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NEW RECORDS AND DESCRIPTIONS OF BEES OF THE GENUS *PERDITA* (HYMENOPTERA)

BY P. H. TIMBERLAKE

CITRUS EXPERIMENT STATION, RIVERSIDE, CALIFORNIA

The bees recorded below were received from the Illinois State Natural History Survey, Urbana, Illinois, through the kindness of Dr. T. H. Frison, and from Professor C. P. Gillette, of Fort Collins, Colorado.

1. *Perdita salicis coloradana*, new subspecies.

Perdita salicis Cockerell (*exclamans* group) is a widespread species and has been recorded previously from Las Cruces, New Mexico (type locality); Rifle, Colorado; Phoenix, Arizona; and San Jose de Guaymas, Sonora, Mexico. It also occurs in southern California, where it is differentiated into three well defined races. The new race *coloradana* is based on one female from Delta, Colorado, and apparently should include the specimens recorded by Cockerell from Rifle, Colorado. The male of *coloradana* is not known but I presume that it will be found to differ in no way from typical *salicis*, since the males of the three Californian races show no differentiation whatever.

P. salicis coloradana differs from typical *salicis* as follows: Yellow bands of abdomen restricted, the first tergite being entirely dark, the band on second tergite ending far from lateral margins, and it and the band on following three segments very narrow and basal. In typical *salicis* there is a yellow band on tergites 1 to 5, reaching to lateral margins on all segments, rather narrow, subapical and continued along lateral margins to the base on 1, and broad and basal on following segments. The apical margin of tergite 5 and the whole of 6 are orange brown in *salicis*, but in *coloradana* these parts are pale brown and preceded on 5 by a brownish piceous band. The piceous color predominates on the tergum of abdomen in *coloradana*, while in *salicis* the yellow predominates. The venter is yellow in both forms. Head distinctly more bluish than thorax (only slightly so in *salicis*), the yellow lateral face marks extending along orbits to summit of foveæ (to about the middle of foveæ in *salicis*), the dog-ear plates yellow only on dorsal half so that the dark color of frons descends broadly to clypeus (prac-

tically as in *salicis*). Pleura of thorax entirely dark (in *salicis* there is a small yellow spot on sides of propodeum directly over the hind coxæ). Lateral margins of mesoscutum narrowly yellow (in *salicis* the yellow is restricted to the marginal bead and declivous part beyond, the disk proper showing no yellow). Wings somewhat milky hyaline with pale brownish yellow veins, the subcosta and margins of stigma slightly darker (in *salicis* the wings are less distinctly milky and with slightly darker veins). Antennæ and legs practically as in typical *salicis* except that the front femora are somewhat brownish beneath. Length about 4.5 mm.

Described from 1 female (holotype), collected May 27, 1900, at Delta, Colorado.

Type in the collection of the State Agricultural College, Fort Collins, Colorado.

2. *Perdita laticincta* Swenk and Cockerell.

1 ♀, 1 ♂, "E. Colo., 7-99," and 1 ♀, Ft. Collins, Colorado.

This and the next four species are included in the *octomaculata* group.

3. *Perdita luteiceps* Cockerell.

1 ♂, "Colo. 1414," apparently collected by Baker. In the collection of Illinois State Natural History Survey.

On August 11, 1928, I spent a few hours at the Academy of Natural Sciences of Philadelphia examining types of *Perdita*. Among other things I noticed that *Perdita zebrata* Cresson, as represented by the type series, is a composite species. *P. zebrata* was described from seven specimens from Colorado. Three of these (including the lectotype) are *zebrata* as recognized by authors, and the other four can be hardly anything else but the previously unknown female of *P. luteiceps* Cockerell. These differ at once from *zebrata* in having the frons and mesonotum rather dull and in the presence of more or less yellow on the frons. In Cockerell's table (Proc. Acad. Sci. Philadelphia, 1896) it would run near the male of *P. gutierreziae* Cockerell. The amount of yellow on the frons is very variable. At its greatest development the yellow extends across the lower third of the frons, narrowly ascending on orbits between foveæ and eyes to about the summit of the foveæ, but reaching on their inner

side only to their base. From this point on each side of the frons the line of demarkation slopes obliquely upward toward the median line, where there is a very deep, narrow triangular extension of the yellow almost to the median ocellus, but the line is more or less irregular and jagged especially toward the sides. Sometimes, or perhaps usually, the yellow is interrupted on each side by an oblique dark mark extending from the antennal socket to fovea. In the darker specimens the frons is entirely dark, except sometimes a very small yellow dot in the middle and the dark color descends on each side of face to include the dog-ear plates. Dark parts of the head and thorax dark brassy green with the propodeum bluish. Prothorax mainly yellow with a transverse dark band from one pleuron to the other. Thorax otherwise entirely dark. Abdomen yellow with a narrow brown or piceous band at apex of tergites 1 to 4, and a round dark spot on each side at base of tergites 3 to 5. The dark lateral foveae of tergite 2 isolated, as they extend from the base only to the middle of the segment. Legs yellow, with the hind tibiae, excepting the basal third, and hind tarsi above infuscated. Frons and mesonotum densely finely tessellate and rather dull in most aspects, the propodeum more shining.

4. *Perdita opacifrons*, new species.

1 ♂ (holotype), Antonito, Colorado, August 5, 1899.

This runs near *Perdita pectidis* Cockerell and *P. cladothricis* Cockerell in Cockerell's table (1896), but strictly it would run out in the preceding couplet (26) as the abdominal marks appear to be yellowish (discolored by cyanide in type). It differs from *P. pectidis* in somewhat larger size, broader head, very dull and opaque frons and vertex, entirely dark flagellum, larger second submarginal cell, etc. From *P. cladothricis* it differs in having the whitish color of face not extending above lower level of antennal sockets except very slightly at sides, the flagellum entirely dark, the pleura without a white spot, the venter dark, the second submarginal cell very broad below and narrowed about two-thirds above, etc.

MALE: General form ordinary. Head not enlarged, distinctly broader than long and well rounded on sides and above. Cheeks narrow and simple.

Eyes rather less than twice as long as wide and with the inner orbits parallel. Face below antennæ moderately and evenly convex. Clypeus projecting for about one-half its length in front of ocular line; its disk somewhat wider than long, with the truncation at summit between dog-ear plates moderately broad; the lateral extensions short and broad, strongly inflexed and only partially visible in frontal view of head. Dog-ear plates about twice as high as broad and pointed below. Lateral plates of face a little widened at lower ends and opposite middle of dog-ear plates each covering slightly less than one-fourth the total width of face. Prominence between antennæ rather low, tectiform and with the carina extending onto frons and continued above as a smooth shining line which reaches to anterior ocellus. Mandibles rather short, gently curved, tapering and acute at apex, and reaching distinctly less than to far margin of labrum. Antennæ with the scape about twice as long as thick and the middle joints of flagellum as long as thick. Abdomen oval, convex above, about twice as long as wide, and with the apex somewhat recurved toward venter. Seventh tergite evenly narrowed to acute apex. Membrane of wings provided with very fine, short, and moderately dense setæ in apical field, but having the venational area nearly bare. Stigma narrowly lanceolate, about as long as the first submarginal cell and emitting the radius slightly beyond the middle. Marginal cell nearly as long as stigma, with the apical truncation rather strongly oblique and with the sub-stigmatal and poststigmatal parts about equal. Second submarginal cell very broad below, narrowed about two-thirds above and receiving the recurrent veins at a considerable and equal distance from base and apex. Discoidal and second recurrent veins very faint. Claws moderately large, strongly curved, and rather deeply cleft with the inner tooth a little shorter than the outer.

Face below antennæ smooth, shining and with very sparse, fine, shallow punctures. Frons and vertex very minutely granular tessellate, impunctate and opaque. Cheeks and thorax finely and rather delicately tessellate and shining, the cheeks and pleura with indistinct minute punctures, the mesoscutum with similar very sparse punctures. Metanotum and disk of propodeum somewhat duller than rest of thorax, the middle of the latter toward base having a coarser and distinctly roughened sculpture. Abdomen microscopically lineolate and shining, except in a subapical band on first three tergites where the lineolations are very dense and the surface duller. Pubescence fine and whitish, rather dense and moderately long on cheeks, front coxæ and sternum. Mesopleura nearly bare but the pubescence probably denuded. Mesoscutum with fine short hairs anteriorly and apparently nude on the disk (the specimen is pinned through the mesoscutum). Face below antennæ with sparse, short, inconspicuous hair but with a small patch of fine short hair on outer side of each antennal socket. Frons otherwise entirely nude. Vertex with a few short hairs behind the ocellar region.

Head and thorax very dark greenish blue. Mandibles, except reddish tips, labrum and entire face below level of antennæ creamy white or pale yellow-

ish (discolored in type), with the dorsal margin of the pale color transverse and almost straight, except that there is a very short angular projection upward on each side at the orbits. Cheeks entirely dark. Tubercles pale yellow or whitish, the thorax otherwise entirely dark. Abdomen piceous above and beneath with the apex of seventh tergite testaceous. Tergites 1 to 5 with pale markings, somewhat reddened by cyanide in type, but probably pale yellow or creamy white in life. Tergite 1 with two oval transverse spots, narrowly separated medially, well separated from lateral margins, and placed a little beyond the middle and not subapical as usual in other species of *Perdita*. Tergite 2 with two transverse basal spots, moderately well separated medially and about as far distant at outer ends from lateral margins as their distance apart. Tergite 3 with a transverse mark on each side at base, more nubilous than on 2, more widely separated medially, oblique at sides and reaching to lateral margins. Tergite 4 and 5 with traces of a small pale spot on the lateral margins. Labio-maxillary structure piceous. Antennæ piceous, with the scape broadly whitish beneath, but with the pedicel and flagellum entirely dark, except that the first two joints of the flagellum are slightly yellowish beneath. Tegulæ hyaline with a pale yellow or creamy base. Wings hyaline, faintly tinted with fuscous, with the margins of stigma and veins, except the obsolete discoidal and second recurrent veins, fuscous, the stigma otherwise pallid.

Type in the collection of the State Agricultural College, Fort Collins, Colorado.

5. *Perdita swenki* Crawford.

1 ♀, Chicago, Illinois (Shelford). From the Urbana collection.

This differs from typical *P. swenki* in having small lunate yellow marks below antennal sockets on the dog-ear plates, and in having the abdominal bands not interrupted medially except on tergites 1 and 2.

6. *Perdita lasiogastra*, new species.

1 ♂ (holotype), Katherine, Texas, Dec. 3, 1911, in sand hills on undetermined flower.

This runs in Cockerell's table (1896) to *Perdita sphaeralcea*, var. *alticola* Cockerell (couplet 32) but is more robust, with head not much wider than long, the yellow of face extending above antennal sockets in median line, the mesonotum dull and strongly tessellate, etc. From *P. hirsuta* Cockerell it differs in having

the head less rounded and somewhat wider than long, the frons and mesonotum moderately hairy, the yellow bands on abdomen not reaching to lateral margins except on first segment, etc. It is closely allied to *P. nebrascensis* Swenk and Cockerell, and *P. swenki* Crawford, differing from the former in having sparser and longer hair on the mesonotum, the first joint of labial palpi very much shorter (hardly one and one-half times longer than following joints instead of about three times), the head and thorax very dark green, inclining to bluish green, instead of brassy green, etc. From *P. swenki* it differs in having the dark color of frons descending at an angle to the antennal sockets, the yellow bands of abdomen much wider, with a strong tendency to become wider at middle instead of at sides, the abdomen sparsely but distinctly hairy above except on first two segments, the first joint of labial palpi shorter, the third discoidal cell more distinct, etc.

MALE: General form a little more robust than usual, or about as in other species of the *octomaculata* group. Head a little wider than long, considerably wider than thorax, gently rounded at the sides and more transverse above. Cheeks broad but simple. Eyes about twice as long as wide, with the inner orbits parallel and slightly and broadly emarginate above the middle. Mandibles moderately curved, tapering, rather acute and simple at apex, and reaching approximately to far margin of labrum. Clypeus projecting a little in front of ocular line and somewhat convex; the disk hardly wider than long, subtruncate above between dog-ear plates, with the sides rounded out above the middle and then suddenly diverging much more rapidly at a point opposite the clypeal dots; the lateral extensions consequently very broad at inner ends, gradually narrowing outward and abruptly narrowed to a slender point close to base of mandibles; their anterior margin broadly reflexed, but their surface nevertheless visible to a large extent in frontal view of head. Dog-ear plates about one-half longer than wide and pointed below. Supraclypeal plate as long, when measured to anterior margin of antennal sockets, as wide. Lateral plates of face considerably widened below, and opposite middle of dog-ear plates each covering slightly less than one-third the total width of face. Antennæ ordinary, with the joints of flagellum about as long as thick. Prominence between antennæ broad and very low. Frons with an obscure median smooth line extending its whole length, and the vertex with a similar but more distinct median line. Abdomen rather narrowly ovate, about twice as long as wide, convex, and with the apex only slightly reflexed toward venter. Seventh tergite broad at base and with a rather narrow produced apex which is obtuse at end.

Membrane of wings densely covered all over with very fine, short setæ. Stigma narrowly lanceolate, a little shorter than first submarginal cell and emitting radius a little beyond the middle. Marginal cell somewhat shorter than stigma, with the apical truncation rather oblique and with the sub-stigmatal and poststigmatal parts about equal. Second submarginal cell narrowed nearly two-thirds above. Recurrent veins exactly interstitial with the intercubiti, the second recurrent and subdiscoidal veins distinct although thinner than the other veins.

Frons, vertex and mesonotum strongly tessellate and dull, yet somewhat shining in some aspects. Cheeks, pleura and propodeum not quite as dull as mesonotum, yet strongly tessellate. Face below antennæ smooth, but the tessellation of frons descends on lateral plates to a point a little below the antennal sockets. Punctures of cheeks, pleura and mesonotum numerous but well separated and very fine and obscure, those of frons very obscure. Clypeus and sides of face with sparse, fine, shallow punctures. Abdomen shining and with the usual microscopic sculpture. Pubescence fine, whitish, moderately dense and long on cheeks and pleura, and somewhat shorter and thinner on mesonotum and frons. Face below antennæ with short sparse hairs. Abdomen above with short subappressed hair except on the first two segments, that on third segment thin, and on following segments becoming denser and longer toward apex, that on the last two segments having the usual length and density. Hair of legs rather dense and that on hind tibiae and tarsi long.

Head and thorax very dark bluish green, the pleura and propodeum slightly bluer. Mandibles except reddish apices, labrum, mark on cheeks, and face below antennæ light lemon yellow, the pale color extending above antennal sockets at sides and in median line. At the sides the yellow extends obliquely from the sockets to foveæ and encloses about one-half of the latter, but the line of demarkation very uneven. At the middle of frons the yellow forms a short spearhead-shaped mark, much broader than high and reaches just to level of foveæ. Dog-ear plates each with a small black spot at lower end. Mark on cheeks broad next to mandibles and extending rather narrowly along orbits to middle of eyes. Entire margin of prothorax and tubercles yellow, except a brief interruption at middle of hind margin of pronotum, and a subhyaline dark streak extending from the dark area on each pleuron to the tubercle. Abdomen yellow beneath and brownish piceous above with seventh tergite yellowish brown. Tergites 1 to 6 with a broad yellow band. Band on 1 subapical, narrow at outer ends where it joins the yellow of venter, narrowly interrupted medially, and each half with a large, oval, inner expansion, truncate at end. Bands on following segments basal, that on 2 broad and even and not quite reaching to lateral margins. Those on following segments successively somewhat narrower, narrowed toward the sides but not at all oblique, and ending considerably farther from lateral margins than that on 2. That on 3 about as wide at middle as that on 2. Narrow, depressed apical margin of tergites 2 to 6 pale brownish yellow,

with the intervening piceous band on 2 and the middle of that on 3 hardly wider than the depressed margin. Legs yellow, but a large blotch on front and middle femora behind, a blotch on front tibiæ behind on apical half, middle and hind coxæ except apex, hind femora except base, apex, and stripe on dorsal margin, and hind tibiæ except base and under side, dark brown, and the hind tarsi somewhat paler brown. Maxillæ and palpi piceous, but the labium and glossa yellowish. Scape entirely yellow, the pedicel and flagellum piceous above and rather broadly dull yellow beneath. Tegulæ hyaline, with a yellow spot at base. Wings slightly milky hyaline, faintly tinted with fuscous; the veins moderately dark brown, with subcosta, margins of stigma and veins of marginal cell a little darker, the stigma centrally pallid.

Length about 5.0 mm.

Type in collection of the Illinois State Natural History Survey, Urbana, Illinois.

7. *Perdita sexmaculata* Cockerell.

1 ♂, Mission, Texas, Dec. 5, 1910. In collection of Illinois State Natural History Survey.

This agrees well with the description of the male given by Cockerell and Porter, 1899, and shows much similarity to a female received from Dr. Cockerell, but I note some differences. Front and middle femora entirely black behind except at apex, and hind femora black except narrowly at apex and a rather broad yellow stripe beneath. Dot at apex of scape above, dorsal side of pedicel and a mark at base of funicle joints 2 to 4 above, pale brownish fuscous. Yellow on frons extending obliquely from dorsal edge of antennal sockets to middle of foveæ, the yellow notched by the foveæ and extending linearly between orbits and foveæ to the middle of the latter. Abdomen deep black, with a creamy white spot on each side of tergites 2 to 5, triangular on 2, oval on the others, and decreasing in size on successive segments, the last pair being very small. Frons strongly but finely tessellate and rather dull, with scattered fine punctures. Mesonotum shining but with a distinct, although delicate, tessellation, and sparsely and very finely punctured. Abdomen oval, convex above and beneath, with only the last segment recurved toward venter. Seventh tergite narrowed from base to a shortly produced, moderately narrow and truncate apex. Maxillary palpi four-jointed.

This species I place in a group by itself, although it is closely allied to the *octomaculata* group. It is the type of the subgenus *Tetraperdita* Cockerell and Porter.

8. *Perdita gerhardi arenicola*, new subspecies.

13 ♀, 12 ♂ (holotype ♀, allotype and paratypes), sand pit, Meredosia, Illinois, Aug. 19, 1913, and Aug. 20, 1917.

1 ♀ (paratype) Devil's neck, Topeka, Illinois, Aug. 17, 1907.

1 ♀, 3 ♂ (paratypes), bluff sand, Arenzville, Illinois, Aug. 14, 1913.

1 ♂ (paratype), Devil's hole, Havana, Illinois, Aug. 18, 1912.

FEMALE: Differs from typical *Perdita gerhardi* Viereck, from East Chicago, Indiana, in having the head, thorax and legs maculated as follows: Dark green spots on the frons enlarged, contiguous to the black fovea on each side, extending somewhat obliquely to the lateral ocelli but not uniting in median line, so that there is a median yellow vitta extending from the pale color of face to the median ocellus. Ocelli enclosed by a dark green transverse band, more or less jagged and irregular, coalescing anteriorly between median and each lateral ocellus with the dark frontal spots, and extending laterally to the eye margins. Yellow of frons extending upward between foveæ and eyes, expanding above the foveæ on each side and sending a small pointed projection obliquely to the outer margin of the lateral ocelli. In front of each lateral ocellus there is usually a yellow dot enclosed in the dark area. Occiput with a dark green band above level of neck, extending more narrowly and more or less distinctly laterad on to the cheeks to the posterior eye margin. The yellow interval on the vertex behind ocelli in typical *arenicola* broken on each side by an oblique connection between the dark band of vertex and that of occiput. Prothorax with an oblique blackish line on each pleuron, extending somewhat on to the tubercle. Mesoscutum with an elongate cuneate dark green vitta on each side, pointed behind where it touches the axillæ on each side of the base of scutellum, and rounded at anterior end where it does not quite reach to the anterior margin of sclerite. Inner margin of cuneate marks nearly straight, parallel and widely separated, and exteriorly the marks are separated from lateral margins of scutum by a yellow interval, narrow posteriorly but widened in front of tegulæ. Suture between pro- and mesonotum darkened, with the dark line becoming more or less expanded medially on the scutum. Sutures between the scutum, scutellum and metanotum also more or less darkened. Legs with a more or less distinct brown blotch posteriorly on front and middle femora and tibiæ and hind femora, besides the usual markings of typical *gerhardi* on the hind tibiæ and tarsi. Brown band on hind margin of tergites 1 to 4 darker and wider than in typical *gerhardi*.

Length about 5.0–5.5 mm.

MALE: The dark green dots on frons of typical *gerhardi* enlarged and extending obliquely upward and inward to each side of median ocellus. Lateral ocelli enclosed by a transverse dark green band, which at most reaches about two-thirds of the distance from ocelli to the eye margin, and just touches but does not enclose the median ocellus. Sometimes the ocellar band and frontal spots are joined by a slender dark isthmus between each lateral ocellus and the median ocellus. In some specimens the frontal spots are much smaller and the ocellar band does not extend laterally beyond the ocelli. Occiput with a dark blotch above the neck, but the dark area does not extend outward on to the cheeks. Prothorax immaculate. Mesoscutum as in the female, except that the suture between it and prothorax is not darkened. Thorax otherwise as in the female, except that in some specimens (five out of sixteen) a basal band on scutellum expanding at sides, a transverse band on metanotum leaving apical half of that sclerite yellow, and an oval spot on each side of disk of propodeum at lateral margins, are dark green. Legs as in the female. Abdomen with a narrow brown apical band on tergites 1 to 5, generally more distinct than in the female of typical *gerhardi*.

Length about 4.0–4.5 mm.

Types in the collection of the Illinois State Natural History Survey, Urbana, Illinois.

The males of *arenicola* seem to be less variable than the females as only one specimen has the cuneate vittæ of mesoscutum only partially developed. In case of the females three specimens from Meredosia and one from Arenzville are almost typical *gerhardi*, but have the frontal spots more or less joined to the black foveæ and the cuneate marks of mesoscutum are indicated by a very faint brownish suffusion. Six other females from Meredosia have the cuneate marks more distinctly indicated, yet more or less nubilous and broken, and brown instead of dark green.

Although the males on the whole are more constant than the females, nevertheless one male from Havana, Illinois, taken with a typical male of *arenicola* is very different and practically has the coloration of *Perdita monardæ* Viereck. Having examined specimens of *monardæ* at Washington and Philadelphia I can affirm positively that it is identical in structure with *gerhardi* and evidently only an eastern race which should be cited as *P. gerhardi monardæ*. The Havana specimen of *monardæ* is

evidently only an extreme individual variation of *arenicola*, but in New Jersey *monardæ* has become a well stabilized race.

I would place *P. gerhardi* and its subspecies *arenicola* and *monardæ* in a group by themselves, and I know of no other species very closely allied, although in a general way *gerhardi* is allied to the *octomaculata* group.

9. *Perdita maculipennis* Graenicher, and var. *bilineata*, new variety.

32 ♀, 20 ♂, on willow, Oregon, Illinois, June 21, 1917.

2 ♀, Savanna, Illinois, July 26, 1892 (one bears four *Asclepias* pollen-masses attached to legs).

1 ♀, on bluff, Wittenberg, Missouri, July 12, 1909.

This species is variable in the extent of the yellow markings and it is possible, when material is known from intervening regions, that it may prove to intergrade with *Perdita maculigera* Cockerell from New Mexico, and the new variety *bilineata* is in fact a distinct lead toward *maculigera*.

The females from Oregon, Illinois, agree closely with Graenicher's description but usually have the pronotum dark without yellow spots. In one specimen there is a slight trace of two yellow longitudinal lines on mesoscutum. The males from the same locality also agree with the original description, but many of them have an additional small yellow spot on mesopleura just behind the tubercles and the yellow band across the anterior part of mesosternum often extends on to the pleuron on each side. The mesonotum is either entirely dark or the lateral margins of the scutum may show a small yellow spot anteriorly, and more rarely there may be two thin yellow longitudinal lines on disk of scutum and a similar yellow line on lateral margins.

The female from Wittenberg, Missouri (holotype of variety *bilineata*), has two large yellow spots on hind margin of pronotum and two distinct discal longitudinal yellow lines on the mesoscutum. These lines reach almost to the anterior margin and are triangularly and transversely enlarged on the posterior margin of scutum. The yellow bands on the abdomen in this specimen are larger than in typical *maculipennis*, being narrowly interrupted in the middle and becoming oblique at sides and

reaching almost or quite to lateral margins on tergites 2 to 4. The two specimens from Savanna, Illinois (paratypes of *bilineata*), agree closely with the Wittenberg specimen, except that the two lines on the mesoscutum are less distinct.

The variety *bilineata* indicated in some of the specimens from Oregon, Illinois, seem somewhat better stabilized at Savanna and still more so at Wittenberg, Missouri. It is possible that *bilineata* should rank as a race at Wittenberg, but of this it is impossible to affirm one way or the other on the basis of a single specimen.

Types of *bilineata* are in the collection of the State Natural History Survey, Urbana, Illinois.

Perdita maculigera Cockerell and *P. maculipennis* Graenicher form a small group of *Perdita* that is distinct in many ways, but coming nearest to the *perpallida* group in the great *octomaculata* complex of groups.

10. *Perdita maura* Cockerell.

1 ♀, Urbana, Illinois, July 16, 1892; 1 ♀, Algonquin, Illinois, Sept. 10, 1896; 1 ♀, Carlinville, Illinois.

P. maura forms another group of the *octomaculata* complex. On account of the peculiar palpi Robertson has placed it in a genus by itself under the name of *Zaperdita*, which I at present regard as only of subgeneric importance. The maxillary palpi are very short and composed of only two joints.

11. *Perdita mentzeliae* Cockerell.

1 ♂, Santa Fe, New Mexico, August, on *Mentzelia* (Cockerell) in the collection of the State Natural History Survey, Urbana, Ill.

1 ♂, Antonito, Colorado, Aug. 5, 1899, in the collection of the State Agricultural College, Fort Collins, Colorado.

P. mentzeliae may be considered the type of a small group of the *octomaculata* complex.

12. *Perdita eriogoni* Cockerell.

1 ♂, Westlake, Colorado, July 8, 1900, and 1 ♂, Livermore, Colorado, July 15, 1900, in the collection of the State Agricultural College, Fort Collins, Colorado.

P. eriogoni is a member of the *californica* group which reaches its greatest development on the Pacific coast. The *californica* group also belongs to the *octomaculata* complex.

13. *Perdita stottleri* Cockerell.

1 ♂, Fort Collins, Colorado, Aug. 25, 1900, in collection of the State Agricultural College.

This and the following species belong to the *zebrata* group.

14. *Perdita fraterna*, new species.

1 ♂ (holotype), "Colo. 1414" and 1 ♂ (paratype), "Colo. 1742," with head missing. These specimens were apparently collected by C. F. Baker.

This species is nearly identical with *Perdita stottleri* Cockerell in external characters but is quite distinct in the genitalia. The coloration and markings are nearly alike but I notice the following differences, although the markings may be subject to some variation in both species. The lateral marks of the frons in *fraterna* extend from the middle, or below the middle, of the outer margin of antennal sockets to a point on orbits just below the foveæ. In *stottleri* they extend from the dorsal end of sockets to a point on orbits level with middle of foveæ, and consequently they are longer, broader and form a much less acute angle with the orbits than in *fraterna*. In *fraterna* the first tergite is either entirely piceous or shows only a trace of a subapical yellow band. In *stottleri* the yellow subapical band is rather broad, narrowly interrupted medially and reaches to lateral margins. There is also a dark band at juncture of tergites 5 and 6 in *fraterna*, which is absent in *stottleri*. In *fraterna* the front femora and tibiæ and middle tibiæ have a more or less distinct brown blotch behind, while in *stottleri* the legs are entirely yellow except on the hind tibiæ above toward apex. The wing veins and margins of stigma are also distinctly darker brown in *fraterna* than in *stottleri*. In size and sculpture the two species are exactly alike except that the mesonotum is highly polished in *fraterna*, and tessellate and a little duller in *stottleri*.

MALE: Head not enlarged, distinctly wider than long, somewhat wider than thorax and well rounded on sides and above. Cheeks narrow and sim-

ple. Clypeus projecting for about one-half its length in front of ocular line; its disk convex, about one-half wider than high and rather broadly truncate above between dog-ear plates; the lateral extensions short, broad, and broadly reflexed anteriorly so that they are visible only in small part in frontal view of head. Dog-ear plates nearly twice as high as wide and obliquely narrowed to a point below. Supraclypeal plate about one-half broader than high (in *P. stotleri* from Fort Collins it is quadrate, but in *P. stotleri flavida* S. & C. from Nebraska it is nearly as transverse as in *fraterna*). Lateral plates of face somewhat widened below, and each covering somewhat less than one-fourth the total width of face at level of dog-ear plates. Prominence between antennæ short, but strongly tectiform and carinate, and hardly extending on to frons. Frons with a smooth median impressed line, which becomes much more distinctly impressed close to the median ocellus. Mandibles simple, gently curved, tapering to acute apex and reaching almost to far margin of labrum. Abdomen oval, about twice as long as wide and gently recurved toward venter at apex. Seventh tergite gradually narrowing to the broadly rounded apex. Membrane of wings beyond venation provided with sparse, very fine, short setæ. Stigma narrowly lanceolate, a little shorter than first submarginal cell and emitting radius slightly beyond the middle. Marginal cell about as long as, and distinctly wider than the stigma, with the substigmal and poststigmal parts nearly equal, the apical truncation nearly square and about one-half as broad as length of metacarpus. Second submarginal cell narrowed one-half to two-thirds above and receiving the recurrent veins interstitially, or nearly so, with the intercubiti. Subdiscoidal vein and second recurrent, except a short stub, obsolete. Claws rather large, strongly bent and deeply cleft, with the inner tooth somewhat shorter than the outer.

Face below antennæ smooth and shining, the clypeus with sparse fine punctures, and the dog-ear and lateral plates with finer punctures. Frons and vertex densely granular tessellate, rather dull and obscurely punctured. Cheeks shining, finely tessellate and punctured. Mesothorax including the pleura polished and shining, with the puncturation fine and sparse on scutum and rather closer on pleura. Disk of propodeum distinctly tessellate and the metapleura lineato-reticulate. Abdomen with the usual microscopic sculpture. Pubescence white, fine, rather dense and long on cheeks, pleura, metanotum and sides of propodeum, and somewhat shorter and moderately abundant on face, vertex, occiput and mesonotum.

Head and thorax dark green, becoming slightly bluish on propodeum and having a brassy luster on mesothorax. Mandibles, except reddish tips, labrum, entire face below antennæ and marks on cheeks, yellow (reddened by cyanide in types). Yellow of face extending obliquely upward on each side from middle of antennal sockets on outer side to a point on orbits slightly below the foveæ. Mark on cheeks in form of a transverse band next to base of mandibles, produced in a thin line along orbits for a short distance. Tubercles, cuneate marks on each side of hind margin of pro-

notum (uniting with yellow of tubercles in paratype) and anterior margin of prothorax, broadly interrupted on each side, yellow. Thorax otherwise dark. Abdomen yellow, banded above with piceous. First tergite entirely dark, but showing a slight trace of a subapical yellow band in paratype. Basal margin of tergite 2, widened at sides, and a band covering contiguous margins of tergites 2-3 to 5-6, piceous. Yellow intervals on tergites 2 and 3 about as wide as the dark bands and a little oblique at sides. Yellow interval on the next two tergites somewhat wider than the dark bands. Dark band at juncture of tergites 5-6 paler than the others, especially in paratype. (In *P. stottleri* there are four dark bands as in *fraterna*, but the first one is at the juncture of tergites 1-2 and there is none on tergites 5-6. The dark bands also tend to end a considerable distance from lateral margins, especially on the more apical segments, which is not the case in *fraterna*.) Legs yellow, with hind tibiae above infuscated and hind tarsi above slightly darkened. In holotype (and to a less extent in paratype) there is a fuscous blotch on posterior side of front femora and of front and middle tibiae. Maxillae piceous but labium and palpi yellowish. Antennae yellow, with apex of scape, pedicel and flagellum above not very broadly infuscated. Tegulae hyaline, with a yellow spot at base. Wings clear hyaline, the veins and margins of stigma moderately dark brown, with subcosta a little darker, and the stigma otherwise paler.

Length about 5.0 mm.

Holotype in the collection of the Illinois State Natural History Survey, Urbana, Illinois; paratype in the collection of the State Agricultural College, Fort Collins, Colorado.

15. *Perdita pratti* Cockerell.

1 ♀, Katherine, Texas, Dec. 3, 1911, in the collection of the Illinois State Natural History Survey, Urbana, Illinois.

This species belongs to the *ignota* group.