
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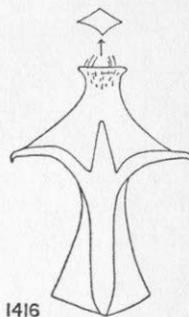
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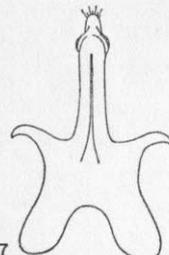
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stigmalis



1416

ambigua



1417

fortis