

REVISIONAL STUDY OF THE
 PERDITA F. SMITH, WITH SPECIAL REFERENCE
 TO THE FAUNA OF THE PACIFIC COAST
 (Hymenoptera, Apoidea) Part II

BY
 P. H. TIMBERLAKE

THIS is the second in a series of revisional studies of the genus *Perdita*. Part I (Univ. Calif. Publ. Entom., 9:345-432, 1954) includes a key to the recognized subgenera, and *Xerophasma*, *Pseudomacrotera*, *Macrotera*, *Cockerellula*, *Macroteropsis*, *Macroterella*, *Heteroperdita*, *Glossoperdita*, *Hesperoperdita*, *Epimacrotera*, *Cockerellia*, *Procockerellia*, *Pentaperdita*, *Xeromacrotera*, *Callomacrotera*, and *Hexaperdita* are described or redescribed and, except in the last case when more than one species is represented, keys are provided and many of the species treated in some detail.

The present section includes the systematics of the subgenera *Alloperdita*, *Hexaperdita*, *Perditella*, and *Pygoperdita*, together with supplemental information on subgenera treated in Part I.

Subg. *Hexaperdita* Timberlake

Hexaperdita Timberlake, 1954, Univ. Calif. Publ. Entom., 9:348, 416.
Perditella Robertson, 1902, Canad. Ent., 34:321; Robertson, 1922, Psyche, 29:161 (not Cockerell).

This subgenus, characterized in the preceding part, contains about twenty-two species which visit the flowers of Compositae exclusively. Many of the nominal species are closely allied to each other, and some of them are here reduced to subspecies. As more material accumulates this process will probably be applied to more of the presently known species. Genera of Compositae visited by these bees include *Aphanostephus*, *Baileya*, *Chrysopsis*, *Grindelia*, *Heterotheca*, *Boltonia*, *Erigeron*, *Rudbeckia*, *Aster*, *Verbesina*, *Helenium*, *Bebbia*, *Coreopsis*, *Xanthisma*, *Helianthus*, and *Aplopappus* (*Isopappus*, *Prionopsis*, and *Sideranthus*).

KEY TO SPECIES

- | | | |
|--|--|---|
| 1. Females | + <i>labrosa</i> Timb. (Suppl. I, Jal. Mex.) | 2 |
| Males | | 2 |
| 2. Abdomen creamy white, with dark markings | | 4 |
| Abdomen dark (ferruginous or blackish), usually with yellowish or whitish bands | or reddish-yellow as in <i>callicerata</i> | 4 |
| 3. Mesoscutum polished, with sparse punctures and fine erect hair; head much broader than long; clypeus and lateral marks creamy white, the latter with narrow extension along orbits to level of antennae; first two or three tergites of abdomen usually more or less fuscous; mandibles slender, nearly straight except for incurved tips | <i>callicerata</i> Cockerell | + <i>compacta</i> Timb
Ae (Graham) Suppl |
| Mesoscutum dull, with moderately close punctures and short erect whitish hair; head not much broader than long, the clypeus prominent; face marks creamy white, including clypeus, lateral marks and often supraclypeal and sometimes subantennal spots, the lateral marks large and reaching level of foveae; abdomen with apical brown or fuscous bands; mandibles curved and a little dilated on inner margin | <i>xanthismae</i> Cockerell | |
| 4. Large species, 6-7 mm. long; subantennal and supraclypeal marks developed, but disk of clypeus sometimes more or less black; abdomen with broad, entire, yellow or white bands; | | |

+ *alexii* Timb. VII
Tx

- mandibles dilated within5
- More or less smaller species; subantennal and supraclypeal marks little developed and usually absent; abdominal light bands, if present, usually interrupted; mandibles usually not much dilated within7
- 5. Propodeum entirely dark; disk of clypeus black, or with two broad black stripes.....6
Propodeum broadly yellow on each side; face below antennae nearly all yellow, abdomen yellow, with a black apical band on tergites 1 to 5*propodealis* Timberlake
- 6. Clypeus black, with a small yellowish-white spot on each side and a narrow median stripe not reaching anterior margin; subantennal and supraclypeal marks large, the latter entire; abdomen black, with a white band on tergites 1 to 5*SD Co CA**bebbiae*, n. sp.
- Clypeus white with two broad black stripes on disk, these confluent on anterior margin; supraclypeal mark divided into two spots which are slightly larger than the subantennal marks; abdomen yellowish-white, with a very broad blackish band at apex of tergites 1 to 5*Baja**rossi*, n. sp.
- 7. Abdomen ferruginous or orange, without light bands8
Abdomen fuscous or blackish, either with or without light bands, or if more or less brown or orange brown having whitish bands10
- 8. Mesoscutum tessellate and dullish; abdomen ferruginous9
Mesoscutum polished; abdomen orange, with a pale-brown band on tergites 1 and 2; clypeus and lateral marks yellowish, the latter ending acutely above level of antennae; a transverse supraclypeal mark also present; wings whitish hyaline*callicerata* Cockerell
- 9. Wings a little dusky, the nervures and margins of stigma brown; clypeus and lateral marks reaching level of antennae, pale yellow, but upper border of disk of clypeus dark, notched medially by the yellow*cambarella cambarella* Cockerell
- + *mellina CA*
Wings whitish hyaline, the nervures pallid; abdomen sometimes with small, indefinite fuscous markings; face marks similar, but more whitish, the clypeus sometimes with only a small brown spot on each side of summit of disk.....*cambarella platyura* Cockerell
- 10. Lateral marks of face large, triangular, and extending upward along orbits to or above level of antennae11
Lateral marks more or less transverse, not or hardly reaching above level of summit of clypeus, or face sometimes entirely dark20
- 11. Face markings yellow12
Face markings white13
- 12. Larger, about 6-7 mm. long; frons and mesoscutum tessellate but shining, the middle of mesoscutum almost polished; scopal hair of hind tibiae more distinctly plumose than usual; facial foveae linear; clypeus and lateral marks yellow, or the clypeus varying to entirely dark; abdomen with a yellow band, narrowly interrupted in middle, on tergites 1 to 4.....*pratti* Cockerell
- + *infusca Baja*
About 5 mm. long; frons and mesoscutum uniformly tessellate, but shining; scopal hair of hind tibiae not plumose; facial foveae much wider than interval between them and margin of eye; clypeus and triangular lateral marks pale yellow, or the markings reduced to a median spot on clypeus; abdomen with an interrupted yellow band on tergites 2 to 4, or these bands sometimes obsolete*foveata foveata*, n. subsp.
- 13. Yellow or white bands of abdomen, when present, straight and basal14
Tergites 1 to 4 each with a creamy white band, broadly interrupted on tergite 1, less interrupted on other segments, and those on tergites 2 and 3 much broadened at outer ends and obliquely margined behind; lateral face marks ending acutely at level of the foveae, the clypeus with a dark blotch on each side above; frons and mesonotum tessellate and dull*agatha (but see section 21)**blatchleyi* Timberlake
- 14. Abdomen with light bands15
Abdomen entirely dark17
- 15. Mesoscutum strongly tessellate and dullish16
+ *Zarbovintsi Timb*
+ *Az (Cochise) CAS*
Mesoscutum and frons delicately tessellate and shining; head and thorax dark blue-green, the clypeus and lateral marks white; abdomen blackish, varying to orange-brown, with a narrow, interrupted whitish band at base of tergites 2 to 4.....*heterothecae* Cockerell

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+ h. Arizona Timb
Az (Cochise) V
+ agatha Timb.
Tx (Hidalgo) III

16. Small species, with head much broader than long; lateral face marks with a narrow orbital extension to level of antennae, which is often more or less obsolete; basal band on tergites 2 to 4 well interrupted, narrow and yellowish-white, and a short, transverse white line far to each side on tergite 1 more or less broken into spots *foveata persimilis*, n. subsp.
 Larger species, about 5.5 mm. long, the head as long as wide; clypeus and large triangular lateral marks, and sometimes a transverse supraclypeal mark creamy white; tergites 2 to 4 (or 5) each with a broad creamy white band, sometimes notched medially or rarely interrupted (or abdomen white with brown or fuscous bands) *xanthismae* Cockerell
17. Wings whitish hyaline, the nervures pallid; tarsi white 18
 Wings dusky hyaline, the nervures brownish; tarsi dark; mandibles at base, clypeal and large lateral marks creamy white, but clypeus sometimes all dark *georgica* Timberlake IL, NC
18. Head and thorax shining, the mesonotum moderately hairy 19
 Mesoscutum tessellate and more dullish than the frons; mandibles except tips, labrum, clypeus, and large lateral marks creamy white, the clypeus with a small brown spot on each side of the summit *asteris* Cockerell 258
19. Clypeus white, except usual dots; flagellum entirely yellowish beneath. *vespertilio* Cockerell
 Clypeus dark brown, with a cuneiform white mark on each side; flagellum rather narrowly testaceous beneath, except toward base; tubercles tipped with white. *fedorensis* Cockerell
- (10) 20. Abdomen with light bands more or less developed 21
 Abdomen entirely dark 28
- + *nubila* Timb III (1915)
 Fla, Ark
 21. Wings slightly dusky, or if milky hyaline with pallid nervures, the tarsi more or less dark. 22
 Wings milky hyaline, with pallid nervures, or if subcosta and margins of stigma a little brownish, the tarsi white or yellowish-white 26
- + *trinitensis* Timb I (1915)
 C. (Cochl.) CAS
 22. Head at most only a little broader than long; generally duller, more strongly tessellate species 23
 Head more distinctly broader than long; frons rather delicately tessellate and shining, the mesonotum somewhat duller; clypeus, except mark on anterior margin or two broad dark stripes, and transverse lateral marks, white; tergites 2 to 4 each with an interrupted yellowish-white band; wings white, the subcosta and margins of stigma brownish *foveata persimilis*, n. subsp. TX, NM
23. Wings more or less whitened 24
 Wings somewhat dusky hyaline, the nervures more or less dark 25
24. Wings whitish hyaline, the nervures pallid, subcosta and margins of stigma pale brownish; clypeus, except dark mark on each side of summit, and small lateral marks white; tergites 2 and 3 with a rather broad, interrupted, pale-yellow band, and sometimes two transverse spots on tergite 4 and a dot on lateral margins of tergite 1; frons and mesonotum rather strongly tessellate and dull; head slightly broader than long. *graenicheri* Timberlake Fla
- Wings moderately whitened, the nervures testaceous, subcosta and margins of stigma pale brown; clypeus and lateral marks white; abdomen dark, with a more or less evanescent band on tergites 2 and 3; frons and mesonotum with tessellation moderately strong; head usually as long, or nearly as long, as wide. *bishoppi planorum*, n. subsp. Ks, Tex
25. Clypeus and lateral marks white, the latter generally separated from clypeus by a narrow dark interval; abdomen with a narrow, broadly interrupted pale-yellow band on tergites 2 and 3, or commonly entirely dark; legs entirely dark; head varying from about as long as wide (Texas) to somewhat broader than long (Atlantic Coast) *bishoppi bishoppi* Cockerell NC-Fla-Tex
- Somewhat larger than *bishoppi*, with a more transverse head; abdomen with a pale-yellow or whitish band on tergites 2 and 3, and sometimes 4; clypeus and small lateral marks white, or the lateral marks absent; three marks on disk of pronotum and apex of tubercles white; anterior side of front tibiae pale yellow. *boltoniae boltoniae* (Robertson) 21, La, Miss + *b. calens* Timb Mex (Ver) VII
26. Lateral face marks large, involving more or less completely the space between clypeus and eye 27
 Lateral marks small and adjacent to the clypeus; tergites 2 and 3 with a narrow, interrupted creamy white band; frons and mesonotum tessellate and dullish *ignota isopappi* Timberlake e Tx, La

27. Mesonotum strongly tessellate and dullish; tergites 2 to 3, or 4, with an interrupted, creamy white band, or the bands sometimes merely notched medially. ^{Calif., Fla., Tex., Mex.} *ignota crawfordi* Cockerell
 Mesonotum faintly tessellate, or almost polished; frons polished and with minute, sparse punctures; bands of abdomen usually well interrupted ^{V., G., A., Mex.} *ignota ignota* Cockerell
- (20) 28. Head distinctly broader than long; facial foveae more than twice as wide as interval between them and eyes; wings whitish, the subcosta and margins of stigma brownish... 29
 Head not much broader than long; facial foveae at most moderately broadened 30
29. Mesoscutum usually weakly tessellate and shining; face and abdominal marks usually present and pale yellow, but sometimes entirely absent... ^{Fla., Ks., Tx.} *foveata foveata*, n. subsp.
 Mesoscutum more or less strongly tessellate and dullish; face entirely dark, or lateral margins of disk of clypeus whitish, and lateral marks sometimes involving the space between clypeus and eye..... ^{Tx.} *foveata brachycephala*, n. subsp.
30. Pygidial plate broadly rounded or truncate at apex; wings somewhat whitened or moderately dusky; facial foveae but little widened above; length about 4 mm. 31
 Pygidial plate narrowly truncate at apex; facial foveae moderately broadened at upper end and wider than the interval between them and nearest eye; clypeus usually dark, with white streaks or blotches, or the disk white except usual dots; lateral marks small and adjacent to the clypeus; wings dusky hyaline, the nervures dark; length about 5 mm.
^{NJ-Fla.} *boltoniae chrysopsina* Timberlake
31. Wings somewhat dusky, the nervures rather dark; clypeus white except usual dots, or with two dark stripes or a blotch on upper part of disk; lateral marks transverse, usually separated from the clypeus by a narrow dark interval, more rarely reduced
^{NC-Fla-Tx} *bishoppi bishoppi* Cockerell
 Wings somewhat whitish, the nervures rather pallid, with subcosta and margins of stigma pale brown; head usually as long as wide ^{Ks., Tx.} *bishoppi planorum*, n. subsp.
- ♂ ^{+ glanis Timb. II} 32. Clypeus strongly dentate on each side of base of labrum 33
 Clypeus not dentate, the lateral extension broad and reflexed next to the labrum and narrowed outwardly 34
33. Mandibles, except reddish tips, and almost entire face below level of antennae, bright yellow; head large, subquadrate, the cheeks broad and subangulate behind upper end of eyes; length about 6.5 mm. *bidentata*, n. sp.
 Head and thorax dark green, the anterior border of face black, the abdomen dark brown; no light markings; head moderately large, the cheeks broad but receding, and sometimes dentate anteriorly; length, about 4.5-5 mm. *pratti* Cockerell
- + ^{caro Timb.} 34. If mandibles more or less dilated at base on outer margin, the labrum not notched at apex. 35
 Mandibles rather broadly and almost squarely dilated on outer margin at base; labrum strongly notched at apex; mandibles at base, labrum, clypeus, and triangular lateral marks yellowish-white, abdomen brown or fuscous with preapical whitish bands
callicerata Cockerell
35. Face marks bright yellow, involving most, if not all, of face below level of antennae 36
 Face marks whitish or not involving nearly all of face below antennae..... 37
36. Head barely longer than wide, the cheeks very broad behind upper end of eyes; subantennal plates large and nearly twice as long as wide; head and thorax, except face markings, dark blue-green, the abdomen brown, becoming darker at base; length, about 5 mm.
bebbiae, n. sp.
 Head somewhat broader than long; subantennal plates not more than one and one-half times longer than wide; pygidial plate extremely broad and nearly truncate at apex; abdomen brown, with suffused yellowish markings on middle segments; length, 4.5 mm.
rossi, n. sp.
37. Face marks comparatively large, sometimes with subantennal and supraclypeal marks present; if the above-mentioned marks absent, the lateral marks reach level of antennae. 38
 Face marks reduced, the lateral marks more or less transverse and hardly extending above level of summit of clypeus; or markings sometimes absent 47
38. Abdomen dark brown or fuscous 39
 Abdomen ferruginous, or more or less yellowish, frequently more or less infuscated on basal segments, or, rarely, nearly all dusky ferruginous in *heterothecae* 43

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39. Mesonotum smooth and shining; wings clear or whitish40
 Mesonotum and frons tessellate and dullish; wings a little dusky, the subcosta and margins of stigma brown; clypeus, except usually on upper margin, and large lateral marks yellowish-white *georgica* Timberlake
40. Face marks mainly restricted to clypeus and lateral marks, the subantennal marks evanescent or absent41
 Subantennal marks usually well developed, and sometimes a supraclypeal mark present...42
41. Lateral marks pale yellow, subquadrate, with the upper outer angle nearly opposite the antennal sockets; head and thorax shining, bluish-black; front and middle tibiae yellow, with a dark blotch behind, the tarsi yellowish testaceous..... *vagans* Cockerell = asteris C.H., vii
 Lateral marks creamy white, triangular; the usual dots of clypeus obscure; front tibiae yellowish, with a brownish blotch behind, the middle pair yellowish in front, the tarsi whitish; face more hairy..... *vespertilio* Cockerell = asteris C.H., vii
42. Wings hyaline; face marks pale yellow, the clypeus with a pair of small brownish spots on upper margin and the usual dark dots, lateral marks broad, subquadrate, margined with black on lower border; head and thorax dark green, almost blackish, the propodeum dark blue; legs dark, the knees, tarsi, and anterior side of front and middle tibiae testaceous
crassiceps Cockerell = asteris C.H., vii
 Wings white, the nervures whitish, the subcosta and margins of stigma sometimes pale yellow; face marks white, usually including well-developed subantennal marks and more rarely a transverse supraclypeal mark; lateral marks broader than high, broad on orbits, and narrowed to a rounded point toward clypeus; head and thorax dark blue-green; front and middle tibiae mostly pale yellow and the tarsi yellowish-white. *xanthismae* Cockerell + asteris C.H.
43. Face marks pale yellow, restricted to clypeus and lateral marks, even in macrocephalous specimens, and the upper margin of clypeus often with two more or less distinct dark marks; lateral marks broader than high, broad on orbits and narrowed to a rounded point toward clypeus; abdomen ferruginous, usually more or less infuscated on two basal segments, or with two dark bands44
 Mesonotum more polished; face marks whitish, with subantennal and supraclypeal marks usually present except in smaller specimens of *heterothecae*, where the lateral marks become a little higher than wide45
44. Wings with a whitish cast, although slightly dusky, the subcosta and margins of stigma brown; sides of pronotum in macrocephalous specimens deeply impressed, with the posterior corners of the disk very prominent *cambarella cambarella* Cockerell
 Wings more whitened, the subcosta and margins of stigma yellowish; sides of pronotum much less impressed and posterior corners of disk not prominent; upper margin of clypeus sometimes with a dark blotch and lateral marks transverse
cambarella platyura Cockerell
45. Abdomen more or less orange-yellow or banded with yellow, the apical depression of tergites nearly concolorous46
 Abdomen darker ferruginous, sometimes with a yellowish band at base of tergite 2, or often more or less banded with brownish fuscous, or mainly dark, the apical depression of tergites more whitish and conspicuous than in allied species; cheeks broad, but receding and widest opposite upper part of eyes..... *xanthismae* Cockerell + asteris C.H.
46. Subantennal and supraclypeal marks usually present except in macrocephalous specimens; lateral mark usually about as broad as high or higher than wide in smaller specimens; cheeks in macrocephalous specimens broad but receding, broadest and slightly angulate or protuberant opposite the upper end of eyes..... *heterothecae* Cockerell + h. *trizonata* Timberlake
 Macrocephalous specimens (the only phase known) with the head broader than long, the very broad cheeks evenly margined beneath, and the face white below level of antennae except for the supraclypeal area, which is only partly light..... *mellina* Cockerell
47. Lateral marks comparatively well developed, usually involving space between clypeus and eye and wider on the orbits than at inner end.....48
 Lateral marks more or less restricted to a small spot adjacent to the clypeus, or face entirely dark51

- +Zavortint, 1106
Az(looker) (CAS) 48. Wings dusky hyaline, or if whitish having the subcosta and margins of stigma distinctly brownish; mesoscutum tessellate and dullish.....49
Wings milky hyaline, the nervures pallid, with subcosta and margins of stigma only slightly brownish
- 49. Wings dusky hyaline, the nervures pale brownish, the subcosta and margins of stigma darker brown*bishoppi bishoppi* Cockerell
Wings whitish hyaline, the nervures pallid, the subcosta and lower margin of stigma brownish*bishoppi planorum*, n. subsp.
- + i. basiliensis Timb. III
ijaliscana Timb. III 50. Frons and mesoscutum polished or faintly tessellate; front tibiae, middle and hind knees, and the tarsi yellowish-white*ignota ignota* Cockerell
Frons and mesoscutum more distinctly tessellate; head of larger specimens often quadrate, with a blunt tooth on anterior part of cheeks*ignota crawfordi* Cockerell
- + n. subla Timb. III
Fla, Ark 51. Head quadrate or distinctly broader than long; or clypeus partly or entirely dark.....52
Head rotund, only slightly broader than long; frons and mesoscutum delicately tessellate and shining; clypeus and usually small lateral marks, adjacent to clypeus, white; wings milky hyaline, the nervures pallid, with subcosta and margins of stigma slightly brownish
ignota isopappi Timberlake
- 52. Face entirely dark, or if face markings present, the head quadrate with a blunt tooth on anterior part of cheeks53
Similar to *isopappi*, but face markings more yellowish, the upper border of clypeus dark, the head somewhat broader, and frons and mesoscutum minutely tessellate and dullish
graenicheri Timberlake
- 53. Mandibles moderately elongate, with a rounded dilation on inner margin before the middle and a quadrate expansion on outer margin at base; head quadrate, the cheeks broad, with a blunt tooth anteriorly; occipital margin of cheeks and temples sharply margined and a little more produced or flaring opposite the summit of eyes; face marks more or less developed, but small54
Mandibles long, slender, and tapering, without a dilation on inner margin; head distinctly broader than long, the cheeks generally not much more than angulate anteriorly; face always entirely dark55
- 54. Clypeus often entirely and the lateral marks yellowish-white, the latter restricted to anterior border of lateral plates of face, or small and adjacent to the clypeus; scape of antennae whitish beneath; vertex and mesoscutum tessellate and somewhat dullish, the frons more shining; wings whitish hyaline, the subcosta and margins of stigma brown
boltoniae boltoniae (Robertson)
Clypeus partly dark, the lateral marks very small or absent, or face sometimes entirely dark; scape of antennae dark; wings with a slight dusky cast, the nervures less pallid
boltoniae chrysopsina Timberlake
- 55. Mesoscutum weakly tessellate or almost polished and shining; tarsi dark.....56
Mesoscutum distinctly tessellate and dullish, the frons moderately shining; head rounded, the cheeks moderately wide and strongly receding; flagellum yellowish-brown beneath; legs dark, except the yellowish-white tarsi.....*foveata persimilis*, n. subsp.
- 56. Mesoscutum almost polished, but slightly tessellate around the margins; head subquadrate, broader than long, the cheeks subdentate anteriorly; head and thorax dark blue, the abdomen blackish; wings whitish hyaline, the subcosta and margins of stigma pale brown
foveata foveata, n. subsp.
Hardly distinguishable from *foveata*, but mesoscut. usually a little more tessellate, the mandibles longer*foveata brachycephala*, n. subsp.

Perdita pratti Cockerell
(Figs. 173, 174, 289)

Perdita pratti Cockerell, 1906, Entomologist, 39: 125, ♀; Timberlake, 1929, Jour. New York Ent. Soc., 37:125.

The type locality of *pratti* is Corpus Christi, Texas, and it was recorded as a

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