

REPORT ON *PERDITA* IN THE COLLECTION OF THE
CALIFORNIA ACADEMY OF SCIENCES

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Abstract.—In this report of *Perdita* in the collection of the California Academy of Sciences, four new species of the genus are described. These are: *Perdita neffi* from Arizona, *P. biornata* and *P. impar* from Baja California Norte, and *P. nayaritensis* from Nayarit. New records are given for 12 additional species and a key to females of the Sphaeralceae Group known to occur in Baja California is included.

This report on a small collection of *Perdita* from the Academy will supplement a previous paper (Timberlake, 1977) and place the Academy collection in a more satisfactory condition. As two new species here described belong to the Sphaeralceae Group of typical *Perdita*, a key to the females of that group known to occur in Baja California has been prepared for inclusion under the heading of that group.

Perdita F. Smith

Subgenus *Macroteropsis* Ashmead

Perita arcuata Fox

New record.—One female, near Consuelo, 6 miles northwest of El Rosario, Baja California Norte, Mexico, April 18, 1965 (D. Q. Cavagnaro, C. E. and E. S. Ross, and V. L. Vesterby).

Perdita latior Cockerell

New record.—One female, Southwestern Research Station, Cochise Co., Arizona, Sept. 24, 1966 (P. H. Arnaud, Jr.).

Subgenus *Cockerellia* Ashmead

Perdita heliophila Cockerell

New record.—One female, Gran Quivira, Torrance Co., New Mexico, 6,500 ft., Aug. 18, 1967 (H. B. Leech).

Subgenus *Hexaperdita* Timberlake

Perdita bishoppi planorum Timberlake

New record.—Five females, Nebraska National Forest, 2.5 miles west Hakey, Thomas Co., Nebraska, July 16, 1967 (H. B. Leech).

Perdita boltoniae chrysopsina Timberlake

New record.—One female, Fort Bragg, Cumberland Co., North Carolina, Sept. 17–20, 1967 (J. D. Birchim).

Perdita graenicheri Timberlake

New record.—One female, Archbold Biological Station, Highlands Co., Florida, Oct. 12, 1964 (P. H. Arnaud, Jr.).

Subgenus *Pentaperdita* Cockerell & Porter

Perdita neffi, n. sp.

A long series of a *Perdita* collected by J. L. Neff at Silver Bell, Arizona, has been referred to the subgenus *Pentaperdita*. The male runs to couplet 76 (Part II, p. 283, Timberlake, 1956) and has the abdominal markings and structure of tergite 7 similar to *P. mohavensis* Timberlake, but the supra-clypeal marking generally lacking, scape of antennae more broadly white beneath, whitish pubescence of face and mesonotum somewhat thinner and less evident. The basal bands of the abdomen are more interrupted in both sexes in *neffi*.

Female.—Head and thorax dark green, with mesonotum and metanotum black, except on anterior part of scutum. Mandibles, except reddened at apex, clypeus and lateral marks, white. Clypeus with anterior margin of disk and usually two stripes on middle of disk black. Lateral marks transverse, broader toward margin of eyes, with dorsal margin more or less incurved. Thorax entirely dark. Abdomen with white dot far to each side on tergite 2 and with interrupted broad basal band on tergites 3 and 4 more or less joined to small lateral spots. Legs dark except front tibiae white in front on basal half. Tegulae testaceous. Wings hyaline, nervures testaceous, margin of stigma and subcosta brownish.

Head broader than long; cheeks posteriorly about as broad as eyes. Lateral ocelli nearly twice their diameter from occipital margin and somewhat less than their distance apart from margin of eyes. Facial foveae reaching about two-thirds of distance from level of antennal sockets to level of anterior ocellus. Antennae inserted below middle of face, flagellum nearly cylindrical, with middle joints as long as thick. Clypeus much broader than high, well rounded at summit, strongly inflexed on each side in front, with lateral extensions only partly visible in frontal aspect. Mandibles robust, rounded at apex, reaching beyond middle of labrum. Proboscis not much longer than head. Pterostigma about two-thirds as wide as first submarginal

cell; marginal cell slightly longer beyond than beneath stigma, with metacarpus about twice as long as apical truncation. Pygidial plate much longer than wide at base and narrowly obtuse at apex.

Frons and vertex minutely tessellate with fine separated punctures, with face below antennae more shining, with separated punctures on disk of clypeus. Cheeks shining and finely punctured, with impunctate orbital space poorly developed. Mesoscutum shining, with well separated punctures on anterior part, but punctures of scutellum more dense; and those of mesopleura fine and close.

Pubescence whitish, moderately long and dense on cheeks, occiput and sides of thorax, and short and thin on mesonotum.

Length 5–6 mm, anterior wing 4.2–5 mm, width of abdomen 1.5–1.75 mm.

Male.—Head and thorax dark green, but mesonotum black except anteriorly. Mandibles, except reddened at apex, labrum, clypeus and other face marks, white. Lateral marks not extending above level of clypeus and wider toward orbits of eyes. Small subantennal marks, and linear supraclypeal mark or two spots adjacent to summit of clypeus. Abdomen fuscous, with narrow, well interrupted basal band white on tergites 2 to 5, and on some segments subapical lateral marks passing over onto reflexed ventral part of segments. Legs fuscous, with extreme apex of femora, at least on anterior side, and anterior side of front and middle tibiae, together with tarsi, pale yellow; but hind tarsi pale brown. Antennae fuscous, scape narrowly white and flagellum yellowish-brown beneath. Tegulae dark testaceous. Wings subhyaline, nervures dark testaceous, margins of stigma and subcosta fuscous.

Head subquadrate, broader than long and broader than thorax. Face gently convex from side to side below level of antennae. Cheeks moderately receding and wide as eyes. Lateral ocelli their distance apart from margin of eyes and somewhat closer to occipital margin. Facial foveae small, faint and close to margin of eyes. Antennae inserted below middle of face, scape falling considerably short of reaching level of anterior ocellus; flagellum moderately clavate, with middle joints as long as thick. Antennal sockets somewhat closer together than to margin of eyes and not much more than their diameter from summit of clypeus. Supraclypeal area broader than long and subantennal plates hardly longer than wide. Disk of clypeus much broader than high, truncate at summit, with lateral extensions broadly reflexed and visible to anterior end of eyes. Mandibles gently curved and median emargination. Pterostigma about two-thirds as wide as first submarginal cell; marginal cell distinctly longer beyond than beneath stigma, with metacarpus considerably longer than apical truncation.

Frons minutely tessellate, dull, minutely and densely punctured, with vertex similar but impunctate. Cheeks shining, with close, fine punctures

and impunctate orbital space little developed. Mesonotum shining, with close, fine punctures, becoming more separated behind on mesoscutum. Mesopleura also shining and similarly punctured. Base of propodeum minutely tessellate, with posterior face polished and impunctate. Abdomen distinctly shining, faintly lineolate, and weakly punctured on apical segments.

Pubescence white, short and thin on mesoscutum, moderately dense and short on frons, and longer on cheeks and underparts of thorax.

Length 4–5 mm, anterior wing 3.25–4 mm, width of abdomen 1.25–1.75 mm.

Holotype female and allotype male, desert shrub site, Silver Bell Bajada, Pima Co., Arizona (J. L. Neff).

Paratypes.—4 females, 46 males, same locality as types.

The females taken at flowers of *Encelia*, *Argemone* and *Lesquerella*, and the males were taken at following flowers, listed in order of frequency of capture: *Echinocereus*, *Lesquerella*, *Argemone*, *Encelia*, *Sphaeralcea*, *Eschscholtzia* and *Phacelia*.

Types in collection of the California Academy of Sciences, San Francisco (Entomology Type Number 13109), except 1 female and 4 male paratypes at the University of California, Riverside.

Subgenus *Perdita* F. Smith

Otomaculata Group

Perdita gerardiae Crawford

New record.—One female, Archbold Biological Station, Highlands Co., Florida, Oct. 9, 1964 (P. H. Arnaud, Jr.).

Halictoides Group

Perdita halictoides F. Smith, var.

New record.—Four females, Fort Bragg, Cumberland Co., North Carolina, May 15 and May 28–June 3, 1967 (J. D. Birchim).

These specimens are similar to typical *halictoides*, but have the wings slightly more dusky, with the marginal cell shorter and broader so that the apical truncation is slightly longer than metacarpus.

Key to the Sphaeralceae Group known from Baja California

Females

1. Yellow markings of face not going above antennae in median line, and lateral marks not reaching summit of eyes

- Yellow markings of face extending onto frons in median line or reaching summit of eyes, or face entirely yellow 13
- 2. Face without distinct light markings 3
 - Light markings present on face 6
- 3. Entirely dark species 4
 - Light markings present at least on abdomen 5
- 4. Small species with whitish wings; marginal cell longer beneath than beyond stigma, with metacarpus shorter than apical truncation
 - gracilior* Timberlake
 - Wings slightly dusky, marginal cell about equally long beneath and beyond stigma, with metacarpus distinctly longer than apical truncation *perlucens* Timberlake
- 5. Head and thorax entirely dark blue-green, or with tiny lateral face marks, abdomen with enclosed, even white band on tergites 2 to 4, and apex furruginous *vanduzeei* Cockerell
 - Dark blue-green, with clypeus and mesonotum black; abdomen with enclosed yellow band on tergites 2 to 6; stigma unusually large, with dark margins; marginal cell much longer beneath than beyond stigma *stigmalis* Timberlake
- 6. Face with lateral marks only 7
 - Face marks more extensive, or clypeus partly light 8
- 7. Lateral marks pale yellow, ending bluntly at anterior end of foveae; clypeus and supraclypeal area black; abdomen with enclosed yellow band on tergites 1 to 5 *biornata*, n. sp.
 - Lateral marks nearly oblong, hardly wider below than at apex end; dark blue-green, with clypeus and mesonotum black; abdomen fuscous, with yellow band on tergites 1 to 4, tergites 5 and 6 fulvo-testaceous *subglabra* Timberlake
- 8. Lateral marks higher than wide and reaching level of foveae 9
 - Lateral marks broader than high and not reaching to foveae; clypeus with broad dark submedian stripe, with marks in middle and on each side rather small; abdomen mainly yellow, with dark band on first two segments *vittata* Cockerell
- 9. Clypeus partly black 10
 - Clypeus yellow, unmarked, supraclypeal area black except for two small spots; abdomen with first two tergites dark on lateral margins and more broadly across apical margin *flavipes* Timberlake
- 10. Clypeus black, except on each side, or with median T-mark 11
 - Clypeus black, with submedian yellow stripes 12
- 11. Clypeus black except on lateral margins; supraclypeal and subantennal plates dark with four small yellow spots; abdomen with transverse yellow mark on each side of tergites 2 to 4 *sonorensis* Cockerell

- Clypeus dark with median yellow T-mark; yellow bands of abdomen nearly as broad as dark intervals and reaching close to lateral margins; length about 7 mm *eucnides platyglossa* Timberlake
- 12. Lateral marks much higher than wide and intruding between foveae and eyes; clypeus pale yellow with broad submedian stripes; abdomen dark with enclosed yellow band on tergites 2 to 4
obliqua Timberlake
- Lateral marks similar, but narrowed before intruding between foveae and eyes; submedian stripes of clypeus not reaching summit of disk; abdomen dark, tinged with brown, with yellow band on tergite 1 *adustiventris* Timberlake
- 13. Face dark above level of antennae except for lateral and median marks 14
- Face largely or mainly yellow above level of antennae 16
- 14. Abdomen with yellow bands; supraclypeal mark intruding between antennal sockets or extending onto frons 15
- Abdomen fuscous without markings; supraclypeal mark slightly broader than high and rounded above and between antennal sockets; legs yellow, but tibiae and tarsi tinged with brown
ashmeadi Cockerell
- 15. Supraclypeal mark extended briefly onto frons; dorsal part of clypeus with two brown stripes, sometimes suffused together; abdomen with enclosed yellow band on tergites 2 to 4; pronotum yellow with narrow dark cross band; legs yellow except hind tibiae and tarsi
duplicata Timberlake
- Supraclypeal mark extended above antennae to middle of frons; clypeus entirely yellow, and pronotum mostly yellow; abdomen with yellow bands, generally enclosed only on tergites 1 and 2; legs yellow except hind tibiae and tarsi dusky *exclamans* Cockerell
- 16. Pygidial plate depressed, broad at base and narrowed to rounded apex 17
- Pygidial plate slightly convex, much longer than wide, and narrowed with apex acute; mainly yellow, with submedian dark stripes on mesoscutum not reaching anterior margin, and sternum with black mark in front of middle coxae; abdomen with four dark bands
luciae luciae Cockerell
- 17. Yellow species with dark markings black; stripes on mesoscutum if present never joined across anterior margin 18
- Markings dark green, similar to those of *luciae*, but mark on vertex covering ocelli; stripes on mesoscutum confluent across anterior border; sternum dark between front and middle coxae
triangulifera Timberlake
- 18. Mandibles simple; black line on vertex from lateral ocelli to nearest

eye, sometimes absent; mesosternum with anterior dark mark on each side, sometimes enlarged; cheeks narrower than eyes

- Mandibles abruptly narrowed before apex; vertex with black line across ocelli more or less complete; sternum with large black mark; cheeks distinctly broader than eyes

punctosignata Cockerell

genalis genalis Timberlake

Perdita biornata, n. sp.

Similar in the female sex to *P. tortifoliae* Ckll. and *P. fremonti* Timb., but having the lateral face marks large, ending bluntly against the facial foveae and broadening anteriorly.

Female.—Head and thorax dark green, more bluish on propodeum, with clypeus and supraclypeal area black. Lateral face marks subtriangular, ending bluntly at anterior end of foveae and dilated anteriorly, together with tubercles and collar of pronotum yellowish white. Abdomen fuscous, pale yellow beneath, and with enclosed band on tergites 1 to 5 and apical segment pale yellow. Mandibles pale yellow, reddened at apex. Labrum yellowish, proboscis more testaceous. Antennae fuscous, scape yellow beneath, flagellum duller yellow beneath. Legs fuscous, with apex of front femora, front and middle tibiae in front, and their tarsi pale yellow. Tegulae subhyaline, with yellow mark at base. Wings whitish subhyaline, nervures testaceous, but subcosta, margins of stigma and metacarpus fuscous.

Head rotund, slightly broader than long; cheeks very strongly receding, about two-thirds as wide as eyes. Vertex behind ocelli receding without definite occipital margin. Posterior ocelli about their distance apart from nearest eye. Facial foveae well defined, close to margin of eyes, and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face nearly plane almost to level of anterior ocellus, and gently convex from side to side below level of antennae. Clypeus about as broad as high, rounded above, and with lateral extensions visible in frontal aspect. Mandibles tapering, abruptly narrowed before apex and reaching far margin of labrum. Proboscis moderately long. Pterostigma about as long and as wide as first submarginal cell, widest on apical half. Marginal cell somewhat longer beneath than beyond stigma, with metacarpus and apical truncation equal.

Head and thorax shining, with extremely minute tessellation and almost impunctate. Pubescence whitish, very sparse except dense as usual on front coxae and sternum, with only very sparse short, erect hair on anterior part of mesoscutum. Scopal hair very fine and about as long as greatest width of tibia.

Length about 4 mm, anterior wing 3 mm, width of abdomen 1 mm.

Holotype female and paratype, 26 miles south of San Felipe, Baja Cali-

fornia Norte, Mexico, April 15, 1965 (D. Q. Cavagnaro, C. E. and E. S. Ross, and V. L. Vesterby).

The paratype has markings on abdomen reduced to segments 1 to 3, with mark on first segment much abbreviated.

Types in collection of the California Academy of Sciences, San Francisco (Entomology Type Number 12989).

Perdita calloleuca Cockerell

New record.—One male, 3 miles southeast of Tuba City, Coconino Co., Arizona, on *Wislizenia*, Aug. 29, 1967 (J. C. Hall); 3 females, 16.6 miles southeast of Round Rock, Apache Co., Arizona, on *Chrysothamnus*, Aug. 28, 1967 (P. H. Timberlake); 1 female, 13.7 miles north of Chambers, Apache Co., Arizona, on *Chrysothamnus*, Aug. 29, 1967 (P. H. Timberlake).

Perdita genalis genalis Timberlake

New record.—Eight females, 26 miles south of San Felipe, Baja California Norte, Mexico, April 15, 1936 (D. Q. Cavagnaro, C. E. and E. S. Ross, and V. L. Vesterby).

Perdita gracilior Timberlake

This little species was described from 26 miles south of San Felipe, in 1977, and additional material from the same locality, including 3 females, and 9 males (some damaged) are now at hand. It was included in the *Ventralis* Group, but it seems appropriate to include it here.

Perdita impar, n. sp.

This species has face white below level of antennae and broken white markings on first three segments of the abdomen. In the key to the *Sphaerulaceae* Group (Timberlake, 1964) it runs out at couple 207 as the abdominal markings are restricted.

Male.—Head and thorax dark green, propodeum more bluish. Mandibles except red tips, labrum, face below level of antennae (lateral marks extending above antennae), collar and two marks on hind margin of pronotum and tubercles, white. Abdomen black, with narrowly interrupted white band on tergites 1 to 3, markings on tergites 1 and 3 abbreviated and ending far from lateral margins, but those on tergite 2 extending nearly to lateral margins and overlapping and uniting with short subapical mark on each side. Tergite 3 also with small subapical mark on each side. Tergite 7 whitish, but venter dark. Legs fuscous, with extreme apex of all femora, anterior side of front and middle tibiae, base of hind tibiae, and tarsi white, except hind tarsi

more tinged with testaceous, especially at apex. Antennae dark, scape marked with yellowish beneath at base and apex, pedicel dark except apical margin pale, first three joints of flagellum dark ringed with yellowish beneath, last two joints entirely dark, and intermediate joints broadly yellowish beneath. Proboscis testaceous brown. Tegulae pale testaceous, subhyaline, with white spot at base. Wings whitish subhyaline, nervures testaceous, margins of stigma and subcosta brown.

Head as broad as long; cheeks receding, about three-fourths as wide as eyes. Posterior ocelli nearly their distance apart from nearest eye and somewhat closer to occipital margin. Antennae inserted below level of middle of eyes, scape short, flagellum somewhat clavate, with middle joints as long as thick. Face below level of antennae gently convex from side to side, with supraclypeal area broader than high.

Head and thorax shining. Frons and vertex microscopically tessellate, and frons with dense microscopic punctures in broad area above antennae. Face below level of antennae smooth and impunctate. Mesonotum polished, with well separated minute punctures. Mesopleura smooth and finely punctured. Abdomen moderately shining, and obscurely punctured. Pubescence white, but face below level of antennae bare. Frons in broad area above antennae with rather short, very dense fine hair. Hair of cheeks, occiput, and underpart of thorax long and dense, but hair of mesonotum thin, moderately long and erect. Abdomen beyond third segment with erect hair increasing in length and density on tergite 6. Hair of legs fine, that on hind legs longer than greatest width of tibia, and that on hind basitarsi still longer.

Length 5 mm, anterior wing 3.9 mm, width of abdomen 1.5 mm.

Holotype male, 26 miles south of San Felipe, Baja California Norte, Mexico, April 15, 1965 (D. Q. Cavagnaro, C. E. and E. S. Ross, and V. L. Vesterby).

Type in collection of California Academy of Sciences, San Francisco (Entomology Type Number 12990).

Perdita nayaritensis, n. sp.

This small, dark species from Nayarit, Mexico, runs in the key to the Sphaeralceae Group (Timberlake, 1964) to couplet 142. It differs from *incompta* in having mandibles, labrum, clypeus and transverse, lateral marks white and the abdomen uniformly dark.

Male.—Head and thorax very dark green, with meso- and metanotum black, thorax entirely dark. Mandibles except at apex, labrum, clypeus and transverse lateral marks white. Lateral marks twice as broad as high and hardly reaching level of summit of clypeus. Abdomen dark without markings. Legs dark, with tarsi more brownish. Antennae black, flagellum dull yellowish beneath. Tegulae dark testaceous. Wings dusky hyaline, nervures testaceous, margin of stigma and subcosta infuscated.

Head as broad as long, broader than thorax and unusually thick fronto-occipitally. Cheeks retreating, broader than eye, well rounded in outline, and widest near level of summit of eyes. Lateral ocelli about their distance apart from nearest eye and closer to occipital margin. Face slightly convex below level of ocelli. Antennae inserted well below middle of face, and about even with anterior third of eyes. Antennal sockets about their distance apart from margin of eyes. Supraclypeal area much broader than high, with summit of clypeus about as close to antennal sockets as their diameter. Disk of clypeus broader than high, rounded on summit, and strongly inflexed on each side. Mandibles unusually thick at base, slightly tapering before narrowing to acute apex. Proboscis concealed in type. Pterostigma about as long as first submarginal cell, three-fourths as wide, and emitting radius at middle. Marginal cell as long as stigma, about equal beneath and beyond stigma, with apical truncation shorter than metacarpus.

Head and thorax smooth and shining, with fine, obscure and sparse punctation on frons and mesoscutum. Pubescence whitish, very short and fine, that on cheeks short and thin, somewhat longer on sides of thorax, with face and mesonotum bare.

Length 3 mm, anterior wing 2.4 mm, width of abdomen 1 mm.

Holotype male, 24 miles southeast of Tepic, Nayarit, Mexico, August 16, 1960 (P. H. Arnaud, Jr., E. S. Ross, and D. C. Rentz).

Type in collection of the California Academy of Sciences, San Francisco (Entomology Type Number 12992).

Perdita vanduzeei Cockerell

New record.—Two males, 4 females, 26 miles south of San Felipe, Baja California Norte, Mexico, April 15, 1965 (D. Q. Cavagnaro, C. E. and E. S. Ross, and V. L. Vesterby).

Literature Cited

- Timberlake, P. H. 1956. A revisional study of the bees of the genus *Perdita* F. Smith, with special reference to the fauna of the Pacific Coast (Hymenoptera, Apoidea). Part II. University of California Publications in Entomology 11:247-350.
- Timberlake, P. H. 1964. A revisional study of the bees of the genus *Perdita* F. Smith, with special reference to the fauna of the Pacific Coast (Hymenoptera, Apoidea). Part VI. University of California Publications in Entomology 28:125-388.
- Timberlake, P. H. 1977. Descriptions of new species of *Perdita* in the collection of the California Academy of Sciences. Proceedings of the California Academy of Sciences, 41:281-295.

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