

Supplementary Studies on the
Systematics of the Genus *Perdita*

(*Hymenoptera, Andrenidae*)

PART II

P. H. Timberlake

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Contents

Acknowledgments, viii

Introduction	1
Subgenus <i>Cockerellula</i> Strand	1
<i>Perdita quadridentata</i> , n. sp. = <i>solitaria</i>	1
Subgenus <i>Macroteropsis</i> Cockerell	2
Key to Females of <i>Macroteropsis</i>	3
<i>Perdita anthracina</i> , n. sp.	3
<i>Perdita parkeri</i> n. sp.	4
<i>Perdita portalis</i> Timberlake	5
Subgenus <i>Macroterella</i> Timberlake	6
<i>Perdita pilonotata</i> , n. sp. (<i>Heter.</i>)	6
<i>Perdita solitaria</i> Cockerell	7
Subgenus <i>Heteroperdita</i> Timberlake	7
<i>Perdita fasciatella</i> , n. sp.	7
Subgenus <i>Epimacrotera</i> Timberlake	8
Revised Key to Males of <i>Epimacrotera</i>	8
<i>Perdita albomarginata</i> , n. sp.	9
<i>Perdita mazatlanica</i> , n. sp.	10
<i>Perdita pauxilla</i> , n. sp.	11
Subgenus <i>Cockerellula</i> Ashmead	12
<i>Perdita albomaculata</i> , n. sp.	13
<i>Perdita imbellis</i> Timberlake	13
<i>Perdita luculenta</i> Timberlake	14
Subgenus <i>Procockerellia</i> Timberlake	14
<i>Perdita moldenkei</i> , n. sp.	14
Subgenus <i>Allomacrotera</i> Timberlake	15
<i>Perdita moabensis</i> Timberlake	15
Subgenus <i>Pentaperdita</i> Cockerell	16
<i>Perdita nevadiana</i> , n. sp.	16
Subgenus <i>Hexaperdita</i> Timberlake	16
<i>Perdita glamis</i> , n. sp.	16
<i>Perdita labrosa</i> , n. sp.	17
Subgenus <i>Perditella</i> Cockerell	18
<i>Perdita minuta</i> , n. sp.	18

Subgenus <i>Pygoperdita</i> Timberlake	19
<i>Perdita arizonica</i> Timberlake	19
<i>Perdita duplonotata</i> Timberlake	19
<i>Perdita fallugiae</i> Timberlake	19
<i>Perdita mormonica</i> Timberlake	19
<i>Perdita nevadensis culbertsoni</i> Timberlake	19
<i>Perdita torchioi</i> , n. sp.	19
Subgenus <i>Perdita</i> F. Smith	20
Zonalis Group	20
<i>Perdita ciliata</i> Timberlake	20
<i>Perdita compactilis</i> , n. sp.	20
<i>Perdita pratensis</i> , n. sp.	21
Halictoides Group	22
<i>Perdita abbreviata</i> , n. sp.	22
Octomaculata Group	22
Supplementary Key to <i>Octomaculata</i> Group	22
<i>Perdita abducta</i> Timberlake, n. name	24
<i>Perdita albescens</i> , n. sp.	24
<i>Perdita algodones</i> , n. sp.	26
<i>Perdita flavicornis</i> , n. sp.	26
<i>Perdita hirtuosa</i> , n. sp.	27
<i>Perdita hubbelli</i> , n. sp.	28
<i>Perdita labergei</i> Timberlake	29
<i>Perdita pretiosa</i> , n. sp.	29
<i>Perdita subrufiventris</i> , n. sp.	31
Ventralis Group	32
<i>Perdita nasuta</i> Timberlake	32
<i>Perdita nigridia</i> Timberlake	32
<i>Perdita politissima</i> , n. sp.	32
<i>Perdita rudei</i> , n. sp.	33
<i>Perdita suavis</i> , n. sp.	34
Sphaeralceae Group	35
Supplementary Key to <i>Sphaeralceae</i> Group	35
<i>Perdita brevicornis</i> , n. sp.	37
<i>Perdita chemsaki</i> , n. sp.	38
<i>Perdita cingulata</i> , n. sp.	39
<i>Perdita cracens</i> , n. sp.	40
<i>Perdita elimata</i> Timberlake	40
<i>Perdita flaviventris</i> , n. sp.	41
<i>Perdita fulvescens</i> , n. sp.	41
<i>Perdita fulviventris</i> , n. sp.	42
<i>Perdita gillaspyi</i> , n. sp.	43
<i>Perdita hiemalis</i> , n. sp.	44
<i>Perdita janzeni</i> , n. sp.	44
<i>Perdita mimosae efferta</i> , n. subsp.	45
<i>Perdita morula</i> , n. sp.	47

Contents

vii

<i>Perdita pernitens</i> , n. sp.	48
<i>Perdita pinguis</i> , n. sp.	48
<i>Perdita pygidialis</i> , n. sp.	49
<i>Perdita recticincta</i> , n. sp.	51
<i>Perdita submaerens</i> , n. sp.	52
<i>Perdita tumida</i> , n. sp.	53
<i>Perdita venustella</i> , n. sp.	54
<i>Literature Cited</i> , 57	
<i>Index to Figures</i> , 59	
<i>Figures</i> , 61	

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Introduction

This is the second part of a study (1971) that is supplementary to my revision of the genus *Perdita* (1954, 1956, 1958, 1960, 1962, 1964, 1968). Herein are treated some 57 species, of which 44 are described as new and the synonymy of three species is given. New keys are provided for the subgenera *Macroteropsis*, *Epimacrotera*, *Cockerellula*, and the *Octomaculata* Group and *Sphaeralceae* Group of the subgenus *Perdita*. The key to *Macroteropsis* is new for the females of that group, that for *Epimacrotera* is a revision of the key in Part III (1958). The key to *Cockerellula* is also a revision and those for *Octomaculata* and *Sphaeralcea* groups are supplementary.

For locating keys, the Index in Part VII (1968:189) should be consulted. This index includes the names of all subgenera and groups and all specific names proposed on or before 1968.

Subgenus *Cockerellula* Strand

***Perdita quadridentata*, n. sp.**

(Figs. 1418, 1419, 1458, 1479)

This species is a very small member of the subgenus *Cockerellula*. The male runs to *bidenticauda* Timb. in the key (1954:354-355) but is very distinctive in having four acute teeth at apex of abdomen, with the two outer teeth diverging and the two inner ones close together and converging. It also has the second sternite thickened medially, with a projecting broadly truncate median lobe. The female is entirely black, with a dull impuncture sculpture and runs to *opuntiae* Ckll. in they key, but differs in its very small size, black abdomen and in the dark impunctate mesonotum. It is very similar to *solitaria* Ckll., which belongs to a different group, but it is smaller and can be distinguished by the perfectly linear facial foveae, which are narrower than the interval between them and eyes.

Male. Head and thorax black, with mandibles, except becoming somewhat testaceous apically, labrum and face below level of antennae pale yellow, the yellow extending a little above antennae on each side. Thorax entirely dark. Abdomen piceous, with slight reddish tinge, but distinctly ferruginous in paratype. Legs and antennae dark, the antennae more brownish beneath. Tegulae testaceous. Wings dusky hyaline, nervures and stigma dusky testaceous, subcosta more infuscated.

Head rotund, as broad as long; cheeks slightly receding, rounded and slightly more than half as wide as eyes. Ocelli small, posterior pair their distance apart from occipital margin and each nearly twice as far from nearest eye. Facial foveae elongate oval, nearly three times longer than wide. Antennae inserted far

below middle of eyes, flagellum clavate, with middle joints as long as thick; antennal sockets about equidistant from each other and margin of eyes. Face gently but clypeus more strongly convex, with lateral extensions inflexed and strongly narrowed and narrowly visible to base of mandibles in frontal aspect; disk of clypeus much broader than long, supraclypeal area transverse and subantennal plates about as broad as long. Mandibles tapering, acute and reaching far margin of labrum. Proboscis moderately elongate, with glossa about as long as head. Tarsal claws strong and bifid. Pterostigma lanceolate, about one-third as wide as first submarginal cell; marginal cell as long as first submarginal cell, and about equal beneath and beyond stigma, with metacarpus distinctly longer than apical truncation.

Face and mesonotum minutely tessellate, dull and virtually impunctate, propodeum more weakly tessellate and shining. Pubescence very short, fine, erect and very thin on face, cheeks, occiput and mesonotum. Outer margin of hind tibiae with coarse erect bristles, about as long as greatest width of tibia, and apical margin of tergite 6 with row of similar slightly longer bristles. Subgenital plate elongate nipple-shaped, and finely pubescent at apex. Caulis of genital armature quadrate, slightly longer than wide with inclusion of dorsal lobes; these lobes very narrowly separated, truncate at apex and about as wide as long; parameral lobes slender, about half as long as caulis and ovaly expanded in apical half, and inserted on sides of caulis, about opposite base of dorsal lobes, where caulis becomes distinctly narrowed; sagittae about as long as caulis but not quite reaching apex of parameral lobes, with rods somewhat thickened in apical part and divergent; vibrissae pressed close together forming broad strong support for sagittae near their middle.

Length about 2.5 mm, anterior wing 2.1 mm, width of abdomen .8 mm.

Female. Entirely black, without pale markings. Flagellum of antennae slightly brownish beneath. Mandibles rufotestaceous, becoming red at apex. Tegulae dark testaceous. Wings almost clear hyaline, nervures testaceous, subcosta slightly infuscated.

Head as broad as long; cheeks about two-thirds as wide as eyes and but little receding. Posterior ocelli about their distance apart from occipital margin and distinctly more distant from eyes. Facial foveae short, linear, extending from above level of antennal sockets about one-third of distance to level of anterior ocellus. Antennae inserted well below middle of face, with scape reaching somewhat more than half-way to level of anterior ocellus; flagellum subclavate, with middle joints as thick as long. Face below level of antennae strongly convex, with outer ends of clypeus very broadly inflexed; disk of clypeus broader than high and rounded above; supraclypeal area broader than high and subantennal plates as broad as long. Mandibles gently curved, parallel-sided, slightly retuse at apex, with blunt inner tooth. Proboscis moderately elongate, galeae somewhat surpassing proboscis fossa. Pterostigma lanceolate; marginal cell longer beyond than beneath stigma, with metacarpus longer than oblique apical truncation. Pygidial plate narrowly obtuse at apex, otherwise concealed in type.

Frons, vertex and mesonotum very minutely tessellate, dull and impunctate, mesopleura more alutaceous, propodeum smoother and more shining.

Face below level of antennae dullish, clypeus with close shallow punctures. Abdomen elongate ovate, gently convex above, widest across second segment, minutely alutaceous, impunctate and moderately shining. Pubescence whitish, short, fine and thin, frons and vertex nearly bare, mesoscutum with few erect hairs, face below level of antennae with thin antrose hair. Scopal hair on outer margin of hind tibiae not much longer than greatest width of tibia.

Length 3.5 mm, anterior wing 2.2 mm, width of abdomen 1.3 mm.

Holotype male and allotype. 5 miles east of Nogales, Santa Cruz Co., Arizona, on *Baccharis*, Sept. 1, 1970 (G. E. and R. M. Bohart).

Types in collection of the University of California, Riverside.

Subgenus *Macroteropsis* Cockerell

With the discovery of three new species of *Macroteropsis* and the transfer of *peninsularis* from *Cockerellula*, a new key to the females has been prepared. A key to males is given elsewhere (1962:87).

KEY TO FEMALES OF *MACROTEROPSIS*

1. Wings subopaque and milky white, with pale yellow nervures; head and thorax with conspicuous white pubescence 2
Wings at most only slightly whitened; pubescence sparse and inconspicuous 3
2. Length 4 mm; eyes less strongly diverging above; posterior ocelli their distance apart from margin of eyes; mandibles rufotestaceous, redder at apex *portalis* Timberlake
Length 5-5.5 mm; eyes strongly divergent above; posterior ocelli distinctly closer together than to margin of eyes, mandibles black on basal half, shading into red at apex *haplura* Cockerell
3. Head and thorax dark green or bluish green, with clypeus, disk of mesoscutum and scutellum black 4
Head and thorax uniformly black or black with pale markings 7
4. Frons very minutely and obscurely punctured 5
Punctures of frons very minute but distinct 6
5. Wings rather dusky hyaline; mesoscutum with close minute punctures *arcuata arcuata* Fox
Wings slightly whitened; mesoscutum more obscurely punctured. *arcuata dinognatha* Cockerell
6. Dark green, with disk of mesoscutum and scutellum black; frons, vertex and mesonotum dull, with minute dense punctures; pubescence of mesoscutum short and fine with numerous longer, and coarser hairs intermixed *latior* Cockerell
More bluish green; punctures of frons more distinct, those of mesoscutum more obscure than in *latior*; pubescence of mesonotum more uniformly short with few longer hairs interspersed *echinocacti* Timberlake
7. Posterior face of propodeum with conspicuous white hair 8
Posterior face of propodeum bare 10
8. Abdomen ferruginous except at base 9
Abdomen black; frons, vertex and mesonotum minutely tessellate and dullish; basal area of propodeum minutely shagreened and dull *peninsularis* Timberlake
9. Base of mandibles and small mark at anterior corners of face white; frons with distinct fine punctures, becoming sparse on vertex, and mesonotum with close minute punctures; marginal cell narrowed toward apex, with metacarpus much longer than apical truncation *robertsi* Timberlake
Mandibles black, shading into red at apex; face entirely dark; frons and vertex minutely granular tessellate, dull and impunctate, and mesoscutum similar but less dull; marginal cell less wide than in *robertsi* and more pointed at apex *parkeri*, n. sp.
10. Head and thorax microscopically granular tessellate and impunctate, except for shallow punctures on clypeus; propodeum bare except for short, fine white hair on lateral ridges; medial part of basal area minutely roughened and dull, length about 4.5 mm *atrella* Timberlake
Similar, but 5-5.5 mm in length; facial foveae longer and broader; propodeum polished, including basal area, and lateral ridges with thin hair *anthracina*, n. sp.

***Perdita anthracina*, n. sp.**

This new species from the vicinity of Guadalajara, Mexico, belongs in *Macroteropsis* and is distinct by its fine moderately dull sculpture, entirely black color, thin suberect pubescence of the mesonotum, long fine, six-jointed maxillary palpi and by

strongly dusky wings, with dark nervures and stigma. The polished propodeum is also distinctive.

Female. Black without markings on head, thorax or abdomen. Legs and antennae dark, flagellum brownish beneath. Mandibles fuscous at base, shading into rufotestaceous on apical half. Tegulae testaceous brown, infuscated at base. Wings strongly dusky or pale fuliginous, nervures and stigma fuscous.

Head as broad as long; cheeks rounded, widest just above level of middle of eyes and about three-fourths as wide as eyes. Posterior ocelli about one and one-half times their distance apart from occipital margin and not quite twice that distance from nearest eyes. Facial foveae shallow, wider than interval between them and eyes, widened above and pointed below and about three-fourths as long as space between antennae and anterior ocellus. Antennae inserted well below middle of face, flagellum moderately clavate, with middle joints as long as thick. Face evenly convex below level of antennae; disk of clypeus distinctly broader than high and lateral extensions broadly inflexed. Mandibles thick at base, dilated and thin in apical half, with slight constriction before middle, with small blunt inner tooth close to broad rounded apex. Proboscis moderately elongate, galeae as long as stipites and slightly longer than slender six-jointed maxillary palpi. Tarsal claws long, with acute inner tooth. Basal plate of hind tibiae distinct. Abdomen ovate, about twice as long as wide, strongly convex above; pygidial plate more than twice as long as wide at base, sides converging to acute apex, disk plane, except for slight median convexity in basal part.

Head and thorax minutely tessellate, moderately dull, dullest on mesopleura, with very fine, sparse obscure punctures on frons, vertex and mesonotum; mesopleura virtually impunctate; punctures on face below level of antennae coarse but shallow, and close, but distinctly separated for the most part. Abdomen very minutely lineolate and slightly dullish; disk of tergite 5 with coarse shallow punctures. Pubescence whitish, fine and most abundant on cheek and underside of thorax, thin on face with frons and vertex nearly bare, and thin, short and erect on mesonotum. Abdomen nearly bare except for plumose apical fimbria. Scopal hair of hind tibiae moderately long, with hairs on outer face gently curved. Hair of front coxae fine, dense and moderately long.

Length 5.6 mm, anterior wing 3.3 mm, width of abdomen 1.6 mm.

Holotype female. 10 miles north of Guadalajara, Jalisco, Mexico, Oct. 16, 1968 (G. E. Bohart). Type in collection of the University of California, Riverside.

Perdita parkeri, n. sp.

This new species from Puebla, Mexico, has the head and thorax dullish black and infuscate, but the abdomen ferruginous. It is distinguished from *robertsi* by characters given in the preceding key.

Female. Head and thorax dull black, without light markings. Abdomen ferruginous, but tergite 1 fuscous except on apical border, and tergite 2 dusky across middle except at median line. Antennae and legs entirely dark (flagellum of both antennae missing in type). Mandibles black at base, shading into red in apical half. Tegulae dark testaceous, fuscous at base. Wings dusky hyaline, nervures dark testaceous, stigma and subcosta fuscous.

Head slightly longer than wide; cheeks slightly receding, rounded and about three-fourths as wide as eyes. Posterior ocelli somewhat more than their distance apart from occipital margin and about one-half more than that distance from eyes. Facial foveae linear, their own width from margin of eyes and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted well below middle of face, scape rather thick and reaching to level of upper end of foveae. Face below level of antennae strongly convex, with lateral extensions of clypeus strongly inflexed and not visible in frontal aspect; disk of clypeus much broader than high and rounded at summit. Mandibles gently curved, slightly narrowed beyond base, expended on apical half, with broad oblique apical margin notched and forming two blunt teeth. Proboscis retracted in type, moderately long, galeae nearly as long as stipites. Spur of middle tibiae minutely serrate, with about seven acute teeth. Tarsal claws with strong inner tooth. Pterostigma lanceolate; marginal cell slightly narrowed toward apex, with metacarpus longer than apical truncation; second submarginal cell narrowed about four-fifths above.

Head and thorax minutely granular tessellate, virtually impunctate and dull, with mesonotum slightly less dull than frons and vertex, but face below level of antennae with close punctures, becoming rather coarse but shallow on the clypeus. Basal area of propodeum with dense lineolate sculpture and very dull. Pubescence white, moderately short on face, with upper part of frons and vertex bare, denser on cheeks, thin on mesonotum, long and thin on sides of thorax, and rather dense and conspicuous on the metanotum and on the posterior face and lateral ridges of propodeum, but basal area bare. Abdomen ovate, dullish, with very minute sericeous pubescence and apical fimbria thin and short. Scopal hair of hind legs moderately thin and longer than greatest width of tibia, with hair on anterior side evenly curved. Pygidial plate concealed in type.

Length about 5 mm, anterior wing 3.5 mm, width of abdomen 1.5 mm.

Holotype female. Cacaoapan, Puebla, Mexico, April 26, 1962 (F. D. Parker).

Type in collection of the University of California, Riverside.

Perdita portalis Timberlake

A flightless macrocephalous male *Perdita* was discovered by Jerome G. Rozen, Jr., of the American Museum, guarding the nest entrance of the bee near Rodeo, New Mexico, on August 31, 1970. This bee was first thought to be a new species, but after receipt of additional specimens it proved to be a brachypterous male of *Perdita portalis* described from nearby Portal, Arizona.

Dimorphic male. Head ferruginous, except for large pale ochreous yellow mark on each side of face, covering space between eyes and antennal sockets, reaching well above antennae, and broadly oval in shape. Antennae and mandibles concolorous with general color of head, proboscis paler, more nearly testaceous brown. Meso- and metanotum black; prothorax, pleura, sternum and propodeum ferruginous, more or less washed with fuscous. Abdomen ferruginous beneath, but pale brown above, shaded with fuscous on lateral margins. Legs black, front trochanters, apical half of front femora above and behind, front tibiae and front tarsi pale yellowish, tarsi otherwise brownish; tibial spurs pale testaceous. Tegulae testaceous. Wings whitish hyaline, subopaque, nervures and stigma pallid.

Head enormous, cheeks and temples about two and one-half times as wide as eyes, cheeks with moderately large anterior process, directed more forward than downward. Ocelli minute, anterior one virtually midway between occipital margin and level of anterior margin of antennal sockets. Facial foveae obsolete. Antennae inserted far forward on face, yet only moderately below level of middle of eyes; scape and flagellum slender, but middle joints of flagellum broader than long. Antennal sockets nearly twice as far from margin of eyes as from each other. Face almost evenly and rather strongly convex from occipital to oral margin; disk of clypeus twice as broad as high and almost touching antennal sockets, with supra-clypeal area obsolete; subantennal plates small, very acutely narrowed below; anterior margin of clypeus with median, triangular porrect process; lateral extensions of clypeus extremely narrow but visible in frontal aspect. Labrum about as broad as long. Mandibles thick, curved, and tapering to blunt simple apex. Proboscis moderately short, maxillary palpi very fine, three-jointed. Tarsal claws large, strongly dentate. Tibial spurs curved at apex, without serration. Wings too small for flight; pterostigma slender, tapering into metacarpus; marginal cell shorter than first submarginal cell, with parts beneath and beyond stigma about equal. Abdomen ovate, depressed, much broader than thorax; apex of tergite 7 minutely bidentate.

Head polished, impunctate; mesoscutum minutely tessellate, moderately shining, with minute punctures, one to several puncture-widths apart. Head bare, except for very thin, fine hair on occiput, and fine hair on labrum. Mesonotum with thin, short, appressed white hair, anterior border of pronotum with similar longer hair, and sides of thorax with longer, suberect hair. Abdomen bare. Hair of hind tibia coarse, erect and about as long as greatest width of tibia. Subgenital plate and genital armature as in normal male.

Length 4 mm, anterior wing 2.4-2.6 mm, width of abdomen 1.7 mm, width of head 1.7 mm.

Material examined. 12 males, 14 females collected from nest one mile south of Rodeo, Hidalgo Co., New Mexico, August 30, 1970 (J. G. Rozen, Jr.), and 2 males, 2 females reared Sept. 12-24 from pupae collected at the same time.

Subgenus *Macroterella* Timberlake***Perdita pilonotata*, n. sp.**

(Figs. 1420, 1421, 1459)

This small species with a lanceolate pterostigma is placed in *Macroterella*, and differs from all other *Perdita* in having white face marks entirely due to presence of dense white pubescence.

Female. Head and thorax black, with greenish luster on sides of thorax and propodeum without integumental marks, but with dense appressed white hair on sides of face above and below level of antennae. Abdomen ferruginous, shaded with pale yellow across tergites 2 and 3, and infuscated at base and apex, and on each side and subapically on tergites 2 and 3. Legs and antennae dark, flagellum brownish. Mandibles red. Tegulae testaceous. Wings slightly dusky, nervures testaceous, subcosta brownish.

Head as broad as long; cheeks strongly receding, about half as wide as eyes. Posterior ocelli somewhat more than their distance apart from eyes and rather less than half as far from occipital margin. Facial foveae finely linear, close to margin of eyes and reaching from level of antennal sockets less than halfway to level of anterior ocellus. Antennae inserted well below middle of face, scape reaching no more than halfway to level of anterior ocellus, flagellum thick, with joints except apical one as thick or thicker than long. Face nearly plane from anterior ocellus to clypeal margin, but convex anteriorly from side to side; disk of clypeus broader than high and rounded across summit; lateral extensions strongly inflexed and not visible in frontal aspect. Antennal sockets about their distance apart from margin of eyes and less than their own diameter from summit of clypeus. No visible sutures defining subantennal plates and supra-clypeal area. Mandibles reaching far margin of labrum, moderately thick and abruptly narrowed on inner margin close to subacute apex. Proboscis moderately long, galeae as long as stipites. Tarsal claws small, with minute inner tooth. Pterostigma sublanceolate, about as long and one-half as wide as first submarginal cell, and emitting radius at middle; marginal cell slightly longer beneath than beyond stigma, with metacarpus hardly longer than apical truncation; first recurrent nervure received by second submarginal cell about one-fourth of its length from base. Abdomen oval, depressed, about twice as long as wide and wider than thorax; pygidial plate longer than wide, narrowed to acute apex, with disk plane.

Head and thorax dull, with extremely minute granular tessellation, and impunctate except for sparse obscure punctures on clypeus and sides of thorax. Pubescence white, moderately fine and long and mostly erect; densest on cheeks, conspicuous on anterior margin of mesoscutum, longer and thin on underside of head, thin on sides of thorax and short on sides of propodeum, but forming even appressed patch of hair on each side of face opposite antennae. Scopal hair of hind legs rather thin, gently curved and nearly twice as long as greatest width of tibia.

Length 3 mm, anterior wing 2.1 mm, width of abdomen 1 mm.

Male. Head and thorax black, with slight bronzy luster on frons and vertex. Mandibles except red tips and labrum yellow; face marks yellow, tinged with brown, including clypeus, transverse lateral marks and more yellowish and transverse supra-clypeal mark. In paratype, face marks reduced to median mark on clypeus. Thorax entirely dark. Abdomen ferruginous without markings. Legs fuscous, front tibiae and all tarsi yellow. Antennae dark, scape yellowish at base, flagellum brown, more yellowish beneath. Tegulae testaceous. Wings dusky hyaline, nervures testaceous, margins of stigma and subcosta fuscous.

Head quadrate, broader than long; cheeks rounded, hardly receding, broadest opposite upper end of eyes and about as wide as eyes. Posterior ocelli behind line tangent to posterior margin of eyes, about their distance apart from occipital margin and twice as far from nearest eyes. Vertex with slight median ridge between and behind posterior ocelli. Facial foveae obsolete. Antennae inserted far below middle of face and about level with end of anterior fourth of eyes. Flagellum clavate with joints broader than long except first and last joints. Antennal sockets slightly nearer margin of eyes than to each other. Anterior part of face with median half truncately produced beyond level of anterior end of eyes, and strongly convex from side to side; supra-clypeal area twice as broad as high; disk of clypeus broader than high, with lateral extensions very narrow and mainly not visible in frontal aspect. Mandibles strongly curved, reaching far margin of labrum and tapering in apical fourth to very acute apex. Proboscis moderately long, slightly surpassing fossa in repose. Pterostigma lanceolate, about one-fourth as wide as first submarginal cell and

emitting radius close to base; marginal cell longer than first submarginal cell, about equally long beneath and beyond stigma, with metacarpus equal to apical truncation.

Head and thorax microscopically tessellate, virtually impunctate and moderately shining, frons and vertex with shining luster. Pubescence of head and thorax very short, thin and fine, most apparent on occiput, anterior margin of mesoscutum, tubercles and on mesopleura near tubercles. Abdomen ovate, depressed, much broader than thorax, widest at junction of second and third segments, gently convex above and plane beneath. Subgenital plate about one-half longer again than wide and somewhat narrowed before truncate and slightly emarginate apex. Genital armature small, with caulis but little longer than wide, with short projecting apical spur on each side, representing parameral lobes; single volsella on each side apparently projecting from sides of sagittal structure; sagittae fused, about one-half longer again than wide, with very short basal rods, and short, thick diverging apical rods, curving downward in lateral view and ending very acutely.

Length 2.5-2.75 mm, anterior wing 1.8-2 mm, width of abdomen .7-.8 mm.

Holotype female. 35 miles northeast of Las Cruces, in Otero Co., New Mexico, 3,900 ft., August 21, 1962 (H. A. Scullen).

Allotype male. 16 miles south of Datil, Catron, Co., New Mexico, June 16, 1956 (R. and K. Dreisbach).

Paratypes. One female, same data as holotype; and one male, Correo, Valencia Co., New Mexico, June 15, 1956 (R. and K. Dreisbach).

Holotype in collection of the California Academy of Sciences, San Francisco; allotype in collection of Michigan State University, East Lansing; paratypes in collections of Oregon State University, Corvallis, and the University of California, Riverside.

Perdita solitaria Cockerell

New Records. One female, 7 miles southeast of Rodeo, Hidalgo Co., New Mexico, August 20, 1958 (P. A. Opler); one female, 18 miles east of Douglas, Cochise Co., Arizona, on *Eriogonum abertianum*, Sept. 5, 1958 (P. D. Hurd, Jr.).

Subgenus *Heteroperdita* Timberlake

Perdita fasciatella, n. sp.

On May 19, 1970, P. F. Torchio collected four specimens of *Heteroperdita* on flowers of *Nama* at Bouse, California. Three of the females have the pygidial plate strongly rounded at apex, sides of face with dense white hair nearly concealing lateral marks, large marks on pronotum and tubercles, abdominal bands as in *sexfasciata* Timb., but clypeus black with a median pale mark. These are described below as *fasciatella*. The other female is provisionally assigned to *sexfasciata*, but it has pronotal marks reduced to small spot on tubercles, the abdominal bands hardly emarginate in front, and the clypeus dark with a small median spot. More material of both forms is needed for a better understanding.

Female. Head and thorax with slight bluish tinge, most pronounced on sides of thorax and propodeum. Outer ends of clypeus and small oval mark on middle of disk, not reaching anterior margin, lateral marks apparently triangular and reaching level of antennae, but mainly concealed by dense white hair, collar of pronotum broadly, cuneate mark on each side of disk, and large mark on tubercles white. Abdomen fuscous, with preapical white bands reaching lateral margins and emarginate in front on each side of tergites 1 to 5. Pygidial plate brown. Legs dark, with apex of femora briefly, anterior side of front and middle tibiae, base of hind tibiae and tarsi yellowish white, but small joints of tarsi, especially of hind legs, dusky. Antennae dark, flagellum more brownish and paler beneath. Mandibles testaceous or whitish,

with apex dark red. Labrum dark. Tegulae pale testaceous, white across base. Wings nearly hyaline, nervures testaceous, margins of stigma and subcosta pale brown.

Head about as broad as long; cheeks moderately receding, about half as wide as eyes. Posterior ocelli their distance apart from eyes and somewhat closer to indefinite occipital margin. Facial foveae finely linear, close to margin of eyes and reaching less than halfway from level of antennal sockets to level of anterior ocellus. Antennae inserted below middle of face, flagellum rather slender, with middle joints about as broad as long, and those toward base broader than long. Pterostigma slender, widest at middle, hardly half as wide as first submarginal cell; marginal cell somewhat longer beneath than beyond stigma, with metacarpus equal to apical truncation. Pubescence white, fine, short and appressed; dense on cheeks and sides of face to slightly above level of antennae, thinnest on occipital margin, dense on prescutellar area of mesoscutum and thinner on each side of scutum and moderately dense on metanotum and sides of propodeum. Sides of thorax nearly bare. Scopular hair of hind tibiae gently curved and slightly longer than greatest width of tibia.

Length 3.8 mm, anterior wing 2.8 mm, width of abdomen 1.3 mm.

Holotype female. Bouse, San Bernardino Co., California, on flowers of *Nama*, May 19, 1970 (P. F. Torchio).

Paratypes. Two females, collected with type.

Type in collection of the University of California, Riverside. Paratypes returned to G. E. Bohart.

Subgenus *Epimacrotera* Timberlake

For distinguishing three new species and for *umbrata* Timb. (1971:1-2), the key to the males of *Epimacrotera* needs to be revised. In the key (1968:14-15), *albomarginata* and *pauxilla* run to couplet 7, *mazatlanica* to couplet 9 and *umbrata* to couplet 12.

REVISED KEY TO MALES OF *EPIMACROTERA*

1. Mandibles abruptly narrowed on inner margin before apex, or with small inner tooth 2
- Mandibles simple 13
2. Abdomen dark with whitish mark on each side of tergites 2 and 3 (or tergites 1 or 2 or 3 or 4) 3
- Abdomen ferruginous or more or less fuscous or blackish, without light markings 4
3. Head and thorax shining dark green, frons, vertex and mesonotum weakly tessellate and obscurely punctured; face whitish below antennae except supraclypeal area *polycarpae* Timberlake
- Head and thorax comparatively dull; frons, vertex and mesonotum strongly tessellate and densely punctured; markings similar *williamsi* Timberlake
4. Abdomen clear ferruginous 5
- Abdomen dark (sometimes somewhat reddened to brownish in *euphorbiae*) 6
5. Head and thorax comparatively shining; frons tessellate dullish, mesoscutum delicately tessellate, with rather obscure, fine punctures; face white below antennae except supraclypeal area *crassula* Timberlake
- Head and thorax dark green; frons dull, mesonotum strongly tessellate, dullish, with sparse fine punctures; clypeus and large quadrate lateral marks white; size large (length about 4.5 mm.) *ainsliei* Crawford
6. Tubercles and scape of antennae dark 7
- Tubercles and scape beneath white 10
7. Head longer than wide 8
- Head broader than long 9

8. Face and mesonotum shining, mesoscutum polished; lateral face marks as long as wide *nigriventris* Timberlake
 Frons, vertex and mesonotum strongly tessellate and dullish; lateral face marks subquadrate, as wide as long *pauxilla*, n. sp.
9. Face and mesonotum weakly tessellate and comparatively shining; clypeus and large quadrate lateral marks white *biguttata* Timberlake
 Face and mesonotum strongly tessellate and dull; anterior line on each side of face, and band across anterior half of clypeus white. *albomarginata*, n. sp.
10. Head broader than long; mesoscutum more or less sparsely punctured, with thin erect hair 11
 Head rotund; mesoscutum tessellate, dullish, with close minute punctures and abundant, fine whitish pubescence; lateral face marks subtriangular, higher than wide *binotata* Timberlake
11. Head and thorax shining; frons distinctly punctured 12
 Head and thorax dull, frons granular tessellate, very obscurely punctured; mesonotum with widely spaced punctures and thin, fine, erect hair; abdomen fuscous, becoming testaceous at apex and beneath; lateral face marks large and ending very broadly at level of antennae *mazatlanica*, n. sp.
12. Abdomen fuscous above and beneath, mesoscutum minutely and delicately tessellate and with remote punctures and very thin, fine, erect hair *nanula* Timberlake
 Abdomen fuscous, with apical segments and underside rufotestaceous; mesonotum more conspicuously hairy than in *nanula*, although still sparsely punctured and thinly hairy. *euphorbiae* Timberlake
13. Clypeus and lateral face marks white 14
 Anterior border only of clypeus white, or face entirely dark 16
14. Cheeks rounded, not angulate anteriorly; clypeus not dentately produced on each side of labrum 15
 Cheeks moderately broad, angulate and slightly dentate anteriorly; disk of clypeus acutely produced on each side of labrum; clypeus, except upper border of disk, transverse lateral marks white *dissimulans* Timberlake
15. Head somewhat broader than long; clypeus, except upper border of disk, transverse lateral marks and tubercles white; abdomen ferruginous, with two nubilous yellowish marks on disk of tergite 2 *namatophila* Timberlake
 Head slightly longer than wide, cheeks broader than eyes; antennae inserted below middle of face; lateral marks quadrate, nearly reaching level of antennae; head and thorax dark blue, disk of mesoscutum and scutellum black; apical margin of tergites 2 to 4 and the apical segment rufotestaceous *nigrocaerulea* Timberlake
16. Anterior half of disk of clypeus yellowish white; head and thorax dark blue green, moderately shining; mesoscutum closely punctured; abdomen black, minutely and densely punctured *peculiaris* Timberlake
 Face entirely dark; head and thorax dull blue; mesoscutum strongly tessellate, with moderately sparse obscure punctures; abdomen minutely lineolate *diversa* Timberlake

***Perdita albomarginata*, n. sp.**

(Figs. 1422, 1423, 1460)

Male. Head and thorax dark bluish green; disk of mesoscutum, scutellum and metanotum black, supraclapeal area blackish. Base of mandibles, arcuate band across anterior half of clypeus, notched on each side of disk by black area on upper half, and thin line reaching from beneath anterior end of eyes to sides of clypeus white. Anterior rim of disk of clypeus pale testaceous. Head, otherwise, and thorax dark. Abdomen black without markings. Antennae and legs fuscous, small spot on front and middle knees

testaceous, and flagellum narrowly yellowish brown beneath except at base and apex. Proboscis brown. Tegulae testaceous brown. Wings dusky hyaline, nervures testaceous, subcosta fuscous, disk of stigma opaquely whitish.

Head subquadrate, wider than long; inner orbits slightly diverging in front; cheeks moderately receding, broadly rounded and about three-fourths as wide as eyes. Posterior ocelli their distance apart from occipital margin and about one-fourth more than that distance from nearest eye. Facial foveae elongate oval, very close to margin of eyes. Antennae inserted well below middle of face, scape falling far short of reaching level of anterior ocellus; flagellum moderately clavate, with middle joints slightly thicker than long. Antennal sockets about equidistant from each other and margin of eyes. Face below level of antennae strongly convex; disk of clypeus much broader than high with lateral extensions not inflexed but extending very narrowly to base of mandibles. Mandibles strongly curved, slightly widening to small acute inner tooth, and then broadly oblique to apex. Proboscis moderately long, galeae nearly as long as stipites and surpassing maxillary palpi. Tarsal claws with strong inner tooth. Pterostigma slender, slightly less than half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus about twice as long as apical truncation; first recurrent nervure received close to apex of first submarginal cell.

Head and thorax minutely tessellate and moderately dull. Frons and vertex impunctate; face below level of antennae with minute, shallow punctures, those on clypeus larger and well separated; and mesonotum with minute, widely spaced punctures. Abdomen shining, broadly ovate, about twice as long as broad and convex above. Pubescence white, fine, erect, moderately long, and rather copious on face, cheeks and sides of thorax, but thin on mesonotum and becoming shorter on face below level of antennae. Abdomen with abundance of very fine, short hair on disk of segments and longer hair on lateral margins and at apex. Subgenital plate about as broad as long, and much narrowed toward distinctly emarginate apex, with lobe on each side about half as wide as notch. Caulis of genital armature no longer than wide; parameral lobes inserted on sides of caulis, extremely long and slender, moderately curved inward and very acute at apex; sagittae of usual form in *Epimacrotera*, fimbriate beneath apex as seen from side with acute apex of rods curved upward.

Length 4.5 mm, anterior wing 3.1 mm, width of abdomen 1.5 mm.

Holotype male. Nochixtlan, Oaxaca, Mexico, 6,800 ft., August 23, 1963 (Scullen and Bolinger).

Paratype. One male, with head missing, collected with type. Types in collection of the California Academy of Sciences, San Francisco.

***Perdita mazatlanica*, n. sp.**

(Figs. 1424, 1425, 1461)

The male of *mazatlanica* is distinguished in the preceding key. The female runs to *polycarpae* Timb. and *williamsi* Timb. in the 1962 key (Part V, p. 93) and differs from *williamsi* in the smooth and more shining mesonotum, and from *polycarpae* in having a pale band on tergites 3 and 4, in some cases either interrupted or abbreviated.

Male. Head and thorax dark green, with mandibles except red tips, labrum, clypeus, large lateral marks, scape of antennae broadly beneath and tubercles white. Lateral marks about as broad as high, very broad at anterior ends and ending in slightly convex curve at lower level of antennal sockets. Abdomen fuscous, with apical depression of tergites 2 to 5, tergites 5 and 6 and apical part of venter testaceous brown, with apical depression of tergite 1 more rufotestaceous. Antennae otherwise brown, pedicel white beneath, flagellum slightly infuscated above. Legs fuscous, apex of femora briefly, anterior tibiae except beneath, base and apex of middle tibia, base of hind tibiae and apex only slightly, and all tarsi white. Tegulae testaceous, with basal white spot. Wings dusky hyaline, nervures testaceous, subcosta fuscous.

Head much broader than long, cheeks rounded, moderately receding and half as wide as eyes, or in more macrocephalous examples, three-fourths as wide. Posterior ocelli their distance apart from occipital margin and slightly more distant from eyes. Facial foveae obsolete. Antennae inserted below middle of face, flagellum moderately clavate, with middle joints thicker than long. Face gently convex; supraclpeal

area much broader than long, subantennal plates as broad as long; disk of clypeus much broader than high and broadly truncate at summit, with lateral extensions broadly inflexed but visible in frontal aspect. Mandibles moderately thick, gently curved, with small inner tooth before apex, and reaching far margin of labrum. Proboscis short, galeae about half as long as stipites. Pterostigma rather slender, about half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus nearly twice as long as apical truncation.

Abdomen broadly ovate, subdepressed, somewhat broader than thorax. Head and thorax minutely tessellate, moderately shining. Frons somewhat more roughly tessellate than other parts, duller, and obscurely punctured, sides of vertex with few minute punctures; face below level of antennae more shining, with sparse obscure punctures; mesonotum with sparse minute punctures. Pubescence whitish, fine, moderately long and erect, thin on mesoscutum, more abundant on scutellum, and very thin and short on face. Abdomen with very fine sericeous pubescence and with long plumose hair on tergite 7. Subgenital plate similar to that in other species of *Epimacrotera*, perhaps most similar to *biguttata* Timb. (Fig. 1304 as *parvula*), but having basal stalk strongly bifurcate. Genital armature similar to parts in *polycarpae* Timb. and *euphorbiae* Timb., with parameral lobes strongly hooked inward at apex, and volsellae larger.

Length 2.5-3 mm, anterior wing 2.0-2.4 mm, width of abdomen 0.7-1.2 mm.

Female. Head and thorax dark green, with marks on face and tubercles white. Lateral mark of face more or less semicircular, covering space between margin of eyes and sides of clypeus and in some cases about reaching level of antennal sockets. In some cases (two out of five specimens), similar mark on clypeus. Abdomen fuscous, with white marks or bands on tergites 1 or 2 to 4; tergites 1 and 2 with mark on lateral margins, in some cases absent on tergite 1; band on tergite 3 and 4 more or less emarginate behind on each side; that on tergite 3 emarginate in front medially or more or less broadly interrupted, and that on tergite 4 interrupted in some cases on each side or abbreviated. Legs fuscous, front femora at apex, front tibiae on outer side except at apex and middle and hind knees white. Antennae dusky, flagellum brown beneath. Tegulae and wings as in male.

Head broader than long; cheeks receding, about half as wide as eyes. Posterior ocelli about their distance apart from occipital margin and about one-fourth more than distance from nearest eye. Facial foveae narrow, about as wide as interval between them and eyes, and reaching from level of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted below level of middle of eyes, flagellum clavate, with joints mostly thicker than long. Face gently convex below level of antennae; disk of clypeus much broader than high and broadly rounded across summit; lateral extensions gradually inflexed and partly visible in frontal aspect. Supraclypeal area broader than high, and continuous with low triangular elevation between antennal sockets. Mandibles slender, reaching far margin of labrum and with small inner tooth before apex. Proboscis and wings as in male. Head and thorax minutely tessellate, but shining, and minutely and sparsely punctured on face and mesonotum. Abdomen rather dull, about twice as long as wide; pygidial plate triangular, a little longer than wide and narrowly obtuse at apex. Pubescence fine, thin and erect, with face except clypeus nearly bare; apical fimbria of abdomen long but thin; scopal hair of hind tibiae distinctly longer than greatest width of tibia.

Length 3.25-3.8 mm, anterior wing 2.5 mm, width of abdomen 1 mm.

Holotype male and allotype. Mazatlán, Sinaloa, Mexico, Oct. 19, 1968 (G. E. Bohart).

Paratypes. 9 males, 4 females, collected with the types.

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

***Perdita pauxilla*, n. sp.**

(Fig. 1462)

This small species from northern Arizona has the abdomen reddish and the head distinctly longer than wide.

Male. Head and thorax dark blue, posterior part of scutum, scutellum and metanotum black. Mandibles except red tips, labrum, clypeus and lateral marks pale yellow. Lateral marks quadrate, broader than high, extending only slightly above level of summit of clypeus, with the blue intruding between them and

sides of clypeus. Tubercles tipped with brown; right one more testaceous at apex. Abdomen dusky rufotestaceous, paler toward apex. Legs fuscous, dorsal edge of femora and anterior side of front tibiae yellowish. Scape of antennae black, flagellum fuscous except broadly brown beneath. Tegulae testaceous. Wings dusky hyaline, nervures testaceous brown, subcosta fuscous.

Head distinctly longer than wide, slightly narrowed above; inner orbits slightly divergent in front; cheeks rounded, hardly receding, as broad as eyes and widest above middle of eyes. Posterior ocelli their distance apart from eyes and about one-fourth more distant from occipital margin. Facial foveae elongate oval, close to margin of eyes and halfway between level of antennal sockets and anterior ocellus. Antennae inserted well below middle of face, flagellum slightly clavate, with middle joints as long as thick. Antennal sockets equidistant from margin of eyes and each other. Face below level of antennae gently convex; lateral extensions of clypeus inflexed, extending very narrowly to base of mandibles and partially visible in frontal aspect; disk of clypeus about one-fourth broader than high and rounded at summit. Mandibles moderately thick, with small inner tooth, and reaching slightly beyond far margin of labrum. Proboscis elongate, galeae reaching base of stipites and glossa extending to front coxae. Tarsal claws strongly dentate, inner tooth nearly as long as primary tooth. Pterostigma slender, widest at middle, somewhat less than half as wide as first submarginal cell, and emitting radius slightly before middle; marginal cell equally long beneath and beyond stigma, with metacarpus slightly longer than apical truncation; second submarginal cell narrowed one-half above.

Head and thorax minutely tessellate and dullish. Frons and vertex impunctate, face below level of antennae more alutaceous than tessellate, with small sparse shallow punctures, but clypeus almost impunctate; cheeks more weakly tessellate than vertex and with minute, well separated setiferous punctures. Mesonotum and mesopleura with minute, widely spaced setiferous punctures. Abdomen broadly ovate, about one and one-half times longer than wide, depressed but convex above. Pubescence very short, fine, erect and whitish, very thin and short on anterior part of face, mesonotum and mesopleura, longer and denser on sternum, and frons and vertex bare. Abdomen with very fine sericeous pubescence. Subgenital plate about as long as wide, somewhat unsymmetrical, rounded at apex, with basal stalk broad and broadly bifurcate. Genital armature very similar to parts of *nigrocaerulea* (Fig. 65), but sagittal rods as seen from above considerably broader (genital armature lost before it could be figured).

Length 3.1 mm, anterior wing 2.4 mm, width of abdomen 1.4 mm.

Holotype male. 50 miles north of Williams, 6,700 ft., Coconino Co., Arizona, Sept. 8, 1966 (R. B. Roberts).

Type received from Dr. Roberts and will be deposited in collection of the California Academy of Sciences, San Francisco.

There is no flower record for this bee, but judging from the narrow head and long tongue, it should visit a long tubular flower like that of *Gilia*.

Subgenus *Cockerellia* Ashmead

In the key to *Cockerellia* (1954:386-391), a new species from Baja California runs to couplet 6, and in the revision of that couplet (Part VII, p. 19, 1968), it falls with *luculenta* Timb., and may be distinguished in a new revision as follows:

- 6a. Face markings white; no light marks on thorax except on tubercles and disk of pronotum 6b
 Face yellow below level of antennae, except clypeus in some cases streaked with fuscous; pronotum mainly yellow and sides of propodeum with large yellow mark; abdomen with broad yellow bands *propodealis* Timberlake
- 6b. Face mainly white below level of antennae, with subantennal marks larger than transverse supra-clypeal mark; legs mainly white beyond apex of femora, scape of antenna nearly all white, and abdomen with interrupted white bands; wings milky hyaline *luculenta* Timberlake
- Clypeus except two fuscous stripes joined on anterior margin and small subantennal marks forming slightly arcuate band with transverse supra-clypeal mark, white; antennae and legs mainly dark, except on front

tibiae and tarsi; abdomen dusky with five broad white bands; wings
 dusky hyaline, with dark nervures *albomaculata*, n. sp.

Perdita albomaculata, n. sp.

Female. Head and thorax dark green. Mandibles white at base, shading through testaceous into dark red at apex. Labrum testaceous. Clypeal, lateral, subantennal and supraclypeal marks yellowish white, but the green reaching narrowly to clypeus on each side. Lateral marks ending very acutely above level of antennae. Transverse supraclypeal mark and subantennal spots forming slightly arcuate band, leaving outer side and anterior end of subantennal plates dark. White of clypeus divided into three parts by fuscous stripes united with broad transverse band on anterior border of disk, with median white stripe as wide as dark stripe. Interrupted band on hind margin of pronotum and tubercles white. Abdomen white, with broad band at apex of tergite 1 to 5 black; pygidial plate testaceous. Legs fuscous tinged with brown and paler apically; apex of front femora and outer side of front tibiae yellowish white, with dark part of tibiae and tarsi testaceous brown. Antennae fuscous, with short white stripe on basal part of scape. Tegulae testaceous, with white spot at base. Wings distinctly dusky hyaline, nervures testaceous brown, subcosta infuscated, disk of stigma pale testaceous.

Head distinctly broader than long; cheeks strongly receding and three-fourths as wide as eyes. Posterior ocelli about their distance apart from eyes and a little more than half as far from occipital margin. Facial foveae elongate oval, close to margin of eyes, not quite reaching level of antennal sockets and as long as width of supraclypeal area. Antennae inserted a little below middle of face, flagellum slightly clavate with middle joints as long as thick. Face below level of antenna strongly convex; supraclypeal area transverse, united with strong convex ridge between antennal sockets; clypeus large, disk slightly broader than high, strongly rounded at summit, with lateral extensions not visible in frontal aspects. Mandibles with moderately broad dilation on inner margin, and with acute apex curved rather than bent inward in comparison with some other species of *Cockerellia*. Proboscis moderately elongate, galeae a little shorter than stipites. Pterostigma almost three-fourths as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus about three times as long as apical truncation; second submarginal cell narrowed about three-fourths above.

Head and thorax shining, very finely and weakly tessellate, with vertex more strongly tessellate and duller than other parts; frons and mesonotum very finely and sparsely punctured, with punctures of mesoscutum widely spaced. Abdomen broadly oval, depressed, moderately shining. Pubescence fine, short, erect, and thin on face and mesonotum and longer and denser on sides of thorax. Abdomen nearly bare except for thin apical fimbria. Scopal hair of hind tibiae long, fine and moderately dense, with hairs simple.

Length about 6 mm, anterior wing 4 mm, width of abdomen 1.8 mm.

Holotype female. 62 miles south of El Crucero, Baja California, Dist. Sur, Mexico, on *Perityle* sp., Nov. 6, 1965 (W. Ewart and R. Dickson).

Type in collection of the University of California, Riverside, California.

Perdita imbellis Timberlake

Perdita imbellis Timberlake, 1968, Univ. Calif. Publ. Entomol., 49:21, Line 4, ♂.

Perdita hilaris Timberlake, 1968, Univ. Calif. Publ. Entomol., 49:21, Line 42, ♂.

Timberlake, 1971, Univ. Calif. Publ. Entomol., 66:2, ♀ (new synonymy).

New record. 2 males, 4 females, 5 miles north of Cameron, Coconino Co., Arizona, on *Cleomella*, Sept. 21, 1966 (Rust, Torchio, Wood, and Yousef).

The females recorded above agree with the specimen recorded in 1971 from Newcomb, San Juan County, New Mexico. The clypeus may have two black stripes on the disk, and the white band on tergite 2 of the abdomen may be interrupted or merely notched behind in the middle. It seems certain from this new material that *hilaris* must fall as a synonym.

Perdita luculenta Timberlake

New record. One female, 27 miles east of Twentynine Palms, San Bernardino Co., California, Oct. 18, 1965 (J. Wilcox).

Subgenus *Procockerellia* Timberlake*Perdita moldenkei*, n. sp.

This is a male *Procockerellia* that runs in the key (1971:5) to *albonotata* Timb., but differs in having the scape of antennae and thorax dark, and the pale color of the face restricted to the sides of the clypeus and small adjacent lateral marks. This species is named in honor of A. R. Moldenke from whom it was received.

Male. Head and thorax dark blue-green, thorax entirely dark. Mandibles except rufescent tip and infuscation at extreme base, large mark on lateral extensions of clypeus and small lateral marks yellow (pale color reddened by cyanide in type, but probably clear yellow). Disk of clypeus dark, less strongly green than supraclypeal area, with dark part narrowed anteriorly and rather broadly separating yellow parts. Lateral marks adjacent to sides of clypeus and to anterior end of subantennal plates. Extreme anterior corners of parocular areas also yellowish. Labrum yellow with median triangular infuscated mark, pointed above. Antennae yellow, but scape and pedicel mainly fuscous, and flagellum infuscated at base above; apex of scape beneath and extreme base including radicle joint yellow. Abdomen black, with broad apical depression of segments whitish subhyaline; small mark on each side of tergites 2 to 6 yellow, mostly on reflexed ventral part of segments, but with slender extensions for short distance mesad, and adjacent to margin of apical depression of segments. Apical half of tergite 7 testaceous yellow. Legs fuscous, small spot at apex of front and middle femora, anterior side of front tibiae, streak on anterior side of middle tibiae, and all tarsi yellow. Tegulae testaceous brown. Wings milky hyaline, with pallid nervures and stigma.

Head as broad as long; cheeks rounded, strongly receding and moderately wider than eyes. Posterior ocelli about their distance apart from margin of eyes and one-fourth less that distance from occipital margin. Facial foveae small about their own length from margin of eyes. Antennae inserted below middle of face but slightly above level of middle of eyes; flagellum moderately clavate, with middle joints as long as wide. Face below level of antennae strongly convex from side to side; disk of clypeus broader than high and rounded across summit, with lateral extensions narrowed to base of mandibles and mostly visible in frontal aspect. Mandibles tapering, acute, and reaching beyond far margin of labrum but not to base of each other. Proboscis elongate, galeae longer than stipites; maxillary palpi very short, five-jointed; labial palpi exceeding galeae, with first joint three times as long as next three together. Flanks of pronotum strongly impressed, but posterior corners of disk little prominent. Tarsal claws of hind legs long and simple, those of other legs bifid. Pterostigma about half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus slightly more than twice as long as apical truncation.

Frons and vertex matt, impunctate; head otherwise and thorax shining, minutely punctured. Punctures of face below level of antennae well separated. Anterior border of mesoscutum minutely tessellate, disk otherwise polished; punctures of scutum and scutellum numerous, but separated, becoming slightly closer on anterior margin of scutum. Pubescence whitish, long, erect and moderately dense, very long on cheeks, moderately long on mesonotum and shorter on face below level of antennae. Abdomen dullish, impunctate, narrowly ovate, widest near apical part of tergite 2 and about as long as head and thorax together. Tergite 7 narrowed into broad, slightly rounded apical lobe. Subgenital plate similar to that in species of *Cockerellia*, with broad bifurcate base, and apical lobe about three times longer than wide, rounded at apex, and fringed at apex with rather short hair. Caulis of genital armature with submedian dorsal processes, and parameral lobes strongly dilated in basal part as in species of *Cockerellia*.

Length 6 mm, anterior wing 4.25 mm, width of abdomen 1.7 mm.

Holotype male. Ocotillo-Borrego area, San Diego Co., California, at nectaries of *Encelia farinosa*, March 27, 1972 (J. L. Neff).

Paratype. One male taken with the type (Moldenke numbers 60558-60559).

Type in collection of the University of California, Riverside.

Subgenus *Allomacrotera* Timberlake*Perdita moabensis* Timberlake

(Figs. 1426, 1427, 1463)

A male *Perdita* that has the same data as the type female of *moabensis*, although mounted differently, with different type of label, is accepted confidently as the opposite sex. This male has the hind claws finely dentate, the flanks of the pronotum but little impressed and the maxillary palpi very short and four-jointed. Consequently *moabensis* must be transferred from *Procockerellia* to *Allomacrotera*. It differs from *stephonomeriae* in having the frons strongly tessellate and the abdomen with pale lateral spots, sternite 6 with a pendent tuft of white hair on each side and the hind tibiae clavate with thin, long, white hair.

Male. Head and thorax dark blue-green; mandibles except red tips, labrum, clypeus except small black mark on each side of summit and short submedian stripe on disk, large lateral marks, four small spots across subantennal and supraclypeal area and short streak on anterior part of inferior orbits white. Lateral marks as broad as high, rounded within and reaching level of antennae on orbits, with dark color of face extending narrowly and acutely to each side of clypeus. Thorax dark, except for white mark on basal inner side of tubercles. Abdomen black, apical depression of tergites testaceous brown, that of apical tergite more whitish; spot of white or transverse streak on each side of tergites 1 to 5, these marks extending onto reflexed ventral part of segments. Sternite 2 with large white mark on each side and sternite 3 with much smaller marks. Legs dark, apex of femora, front tibiae except beneath and behind, anterior side of middle tibiae, base of hind tibiae and all tarsi yellowish white. Tarsal claws ferruginous at apex and white on basal half. Antennae dark, flagellum brownish, becoming paler toward apex, underside of scape and flagellum white, becoming more broadly pale toward apex, apical joint nearly all pale. Tegulae testaceous, with small white spot at base. Wings milky hyaline, nervures pallid, stigma opaque, pale yellowish.

Head quadrate, as broad as long; cheek moderately receding, rounded, widest opposite upper end of eyes and about as wide as eyes. Posterior ocelli about their distance apart from occipital margin and nearest eye. Facial foveae shallow, linear, close to margin of eyes and about as long as diameter of ocelli. Antennae inserted below middle of face, but above level of middle of eyes; flagellum slender, middle joints slightly longer than thick. Face below level of antennae gently and evenly convex; disk of clypeus distinctly broader than high and equal to transverse length of lateral extensions, with these mainly visible in frontal aspect. Mandibles thick, tapering in apical fourth to acute apex and reaching nearly to base of each other. Proboscis elongate, glossa about 3.8 mm long. Tarsal claws of front and middle legs bifid, with inner tooth thicker than apical tooth; claws of hind tarsi long, strongly curved, with small inner tooth well removed from very acute apex. Pterostigma large, emitting radius at middle, and about three-fourths as wide as first submarginal cell; marginal cell longer beneath than beyond stigma, with metacarpus twice as long as apical truncation; second submarginal cell narrowed two-thirds above. Propodeum with broad obliquely inclined basal part. Abdomen elongate oval, convex above, with apex strongly recurved.

Head and thorax moderately shining, but frons and vertex minutely tessellate, almost smooth next to eyes, and with minute, well separated punctures; face below level of antennae mostly smooth and impunctate. Thorax minutely tessellate and shining, with posterior middle of scutum and scutellum polished; punctures of mesonotum very fine, but distinct and well separated. Abdomen minutely lineolate, rather dull, and with minute sparse punctures on apical tergites. Pubescence white, long, erect, and thin, but conspicuous, longest on vertex, occiput, cheeks, and sides of thorax, somewhat shorter on mesonotum and distinctly shorter on frons. Abdomen thinly hairy on lateral margins of apical segments; venter with long erect hair on middle of sternites 1 and 2, minute sericeous pubescence on following segments, and tuft of pendent hair on lobes of sternite 6. Subgenital plate triangular, longer than wide, acute at apex, thickened dorsoventrally and split into two planes in the apical part; lateral apodemes nearly horizontal; basal stalk with broad divaricate lobes, curving downward and on account of curvature appearing acute at end in dorsal view. Caulis of genital armature about as long as wide and as deep dorsoventrally as wide, emarginate at base, and produced on each side into parameral lobes, about as long as caulis, very broad at base, much narrowed apically and with tuft of hair at apex; sagittae thin dorsoventrally, almost parallel-sided,

although slightly wider in apical half, blunt at apex and as seen in lateral view narrowed to sharp apex; basal rods of sagittae short, curved upward and with their tips closely opposed.

Material examined. One male, Moab, Grand Co., Utah, August 8, 1963 (G. L. Knowlton).

Subgenus *Pentaperdita* Cockerell

***Perdita nevadiana*, n. sp.**

This species is clearly allied to *annexa* Timb. (1960:133-134) from Santa Fe, New Mexico, but the frons is shining, the lateral marks of the face are entirely transverse, the marks on tergite 2 are reduced to a small spot touching the posterior end of the lateral foveae, the mandibles are broad but not dilated within, and the facial foveae diverge from the margin of eyes above.

Female. Head and thorax dark blue-green, with dark stripes on clypeus, disk of mesoscutum, scutellum and metanotum black. Clypeus, transverse lateral marks, collar of pronotum, streak on each side of disk and tubercles white. Dark stripes on clypeus somewhat wider than interval between them, uniting on anterior margin of disk and not quite reaching summit. Abdomen black, with small spot reaching posterior end of lateral foveae on tergite 2, well interrupted band on tergite 3, curving backward at outer ends and nearly reaching lateral margins, and two narrowly separated oval marks on tergite 4, white. Pygidial plate ferruginous. Legs fuscous, small spot at base of front and middle tibiae white. Antennae dark, flagellum broadly brown beneath. Labrum dilute fuscous, rufotestaceous at apex. Mandibles black at base and dark red on apical half. Tegulae pale testaceous. Wings whitish subhyaline, nervures pale testaceous, margins of stigma and subcosta brown.

Head as broad as long; cheeks moderately receding, two-thirds as wide as eyes. Posterior ocelli equidistant from each other and margin of eyes and occipital margin. Facial foveae well impressed, about their own width from margin of eyes anteriorly, each diverging from eyes above, and about two-thirds as long as space between antennal sockets and anterior ocellus. Flagellum of antennae slightly clavate, with middle joints a little thicker than long. Face below level of antennae strongly convex, disk of clypeus broader than high, well rounded at summit, and with lateral extensions visible in frontal aspect. Mandibles broad, hardly dilated within, but narrowed to acute apex by curvature of outer margin. Proboscis moderately elongate, with galeae longer than stipites and about twice as long as maxillary palpi. Pterostigma rather slender, hardly more than half as wide as first submarginal cell; marginal cell a little longer beyond than beneath stigma, with metacarpus nearly twice as long as apical truncation. Pygidial plate plane, narrowed to rounded, subacute apex.

Head and thorax shining, vertex minutely tessellate and dullish. Puncturation fine, sparse on vertex, clypeus and supraclipeal area, and close on frons and parocular areas to level of summit of clypeus. Mesonotum polished, with moderately close punctures, becoming sparse on posterior middle of scutum. Abdomen dullish, with shallow punctures, especially on tergites 4 and 5. Pubescence white, rather long and erect; long and dense on cheeks and thin on face and mesonotum. Apical fimbria of abdomen rather dense and long. Scopa of hind tibiae long and dense for *Perdita*, hair on anterior side twice as long as greatest width of tibia.

Length 4.9 mm, anterior wing 3.5 mm, width of abdomen about 1.4 mm.

Holotype female. Valley of Fire, Clark Co., Nevada, on *Baileya*, May 17, 1970 (P. F. Torchio). Type in collection of the University of California, Riverside.

Subgenus *Hexaperdita* Timberlake

***Perdita glamis*, n. sp.**

(Figs. 1428, 1429, 1464)

This is a remarkable species discovered in the sand dunes area of Imperial County, California. It is allied to *xanthisma* Ckll., with a macrocephalous male having the head in some cases much broadened anteriorly with diverging orbits; the

mandibles are thick, with an attenuate incurved apical part, and they reach to the base of each other; and the cheeks are much wider than the eyes.

Male. Head and thorax dark blue, disk of mesoscutum, scutellum and metanotum black. Mark on cheeks below anterior end of eyes, mandibles except attenuate reddish apex, labrum, clypeus, lateral marks broader than high, but reaching level of antennae on orbits, slightly oblique subantennal marks, anterior border of disk of pronotum, band on posterior border interrupted medially, and large mark on tubercles, white. Supraclypeal area blue, with thin line of white on anterior margin in one specimen. Abdomen fuscous without markings, but reflexed ventral part of tergites and bands on sternites more or less distinctly pallescent or whitish; apical depression of tergite 6 and tergite 7 testaceous. Legs fuscous, with extreme apex of all femora, anterior side of front tibiae broadly, base of middle and hind tibiae and all tarsi white. Antennae dark, scape white beneath, flagellum broadly pale yellowish brown beneath. Tegulae pale testaceous, with white mark at base. Wings milky hyaline, nervures whitish, margins of stigma testaceous, darker on outer side.

Head broader than long, eyes diverging in front; cheeks rounded, strongly receding and much broader than eyes. In paratype, head much broadened anteriorly, with inner orbits strongly divergent in front. Posterior ocelli their distance apart from eyes and occipital margin. Facial foveae linear, four or five times longer than wide and close to margin of eyes. Antennae inserted below middle of face, but above level of middle of eyes, scape reaching nearly to level of anterior ocellus, flagellum slightly clavate, with middle joints as long as thick. Face nearly plane from anterior ocellus to clypeal margin, but gently convex from side to side anteriorly; disk of clypeus not much broader than high, rounded at summit, with its width about equaling lateral extensions, these extending narrowly to base of mandibles and mainly visible in frontal aspect; supraclypeal area transverse. Mandibles thick at base, gently curved, and narrowed in apical fifth to incurved, attenuate and acute apex. Proboscis long, glossa reaching base of front coxae. Flanks of pronotum broadly impressed, with separate impression below posterior corners of disk, these rounded, sharply margined and far below level of disk of mesoscutum. Pterostigma as long and about two-thirds as wide as first submarginal cell; marginal cell longer beneath than beyond stigma, with metacarpus nearly twice as long as apical truncation.

Head and thorax shining, with frons, vertex and mesonotum polished and minutely punctured; punctures of frons moderately close, those of notum sparse. Pubescence long, fine, erect and white; abundant in general, but rather thin on face and mesonotum; hair of hind tibiae long and much denser than in female sex of most species of *Perdita*. Subgenital plate broad at base, greatly narrowed on apical half, with rounded apex and fine pubescence fringing margin. Genital armature similar to that of *xanthisma* Ckll., but parameral lobes dilated at incurved apex and sagittae much thinner dorsoventrally.

Length 5 mm, anterior wing 4 mm, width of abdomen 1.5 mm.

Holotype male. Glamis, Imperial Co., California, June 13, 1965 (G. E. Wallace).

Paratype. One male, same data as type.

Types in collection of the University of California, Riverside.

Perdita labrosa, n. sp.

This species of *Hexaperdita* from Jalisco, Mexico, has the light marking reduced to small lateral marks on the face and lateral marks on the abdomen, and the labrum is curiously impresso-emarginate at apex.

Female. Head and thorax dark green, with labrum and clypeus except upper border black; light markings reduced to small L-shaped lateral marks, reaching level of antennae and thickened and extended below to margin of clypeus. Abdomen black, with oblique white mark on each side of tergites 2 to 4, reaching lateral margins. Legs and antennae entirely dark, but tibial spurs pale testaceous. Mandibles black at base, shading into testaceous and dark red at apex. Proboscis brownish. Tegulae testaceous brown. Wings very dusky or fuliginous, nervures very dark.

Head as broad as long; cheeks rounded, only slightly receding and about two-thirds as wide as eyes. Posterior ocelli a little more than their distance apart from occipital margin and nearly twice as far from eyes. Facial foveae shallow, twice as wide as interval between them and eyes, and reaching from level of

antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted below middle of face, scape longer than foveae, but not reaching level of anterior ocellus; flagellum moderately clavate, with middle joints as long as thick. Antennal sockets in definite impression on each side of median ridge, and closer together than to margin of eyes. Face below level of antennae moderately convex, disk of clypeus broader than high, and rounded at summit; lateral extensions strongly inflexed and not visible in frontal aspect. Labrum thick, triangularly impressed apically, disk appearing acutely emarginate in frontal aspect, but true apical margin truncate. Mandibles thick at base, dilated on inner margin, rather abruptly narrowed one-half before apex, then tapering to blunt apex. Proboscis long, galeae elongate, reaching shortly beyond base of stipites. Pterostigma more than four times longer than wide, and two-thirds as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus more than twice as long as apical truncation. Tarsal claws acute and simple. Abdomen broadly ovate, broadest across third segment; pygidial plate broad, but narrowed to notched apex.

Head and thorax shining, except frons and venter tessellate and moderately dull, and mesonotum more weakly tessellate and somewhat dullish. Puncturation minute, close, but very obscure on frons, and distinct, but sparse on vertex and cheeks, and moderately dense on mesonotum. Disk of clypeus with numerous coarse shallow punctures. Pubescence fine, erect, moderately long and whitish, most abundant on cheeks and occiput and thin on face and mesonotum, with frons and vertex nearly bare. Hair of front coxae short and moderately dense. Scopular hair of hind legs moderately dense, fine, and distinctly longer than greatest width of tibia.

Length, with head stretched forward, 6 mm, anterior wing 4 mm, width of abdomen 2 mm.

Holotype female. 15 miles northwest of Guadalajara, Jalisco, Mexico, Sept. 17, 1970 (G. E. and R. M. Bohart).

Type in collection of the University of California, Riverside.

Subgenus *Perditella* Cockerell

Perdita minuta, n. sp.

This is the fifth known species of *Perditella* and is similar to *minima* Ckll., but with a duller, darker, more ferruginous brown color, and with a quadrate white mark jointly on the scutellum and metanotum. The mesoscutum also has a thin band of appressed white pubescence.

Female. Head, thorax and abdomen ferruginous brown, darker and duller than in *minima*; collar and narrow hind margin of disk of pronotum whitish; scutellum and metanotum each with creamy white band, thinly extended laterally on each side and jointly forming quadrate mark. Abdomen unmarked, pygidial plate much paler and testaceous, very fine lateral foveae of tergite 2 infuscated. Legs darker than thorax, or somewhat infuscated, front tarsi yellowish. Scape concolorous with face, flagellum subinfuscated. Mandibles, proboscis, and tegulae concolorous with adjacent parts. Wings hyaline, but slightly dusky as in *minima*, nervures brown, subcosta darker, stigma pale brown except clear at base.

Head a little broader than long; cheeks strongly receding, nearly half as wide as eyes. Posterior ocelli somewhat less than their distance apart from occipital margin and nearly twice that distance from eyes. Facial foveae very short and linear, well removed from margin of eyes as in *minima*. Antennae inserted well below middle of face, scape falling far short of reaching level of anterior ocellus, flagellum clavate, with middle joints as long as thick. Proboscis retracted in type, but apparently very short as in *minima*. Anterior part of mesoscutum strongly convex and well elevated over disk of pronotum as in other *Perditella*. Venation as in *minima*. Pygidial plate a little less broad than in *minima* and tapering more evenly to subacute apex.

Frons, vertex and mesoscutum very minutely tessellate, moderately dull, and duller than other parts of head and thorax, with all parts quite impunctate. Pubescence white, thin, short and erect on cheeks, occiput and sides of thorax; face with very thin short hair below level of antennae; mesoscutum with thin band of short appressed hair across anterior middle, but anterior border and posterior middle bare. Apical fimbria of abdomen short and thin. Scopular hair of hind legs thin and about as long as greatest width of tibia. Hair of middle tibiae comparatively coarse and dense.

Length 2.6 mm, anterior wing 1.8 mm, width of abdomen about .75 mm.

Holotype female. Belem, Sonora, Mexico, Sept. 4, 1970 (G. E. and R. M. Bohart).
Type in collection of the University of California, Riverside.

Subgenus *Pygoperdita* Timberlake
Perdita arizonica Timberlake

New record. One male, Pinto, Utah, June 10, 1966 (G. F. Knowlton).

Perdita duplonotata Timberlake

New record. 2 females, 4 males, Logandale, Clark Co., Nevada, April 18, 1959 (R. C. Bechtel).

Perdita fallugiae Timberlake

New record. One female, St. George, Washington Co., Utah, on *Stanleya*, August 4, 1963 (G. E. Bohart).

Perdita mormonica Timberlake

New record. One female, Pine Valley, Utah, June 16, 1961 (O. Davis); one female, Washington Co., Utah, June 10, 1966 (G. F. Knowlton).

Perdita nevadensis culbertsoni Timberlake

As the pollen-collecting habits of *nevadensis* have never been recorded, I am pleased to learn from A. R. Moldenke that *culbertsoni* is extremely abundant in the vicinity of Camp Mathis, Tuolumne County, California, where it collects pollen from *Perideridia gairdneri* and visits *Eryngium aristulatum* frequently for nectar. He also has informed me that the nest sites are often in the dried adobe soil of vernal pools which places the diapausing stages under water for a part of the year.

***Perdita torchioi*, n. sp.**

This is a new species of *Pygoperdita*, running to *santaclarensis* Timb. and *coalingensis* Timb. in the key (1956:276-284), and it differs by having the frons and vertex smooth and shining, and the lateral face marks large and reaching above level of antennae.

Female. Head and thorax shining, dark blue-green, disk of mesoscutum and scutellum blackish. Base of mandibles, clypeus, large triangular lateral marks, reaching above level of antennae and intruding between foveae and eyes, tubercles and interrupted band on hind margin of disk of pronotum creamy white. Clypeus with two short oblique fuscous stripes meeting at middle of summit. Labrum testaceous, and mandibles shading through testaceous to red at apex. Abdomen nearly concolorous with thorax on tergite 1 except for ferruginous apical depression. Apical depression of following segments ferruginous, and also tergite 5 except shaded with pale yellow across middle of base. Tergites 2 to 4 each with narrowly interrupted, basal band, somewhat more yellowish than face marks; that on tergite 2 enclosed by black, and those on tergites 3 and 4 bent backward at outer ends to reach lateral margins and followed by an enclosed black or fuscous band. Tergites 3 and 4 with large black mark at basal corners, and the dark band on tergite 4 narrow and arcuate, but dilated at outer ends, and followed by narrow preapical yellowish band. Pygidial plate fuscous. Legs fuscous, anterior side of front tibiae and line on middle tibiae pale yellow. Antennae fuscous, scape narrowly whitish beneath and flagellum broadly yellowish brown beneath. Tegulae pale testaceous, with white mark at base. Wings subopaquely whitish, nervures pale testaceous, subcosta more infuscated.

Head broader than long, thick fronto-occipitally, with cheeks almost as broad as eyes. Posterior ocelli slightly more than half their distance apart from occipital margin and about two-thirds of that distance from nearest eye. Facial foveae shallow, wider than interval between them and eyes and reaching about two-thirds of distance from upper level of antennae sockets to level of anterior ocellus. Face below level of antenna strongly convex; disk of clypeus broader than high, rounded at summit, with outer ends very broad and strongly inflexed and forming broad rounded projection on each side of base of labrum. Mandibles thick, tapering and simple. Pterostigma about four times longer than wide and about two-thirds as wide as first submarginal cell; marginal cell somewhat longer beyond than beneath stigma, with metacarpus about twice as long as apical truncation. Pygidial plate compressed, narrow at apex and widened toward base.

Head and thorax smooth, shining, and minutely punctured, with anterior border of mesoscutum weakly tessellate. Punctures of frons moderately close, leaving impunctate space in front of anterior ocellus, those of vertex, cheeks and mesonotum sparse, with middle of disk of scutum mainly impunctate; scutellum with close punctures on apical margin. Basal area of propodeum broad and minutely tessellate. Abdomen shining, especially on tergite 1; disk of tergites 2 to 4 with sparse minute punctures. Pubescence whitish, very fine, erect and thin on face and mesonotum and comparatively long and dense on front coxae and mesosternum.

Length about 6 mm, anterior wing 4.4 mm, width of abdomen 1.8 mm.

Holotype female. 16 miles east of Ajo, Pima Co., Arizona, on *Larrea divaricata*, April 16, 1969 (P. F. Torchio).

Type in collection of the University of California, Riverside.

Subgenus *Perdita* F. Smith

Zonalis Group

Perdita ciliata Timberlake

Perdita crassihirta Timberlake, 1968, Univ. Calif. Publ. Entomol., 49:46, ♀ (new synonymy).

New record. 2 females, one male, Athens, Umatilla Co., Oregon, on goldenrod, August 13, 1943 (Schuh and Rieder).

On comparison with *ciliata*, it seems certain that *crassihirta* is only a variation as the color characters do not hold and the apparent shorter, coarser pubescence may be due to the condition of the type.

Perdita compactilis, n. sp.

(Figs. 1430, 1431, 1465)

A population of a bee of the *Zonalis* Group has been discovered by A. R. Moldenke on Mount Laguna in San Diego County, California. This bee is similar to *repens* Timb., but different enough to be considered a distinct species until or unless intergrading populations can be discovered. In the key (1971:11-13) to certain species of the *Zonalis* Group, *compactilis* runs to *rivalis* Timb. and *repens*, and agrees better with *repens*.

Male. Agreeing with *repens* in sculpture, coloration, and markings, except supraclypeal mark typically divided into two spots, higher than wide, but broader than interval between them. Thorax entirely dark except yellow tubercles. Abdomen black above, with abbreviated yellow band on tergites 2 to 5, bands interrupted medially in about half of cases and often concealed by preceding segment on tergites 3 and 5. Legs dark, with much yellow on apex of coxae, on trochanters, anterior side of front and middle femora and tibiae, underside of hind pair and all tarsi except hind pair. Wings dusky hyaline, nervures dark. Frons and vertex opaque, with extremely minute punctures and fine hair on anterior part of frons. Mesonotum polished, with very sparse, fine setiferous punctures. Subgenital plate longer than wide.

rounded at apex, and with basal stalk longer and much more expanded than in *repens*. Genital armature similar to part in *repens*, but sagittae only slightly extending beyond apex of parameral lobes, and lobes in lateral view not extending below ventral outline of caulis; vibrissae about equal in length and mostly hidden by dorsal lobes of caulis.

Length about 3.5 mm, anterior wing 3 mm, width of abdomen 1.4 mm.

Female. Similar to *zonalis bernardina* Ckll., but distinctly smaller, with pygidial plate more narrowed to apex, frons more shining, with finer punctures and punctures of mesonotum sparser. Similar in color and markings, but supraclypeal mark in most cases present, either notched above or divided into two spots, and yellow bands of abdomen less broad, with that on tergite 1 much broken or obsolescent.

Length 4.75-5 mm, anterior wing 5.2 mm, width of abdomen 1.6 mm.

Holotype male and allotype. Mount Laguna, San Diego Co., California.

Paratypes. 12 males, 5 females, collected with the type.

Types in collection of the University of California, Riverside, and paratypes returned to A. R. Moldenke.

Perdita pratensis, n. sp.

The female of *pratensis* is much like typical *zonalis* Cress. in color and markings, but it differs from that and other species of the *Zonalis* Group in having the frons matt and virtually impunctate. In the key to the *Zonalis* Group (1958:304-315), it runs to *isocornae* Timb., but has the frons more distinctly dull and obscurely punctured; or it might go to *baccharidis* Ckll. which has the frons less minutely tessellate and less hairy (see key, Univ. Calif. Publ. Entomol. 17:2-22).

Female. Head and thorax dark green, but basal third of mandibles, labrum, clypeus, lateral marks strongly intruding between foveae and margin of eyes, supraclypeal mark much broader than high and emarginate above, scape of antennae, and pronotum except large dark mark on middle line of flanks, creamy white or pale yellow. Abdomen pale yellow with even fuscous band at junction of tergites 1-2 to 4-5 and small dark spot on each side of tergite 1; first dark band touching anterior end of lateral foveae on tergite 2, next two bands with part at base of segments slightly expanded at outer ends, but not quite reaching lateral margins, and distal band with slight anterior swelling on each side on tergite 4. Legs yellow, with small spot on front femora behind, streak on middle tibiae behind, and hind tibiae and tarsi fuscous. Small spot at apex of scape above black, and pedicel and flagellum dark, but narrowly whitish beneath. Mandibles shading through testaceous to red at apex. Tegulae testaceous, with white mark at base. Wings dusky hyaline, nervures and margins of stigma testaceous, subcosta brownish except at base.

Head a little broader than long; cheeks moderately receding, evenly rounded and about two-thirds as wide as eyes. Posterior ocelli their distance apart from occipital margin and somewhat closer to eyes. Facial foveae well impressed, about twice as wide as interval between them and eyes and reaching from level of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted below middle of face, with middle joints of flagellum as long as wide. Face below level of antennae gently convex, with disk of clypeus much broader than high and truncate at summit; lateral extensions of clypeus visible in frontal aspect. Mandibles moderately thick and abruptly narrowed on inner margin before apex. Proboscis moderately long, galeae as long as stipites and slightly exceeding maxillary palpi. Pterostigma about two-thirds as wide as first submarginal cell; marginal cell a little longer beyond than beneath stigma, with metacarpus about one-half longer again than apical truncation. Abdomen broadly ovate; pygidial plate as long as wide at base, and rounded at apex.

Head and thorax shining, but frons microscopically granular tessellate and dull, with extremely minute, obscure punctures on each side next to foveae; vertex minutely tessellate, with several obscure punctures; cheeks smooth and minutely punctured except for broad impunctate space at margin of eyes. Thorax polished, except propodeum delicately tessellate; mesonotum and flanks of thorax with minute sparse punctures, becoming more separated on middle of scutum. Pubescence white, fine, erect and moderately long; face nearly bare except for very fine hair between foveae and antennal socket on each side; thorax

with thin hair, moderately long on mesonotum and longer on mesopleura. Apical fimbria of abdomen moderately long and thin. Scopal hair of hind legs normal for *Zonalis* Group.

Length 5.5 mm, anterior wing crumpled, about 3.4 mm, width of abdomen 1.7 mm.

Holotype female. Poison Meadow, Fresno Co., California, August 17, 1969 (Susan Conn).
Type in collection of the University of California, Riverside.

Halictoides Group

***Perdita abbreviata*, n. sp.**

(Figs. 1432, 1433, 1466)

This new species of the *Halictoides* Group is hardly distinguishable from *chamaesarachae* Ckll. or *physalidis* Timb., except by the terminalia. The abdomen is dull ferruginous, but perhaps discolored and normally as light as in *chamaesarachae*.

Male. Head and thorax dark blue-green; mandibles except red tips, labrum, face below level of antennae, scape of antennae broadly beneath and tubercles white. Abdomen dull ferruginous. Posterior margin of disk of pronotum with trace of white on each side. Antennae otherwise fuscous, with flagellum broadly brownish beneath. Legs fuscous, apex of all femora, front tibiae and tarsi, middle tibiae except beneath and behind, base of middle and hind tarsi white; tarsi otherwise dusky. Tegulae testaceous hyaline, large mark at base white. Wings hyaline, nervures testaceous, margin of stigma and subcosta dilute fuscous.

Head rotund, slightly broader than long; cheeks moderately receding, about three-fourths as wide as eyes. Posterior ocelli about their distance apart from nearest eye and somewhat closer to occipital margin. Facial foveae small, shallow, longer than wide, one on right side larger than other. Antennae short, inserted a little below middle of face, joints of flagellum mostly thicker than long. Face below level of antennae gently convex; disk of clypeus somewhat broader than high, with lateral extensions visible in frontal aspect; supraclypeal area about twice as broad as high. Mandibles reaching far margin of labrum. Proboscis short, galeae about as long as stipites; maxillary palpi abbreviated, with three joints; labial palpi with three joints; first joint about twice as long as next two together. Pterostigma about three-fourths as wide as first submarginal cell; marginal cell about as long beneath as beyond stigma, with metacarpus subequal to apical truncation.

Head and thorax shining, nearly impunctate, but with few scattered fine punctures on frons and mesonotum; frons smooth and minutely tessellate, mesonotum polished. Pubescence white, fine, short and thin, mesonotum with scattered erect hairs. Abdomen ovate, depressed, about twice as long as wide. Subgenital plate nearly as in *physalidis*, except for more truncate apex. Sternite 7 with a semicircular median notch as broad as lobe on each side. Genital armature about as in *physalidis*, with very broad parameral lobes, having broad subvertical wall partly visible in dorsal view, and apex of lobes slightly emarginate, without deep incision as in *chamaesarachae* and *physalidis*; sagittae fused and broad, but acute at apex; vibrissae long, closely appressed to sides of sagittae, and well exposed in dorsal view; caulis much broader than long and strongly bilobed in dorsal view.

Length about 3 mm, anterior wing 2.3 mm, width of abdomen 1 mm.

Holotype male. 22 miles southwest of Carlsbad, New Mexico, on *Chamaesaracha*, May 21, 1969 (Brothers, Krueger, and Michener).

Type in collection of the University of Kansas, Lawrence.

OCTOMACULATA GROUP

SUPPLEMENTARY KEY TO OCTOMACULATA GROUP

(See keys, Univ. Calif. Publ. Entomol., 1960, 17:2-22; 1968, 49:62-67)

- | | |
|--|----|
| 1. Females..... | 2 |
| Males..... | 10 |
| 2. Thorax marked with white or yellow besides usual marks on pronotum
or tubercles..... | 3 |

- Thorax entirely dark except marks on tubercles or disk of pronotum 4
3. Ground color of head, thorax and abdomen black; lateral marks of face extending to summit of eyes and vertex mostly creamy white; four strips on mesoscutum and large mark on sides of thorax white; abdomen with five white bands; facial foveae distinctly broader than narrow interval between them and eyes *hubbelli*, n. sp.
- Ground color of head, thorax and abdomen pale yellow, with black markings; abdomen with narrow dark band at junction of tergites 1-2 to 4-5; facial foveae but slightly wider than distinct interval between them and eyes *perpallida citrinella* Graenicher
4. Abdomen ferruginous, without dark markings 5
- Abdomen more or less pallid, with definite dark markings 7
5. Clypeus, lateral and supraclypeal marks of face yellow or white 6
- Face and thorax dark green except narrow streak on collar and mark on tubercles white; abdomen bright ferruginous except for dark lateral foveae of tergite 2; frons with a few minute punctures and nearly bare; mesonotum with well separated, minute punctures and thin short erect hair *subrufiventris*, n. sp.
6. Labrum dark, with median smooth space producing apparently subacute apex; clypeus, large lateral mark and supraclypeal mark white; abdomen clear ferruginous; pygidial plate obtuse at apex *polygonellae* Timberlake
- Labrum normal and white; abdomen ferruginous, often suffused with whitish across disk of tergites 1 to 3 or 4; pygidial plate notched at apex; clypeus and lateral marks white, supraclypeal mark transverse or divided into two spots *labergei* Timberlake
7. Head more or less distinctly broader than long; abdomen white or fulvous on two or three apical segments 8
- Head slightly longer than wide; lateral face marks broadly truncate at anterior end of foveae; clypeus with two black stripes on disk confluent with dark supraclypeal area, but subantennal plates green; abdomen white, with narrow dark band at junctions of first four segments and dark spot on each side of base of tergite 1 *albescens*, n. sp.
8. Abdomen fulvous on apical segments 9
- Abdomen creamy white with five black bands on first four segments, two apical segments white or pale testaceous; face marks white including supraclypeal area and subantennal spot on each side; mesonotum polished with scattered punctures and short thin hair *pretiosa*, n. sp.
9. Head distinctly broader than long; clypeus and lateral marks white, but head otherwise green; abdomen white with four black bands; pygidial plate narrowed to rounded apex; face and mesonotum densely punctured and hairy *hirtiosa*, n. sp.
- Head but little broader than long, shining blue-green, with clypeus, triangular lateral marks and transverse supraclypeal mark white; abdomen with three white and four dark bands on first three segments and fulvous beyond; face and mesonotum with comparatively sparse punctures and thin hair *crotonis leucoptera* Timberlake
10. Mesosternum with yellow T-mark 11
- Mesosternum without yellow T-mark 12
11. Abdomen ferruginous, in some cases suffused with pale yellow across disk of tergites 1 to 3 or 4; pronotum yellow, with dark narrow band extending broadly onto flanks; mesonotum dullish, with sparse minute punctures and thin, erect hair *subrufiventris*, n. sp.
- Abdomen pale yellow with ferruginous band, faint in some cases, across apex of tergites 1 to 5 and base of tergite 1 more or less fuscous; pronotum yellow, with narrow dark band on disk; mesonotum with minute punctures and moderately abundant erect hair *abducta*, n. name

12. Face white to level of antennae, with lateral marks extending broadly above that level 13
 Face yellow in middle or straight across above level of antennae 14
13. Abdomen dark with narrow, abbreviated and interrupted white band on tergites 1 to 3, and oblique marks on lateral margins of tergites 2 to 5 or 6, and in some cases subapical streak across middle of tergites 3 to 6; mesonotum dull, minutely punctured, with abundant short erect white hair *algodones*, n. sp.
 Abdomen dark on first four segments, pale at apex, with broad abbreviated band on tergites 2 to 4, broadened and notched medially on tergite 3 or 4; mesonotum shining with scattered punctures and short thin erect hair *pretiosa*, n. sp.
14. Abdomen yellow or almost creamy white, with dark bands or markings 15
 Abdomen flavous or flavo-ferruginous, paler across disk of basal segments, or in some cases with whitish band across disk of tergites 1 to 4; dark part of tergite 1 more or less infuscated; frons and mesonotum tessellate, moderately shining and with short erect white hair *labergei* Timberlake
15. Frons and mesonotum granular tessellate and dull; face yellow to level of foveae; pronotum yellow with dark band from flank-to-flank; abdomen yellow, but fuscous above with broad yellow band on tergites 1 to 5 and two spots on tergite 6, bands on tergites 2 to 5 enclosed *flavicornis* n. sp.
 Frons and vertex dull, but mesonotum moderately shining; face pale yellow to level of foveae; pronotum pale yellow with dark band across disk; abdomen almost whitish, with base of tergite 1, sublateral margins of tergites 1 to 3 and oval subapical spot on each side of tergites 1 and 2 black *albescens*, n. sp.

Perdita abducta Timberlake, n. name

Perdita dilecta Timberlake, 1960, Univ. Calif. Publ. Entomol., 17:40, ♂ (excluding female).

As I now believe that the female of *dilecta* belongs with *labergei* Timb., the new name of *abducta* is proposed for the distinctive male.

New record. 2 males, north of Kanab, Kane Co., Utah, on *Euphorbia*, July 30, 1967 (R. C. Dickson).

***Perdita albescens*, n. sp.**

(Figs. 1434, 1435, 1467)

This distinctive member of the *Octomaculata* Group runs near *abdominalis* Timb. in the key (1960:2-22), but differs in the creamy white abdomen, with narrow dark bands, and in having the lateral face marks ending truncately at the level of the anterior end of the facial foveae.

Female. Head and thorax dark green with mandibles except reddened tips, labrum, clypeus, lateral marks and pronotum except dark band broadening on flanks creamy white. Lateral marks truncate at upper end from outer side of antennal sockets to margin of eyes. Subantennal plates green, but supra-clypeal area black and confluent with two prong-like marks on clypeus, reaching a little more than half way to apical margin of disk. Abdomen creamy white, with small mark on each side of summit of basal declivity of tergite 1, and narrow band at junction of tergites 1-2 to 4-5 fuscous; that part of bands at apex of segments with oval enlargement on each side, and part at base of tergites 3 and 4 with small, narrow projection backward at outer ends; distal band fainter, or reduced to oval spot on each side of tergite 4 and small spot at basal corners of tergite 5; that part of band at base of tergite 2 confluent at outer ends with black lateral foveae. Legs pale yellow with blotch beneath on apical half of middle tibiae, streak on underside of hind femora, and hind tibiae except basal fourth, and hind tarsi fuscous. Scape of antennae yellow except small triangular mark above at apex, and flagellum fuscous above and brownish

yellow beneath. Tegulae white with quadrate apical part testaceous. Wings whitish subopaque, nervures pale testaceous.

Head slightly longer than wide, with inner orbits of eyes slightly converging above; cheeks strongly receding, about half as wide as eyes. Posterior ocelli about half their distance apart from nearest eye and nearly that distance from occipital margin. Facial foveae linear, close to margin of eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted below middle of face, middle joints of flagellum as long as thick. Face below level of antennae gently convex, disk of clypeus distinctly broader than high, with outer ends broadly inflexed. Mandibles simple, tapering and acute. Proboscis moderately elongate. Pterostigma about four times longer than wide and about two-thirds as wide as first submarginal cell; marginal cell a little longer beyond than beneath stigma, with metacarpus nearly twice as long as apical truncation. Pygidial plate with sides converging to narrowly rounded apex, and in some cases with small median notch.

Frons and vertex of head strongly tessellate, dull and impunctate; mesonotum more smoothly tessellate, dullish and with close minute punctures; other parts of head and thorax mostly smooth and more shining. Pubescence fine, mostly erect, whitish or pale ochreous, moderately long and dense on cheeks and occiput, recumbent on face and rather dense opposite foveae, and abundant on mesonotum, but not dense enough to conceal surface.

Length about 5 mm, anterior wing 3.6-3.7 mm, width of abdomen 1.5 mm.

Male. Head and thorax dark green; mandibles except red tip, labrum, face to level of facial foveae, head beneath broadly at anterior end with orbital extension to middle of eyes, pronotum except dark band across disk, antennae, as well as legs in large part pale yellow. Green of frons descending below level of foveae nearly evenly across middle about halfway to level of antennal sockets. Small spot at apex of scape fuscous and following five or six joints with dark suffusion above decreasing in intensity distad, with flagellum otherwise deeper yellow than scape or face. Base of hind coxae, streak on posterior side of front and middle femora, small mark at apex of middle tibiae behind, broad streak on anterior side of hind femora and smaller streak behind, hind tibiae except at base and on anterior side, and hind tarsi fuscous. Abdomen yellow; tergite 1 narrowly margined all around with fuscous, with apical band dilated on each side; tergites 2 and 3 with basal margin and lateral margins nearly to apex narrowly fuscous, and apex of tergite 2 with oblong dark mark on each side, somewhat closer to lateral margins than to each other; tergite 4 with traces of markings of tergite 3. Tergite 5 to 7 a little deeper yellow than preceding segments and unmarked. Abdomen beneath entirely yellow, except for small median two-pronged mark at base of first segment. Tegulae and wings nearly as in female.

Head as broad as long; inner orbits somewhat convergent at posterior ends; cheeks receding, rounded and about half as wide as eyes. Posterior ocelli their distance apart from occipital margin and somewhat closer to nearest eye. Facial foveae minute, close to margin of eyes. Face depressed, except clypeus gently convex, with outer ends broadly inflexed. Antennae inserted slightly below middle of face, flagellum slightly clavate, with middle joints about as long as thick. Supraclypeal area broader than high; disk of clypeus as broad as high, with summit slightly rounded. Mandibles tapering, acute and reaching slightly beyond far margin of labrum. Proboscis and wings about as in female, but metacarpus of wings a little more than twice as long as apical truncation of marginal cell. Abdomen about twice as long as wide, convex above; tergite 7 with medio-apical lobe triangular, and subacute at apex.

Head and thorax in general shining, but dark part of frons and vertex strongly tessellate, impunctate and dull; mesonotum only slightly dullish, although distinctly tessellate and with moderately sparse minute punctures. Pubescence whitish, fine, moderately long and erect, moderately dense on cheeks and occiput, thin on mesopleura and notum of thorax, recumbent on face and very thin on vertex. Subgenital plate triangular, with lateral margins slightly convex and converging to acute apex; apical part of disk with usual minute pubescence. Genital armature similar to parts in *translineata* Timb., but apical lobes of caulis stronger and parameral lobes broader and strongly incurved; sagittae strongly angulate and reaching beyond parameral lobes.

Holotype female and allotype. Samalayuca, Chihuahua, Mexico, Sept. 22, 1970 (G. E. and R. M. Bohart).

Paratypes. 6 females, taken with the types.

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

Perdita algodones, n. sp.

(Figs. 1436, 1437, 1468)

This species from the vicinity of Glamis, California, runs to *pectidis* Ckll., couplet 153 in the key (1960:19) to the *Octomaculata* Group, and differs in the more closely punctured and more hairy frons and mesonotum, in the whitish wings and different pattern of markings on the abdomen.

Male. Head and thorax dark blue-green. Very narrow line on interior orbits to middle of eyes, mandibles except red tips, labrum, face below level of antennae, with lateral marks ending broadly at foveae, antennae broadly beneath, small spot on each side of pronotum and tubercles white. Abdomen black, with two small spots on disk of tergite 1, abbreviated, narrowly interrupted band at base of tergites 2 and 3 (that on tergite 3 much more abbreviated), subapical, short, oblique streak on each side of tergites 2 to 6 (with trace also on tergite 1), those on tergite 6 continued across disk, white. In paratype, tergites 2 to 6 with subapical narrow band across middle of disk, that on tergite 6 much broadened. Apical depression of tergite 6 and apex of tergite 7 also white. Legs black, with apex of femora, tibiae and tarsi white, except for dark blotch on posterior side of tibiae. Scape of antennae narrowly black above, and flagellum subinfuscated narrowly above and less strongly toward apex. Proboscis brownish. Tegulae pale testaceous, but broadly white on inner margin. Wings whitish, subopaque, nervures and stigma whitish, margins of stigma more yellowish and subcosta pale brown except at base.

Head slightly longer than wide; cheeks receding, rounded and about three-fourths as wide as eyes. Posterior ocelli somewhat more than half their distance apart from margin of eyes and occipital margin. Facial foveae punctiform. Antennae inserted slightly below middle of face, flagellum weakly clavate, with middle joints as long as wide. Face below level of antennae rather strongly convex, with lateral extensions of clypeus broadly inflexed, but hardly visible in frontal aspect; disk of clypeus as broad as high and rounded at summit; supraclypeal area slightly longer than wide, its white extension in paratype reaching upper margin of antennal sockets and deeply notched. Mandibles normal, tapering, acute. Proboscis longer than head, galeae exceeding stipes. Tarsal claws bifid, with short inner tooth. Pterostigma not much more than three times longer than wide, about three-fourths as wide as first submarginal cell; marginal cell equally long beneath and beyond stigma, with metacarpus slightly longer than apical truncation; second submarginal cell narrowed distinctly more than half above.

Head and thorax shining, except frons and vertex strongly tessellate and dull; mesonotum distinctly but weakly tessellate, and with minute, well separated punctures. Punctures of frons close and fine, but vertex nearly impunctate; face below level of antennae smooth and almost punctureless. Pubescence white, fine, rather long, erect and very dense on cheeks, thin and shorter on face and thin and erect on mesonotum. Abdomen oval, broadest at middle, rather strongly convex above and thinly hairy toward apex. Subgenital plate triangular, but rounded at apex. Caulis of genital armature longer than wide, with short dorsal lobes; parameral lobes slender, not much widened at base; sagittae fused, thin dorsoventrally, angulate on each side as seen from above, and acute at apex.

Length 4.3-4.5 mm, anterior wing 2.87-3 mm, width of abdomen 1.2-1.5 mm.

Holotype male. 3.5 miles northwest of Glamis, Imperial Co., California, April 13, 1968 (P. A. Rauch).

Paratypes. One male, one mile west of Glamis, April 25, 1965 (M. E. Irwin); one male, 3 miles northwest of Glamis, April 9, 1972 (A. Hardy).

Types in collection of the University of California, Riverside.

Perdita flavicornis, n. sp.

(Figs. 1438, 1439, 1469)

This species, known only from two males from Samalayuca, Chihuahua, runs to *aridella* Timb., var. (couplet 164) in the key (1960:20) to the *Octomaculata* Group, but differs in its larger size, broader yellow bands on abdomen, more dusky wings and in the distinctive terminalia.

Male. Head and thorax dark green; with mandibles except red tips, labrum, face to level of foveae, inferior orbits to middle of eyes, and pronotum, except broad band from flank to flank, yellow. Abdomen yellow, with fuscous bands above, the yellow but slightly broader than dark bands, but not quite reaching lateral margins, band on tergite 1 wider than others, broadened at middle and not enclosed at outer ends; tergite 6 dark with two submedian yellow marks. Yellow bands in paratype not as wide as dark intervals and more broadly enclosed at outer ends, that on tergite 5 interrupted medially, and tergites 6 and 7 entirely dark; venter also infuscated with pale yellow bands. Legs yellow, front and middle femora and tibiae with broad streak behind, hind femora broadly beneath and behind, hind tibiae except briefly at base, and hind tarsi fuscous. Antennae yellow, except slight infuscation at extreme apex of scape above, outer side of pedicel fuscous, and several basal segments of flagellum slightly infuscated above. Tegulae testaceous with yellow mark at base. Wings slightly dusky, nervures testaceous, margins of stigma and subcosta brownish or subcosta.

Head about as broad as long; cheeks moderately receding, rounded and nearly as wide as eyes. Posterior ocelli about their distance apart from occipital margin and distinctly closer to eyes. Antennae inserted slightly below middle of face, scape reaching but little more than halfway to level of anterior ocellus; flagellum slightly clavate, with middle joints as long as thick. Face moderately convex below level of antennae; supraclypeal area broader than high to level of antennal sockets; subantennal plates twice as long as wide; disk of clypeus a little broader than high, truncate at summit and with lateral extensions concealed in frontal aspect. Mandibles tapering, acute and reaching far margin of labrum. Proboscis moderately long. Tarsal claws bifid. Pterostigma about four times longer than wide and two-thirds as wide as first submarginal cell; marginal cell equally long beneath and beyond stigma with metacarpus somewhat longer than apical truncation. Abdomen oval, longer than head and thorax combined; disk of tergite 7 narrowed to blunt apex.

Head and thorax alutaceous and dullish, with frons and vertex matt, with sides of thorax and propodeum more shining than notum. Puncturation extremely minute and obscure, with frons and mesonotum appearing impunctate, but frons and mesoscutum with extremely fine and short pubescence with a few longer hairs intermixed on scutum. Cheeks with short appressed hair and occipital margin with longer erect hair. Subgenital plate triangular except truncate at apex. Caulis of genital armature longer than wide, with dorsal lobes rounded at apex; parameral lobes moderately long, curved inward at apex and moderately wide as seen in lateral view and narrowed about one-half to apex; sagittae partially fused, widest at middle, then tapering to acute apex beyond apex of parameral lobes.

Length 5 mm, anterior wing 4 mm, width of abdomen 1.7 mm.

Holotype male. Samalayuca, Chihuahua, Mexico, Sept. 22, 1970 (G. E. and R. M. Bohart).

Paratype. One male, taken with type.

Type in collection of the University of California, Riverside, and paratype returned to G. E. Bohart.

***Perdita hirtuosa*, n. sp.**

This is one of the most elegant and beautifully colored species of *Perdita*, having four white and four narrow black bands on the abdomen, followed by pale fulvous. In the key to the *Octomaculata* Group (1960:4), it runs to *crotonis leucoptera* Timb., couplet 29, but it is distinctly larger, with scape of antennae mainly dark, the abdomen with four broad white bands, and the face and abdomen with comparatively dense white pubescence.

Female. Head and thorax dark green, with propodeum more bluish; mandibles except red apical third, clypeus and triangular lateral mark ending acutely just below level of antennae, creamy white. Clypeus with small dark submedian spot on each side of summit and corresponding spot on anterior margin, representing submedian stripes seen in other species. Pronotum dark, with tubercles, collar, and narrow band on hind margin of disk, broadened on each side before very narrow continuation to tubercles, white. Abdomen yellowish white, with two apical segments, including pygidial plate pale fulvous; basal declivity of tergite 1 and narrow band at junction of tergites 1-2 to 3-4 black; basal corners of tergites 3 and 4 black halfway toward apical margin of segments, and black band at base of tergite 2 confluent with black

lateral foveae. Legs blackish, with apex of coxae, trochanters, and apex of femora of all legs (more broadly beneath on hind femora), front tibiae, except beneath, front tarsi, and middle tibiae at base and broadly in front, yellowish white. Antennae fuscous, scape very narrowly white beneath and following joints tinged with white beneath. Tegulae pale testaceous, but broadly white at base and on inner margin. Wings subopaquely whitish, nervures nearly colorless, margins of stigma yellowish.

Head as broad as long, with inner orbits curving slightly inward above; cheeks receding, about half as wide as eyes. Posterior ocelli closer to eyes than to occipital margin. Facial foveae narrow and very close to margin of eyes, and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Face gently convex, with outer ends of clypeus broadly inflexed; disk of clypeus broader than high and well rounded at summit. Antennae short, flagellum clavate, with middle joints as broad as long. Proboscis broken in type, apparently of ordinary length. Mandibles simple, tapering and acute at apex. Pterostigma somewhat more than four times longer than wide and 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. Pygidial plate about as long as wide at base, with sides converging to obtuse apex.

Head and thorax shining, with frons finely and almost densely punctured and mesoscutum a little more coarsely and less densely punctured; punctures of face extending onto green part below level of antennae, but vertex nearly impunctate, minutely tessellate and slightly dullish. Mesopleura polished with numerous but well separated minute punctures. Pubescence whitish, dense for a *Perdita*, moderately long, mostly suberect, abundant on face and mesonotum, thin on mesopleura but dense on sides of propodeum. Hair of front coxae long and rather thin.

Length 5.2 mm, anterior wing 3.5 mm, width of abdomen 1.7 mm.

Holotype female. 29.5 miles southwest of San Ignacio, Baja California, Sur, Mexico, Feb. 24, 1969 (R. R. Snelling).

Type in the Los Angeles County Museum, Los Angeles.

Perdita hubbelli, n. sp.

This species is very closely allied to *perpallida* Ckll., and almost identical in structure, sculpture and pubescence, but it has the ground color of head, thorax and abdomen black. Since the facial foveae are broader than the narrow interval between them and the eyes, more deeply impressed and slightly longer than in *perpallida*, there is some reason to suppose that *hubbelli* is a valid species instead of a melanic variety or race of *perpallida*.

Female. Ground color of head and thorax black with extensive yellowish white markings as follows: Mandibles except reddish apical part, clypeus except two short streaks on upper part of disk and tentorial dots, transverse supraclypeal mark, notched medially above, spot on subantennal plates, large lateral marks, reaching between foveae and eyes to summit of eyes and broadly reaching to middle of foveae on their inner margin, broad mark on slightly less than upper half of cheeks, confluent with band across vertex, extending forward between posterior ocelli and obliquely on outer side of anterior ocellus as far as its anterior margin, but black mark on outer side of posterior ocelli, extending forward to connect with black of frons. Four stripes on mesoscutum, with lateral pair curving inward at anterior end, submedian pair united by band across posterior border of disk, and curving outward at anterior end, small spot on axillae, scutellum and metanotum except sutures, two spots on base of propodeum, spot on each side of disk of pronotum, tubercles, large quadrate mark on anterior part of mesopleura, with small knobbed extension toward base of wings and slender oblique exterior to posterior margin of episternum, and small spot on upper end of metapleura, white. Abdomen black, with narrow interrupted band at summit of basal declivity of tergite 1, and broad band at base of tergites 2 to 5 pale yellow; bands on tergites 2 and 3 curving backward at outer ends. Apical depression of tergite 5 pale testaceous. Pygidial plate rufotestaceous, with paler margin. Legs black, apex of femora, including most of posterior side of middle pair, anterior side of front and middle tibiae and extreme base of hind tibiae pale yellow. Antennae black, flagellum brown, broadly paler beneath. Tegulae testaceous, with large white mark at base. Wings subhyaline, slightly more dusky opaque than in *perpallida*, nervures yellowish testaceous.

Head as broad as long, cheeks three-fourths as wide as eyes. Posterior ocelli about their distance apart from eyes and one-fourth more than that distance from occipital margin. Facial foveae strongly impressed, wider than narrow interval between them and eyes and reaching from level of middle of antennal sockets about four-fifths of distance to level of anterior ocellus. Face below level of antennae strongly convex, with outer ends of clypeus strongly inflexed and only partly visible in frontal aspect; disk of clypeus broader than high, with broad summit slightly rounded. Mandibles and proboscis as in *perpallida*. Pterostigma about one-half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma with metacarpus nearly twice as long as apical truncation. Pygidial plate about as long as wide at base, strongly narrowed to notched apex, with small blunt lobe on each side subequal to notch. Pubescence whitish, extremely short and thin, most apparent on cheeks and sides of thorax; apical fimbria of abdomen long but thin; scopal hair of hind tibiae about as long as greatest width of tibia.

Length 7 mm, anterior wing 4 mm, width of abdomen 1.8 mm.

Holotype female. Boise City, Cimarron Co., Oklahoma, June 30, 1926 (T. H. Hubbell).

Type in collection of Michigan State University, East Lansing.

Perdita labergei Timberlake

Perdita labergei Timberlake, 1960, Univ. Calif. Publ. Entomol., 17:41, ♀, ♂.

Perdita dilecta Timberlake, 1960, Univ. Calif. Publ. Entomol., 17:40, ♀ (excluding ♂), (new synonymy).

In 1960, the two species noted above were described in both sexes from near Hutchinson, Kansas, and Kanab, Utah, and although the females were very similar, the males were very distinctive and apparently correctly associated, but after seeing material from Samalayuca, Chihuahua, Mexico, I am convinced that the female of *dilecta* is synonymous with *labergei* and that the male needs a new name.

New record. 7 males, 3 females, Samalayuca, Chihuahua, Mexico, on *Euphorbia*, Sept. 22, 1970 (G. E. and R. M. Bohart).

Perdita pretiosa, n. sp.

(Figs. 1440, 1441, 1470)

The female of *pretiosa* runs best to *indioensis* Timb., couplet 35, in the key (1960:5) to the *Octomaculata* Group, but it is much smaller, with the mesonotum much less punctured and hairy, and the pale markings different. In the 1968 key (p. 64), it runs to *croceipes* Timb., couplet 15, which has a duller sculpture, with the mesoscutum tessellate and more densely punctured and hairy. The male runs to *hirticeps apicata* Timb., couplet 151 (1960:18), but it differs in the short thin hair of the mesoscutum and in different marking of legs and abdomen.

Female. Head and thorax dark green, with creamy white markings, including mark on base of mandibles, clypeus, lateral marks, acute above at anterior end of foveae, supraclypeal mark much broader than high, subantennal spot on each side close to margin of supraclypeal mark, scape of antennae, pronotum, except dark band from flank-to-flank, and mark on base of tegulae. Clypeus, in one case, with narrow submedian testaceous stripes. Labrum fuscous. Abdomen creamy white with fuscous band at base of tergite 1 and at junction of tergites 1-2 to 4-5, the white forming broad bands generally reaching lateral margins, but in one case, enclosed on tergites 1 to 3, but lateral margins of these segments very narrowly pale like venter. Tergite 5 white, except for small dark mark at basal corners (segments 4 to 2 with similar marks successively larger). Tergite 6 more testaceous than white. Legs yellowish white with blotch on front femora behind except at apex, small blotch on front tibiae, blotch on middle and hind tibiae except at base, fuscous, and hind tarsi somewhat infuscated except on anterior side of basitarsi. Pedicel and flagellum of antennae black above and dingy white beneath. Tegulae otherwise testaceous. Wings milky hyaline, nervures pallid, margin of stigma and subcosta pale testaceous.

Head distinctly broader than long, cheeks broad and receding. Posterior ocelli about two-thirds of their distance apart from margin of eyes and somewhat closer to occipital margin. Facial foveae broad and well impressed, separated by about their own width from antennal sockets, reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus and close to margin of eyes. Face below level of antennae gently convex, with disk of clypeus much broader than high, rounded across summit, with outer ends strongly inflexed and mainly concealed in frontal aspect. Mandibles simple, tapering, acute. Proboscis long but normal. Pterostigma nearly as wide as first submarginal cell; marginal cell distinctly but not greatly longer beneath than beyond stigma, with apical truncation unusually broad and broader than length of metacarpus.

Head and thorax shining, but frons and vertex strongly tessellate, rather dull and virtually impunctate. Mesonotum polished, disk of scutum with fine scattered punctures, anterior border finely tessellate and more closely punctured and narrow prescutellar area dull and with fine appressed antrose pubescence. Hair of mesonotum otherwise erect, thin and at most, hardly longer than diameter of ocelli. Scopa of hind legs fine, somewhat longer than greatest width of tibia. Abdomen about two and one-half times longer than wide, widest across third segment; pygidial plate about as long as wide at base, sides converging to narrow notched apex, with teeth subequal to notch and moderately sharp.

Length 5.5 mm, anterior wing 3.9 mm, width of abdomen 1.5 mm.

Male. Head and thorax dark green; mandibles except red tips, labrum, face below level of antennae and pronotum except dark band from flank-to-flank creamy white. Outer suture of subantennal plates narrowly dark, but widened to dark spot at anterior end. Lateral marks ending bluntly against anterior end of foveae. Scape of antennae white, except for dark spot above at apex; and flagellum dull yellowish becoming narrowly black above, changing to brown on apical joint. Legs creamy white, posterior side of front femora except at apex, underside of front tibiae, spot on middle femora above and middle tibiae behind except at apex, posterior side of hind femora except at base and apex, and hind tibiae on outer margin except at base and apex, fuscous. Abdomen creamy white, except first four tergites mainly fuscous; lateral margins of these segments narrowly pale, with preapical extension inward on each side. Tergite 1 otherwise dark; tergites 2 to 4 with abbreviated basal white band, enclosed on tergites 2 and 3, and that on tergite 4 interrupted, with each half nearly twice as long as wide and merging more or less at outer posterior corner with preapical extension. Band on tergite 2 even, but that on tergite 3 dilated with broad rounded lobe on each side of median notch. Three apical tergites pale, with tergite 7 and apical depression of tergites 5 and 6 testaceous; tergite 5 with small preapical spot on each side subinfuscated and larger black mark just inside basal corners. Venter entirely pale. Tegulae subhyaline, pale testaceous, with large basal white mark. Wings whitish, nervures pale, margins of stigma and subcosta brown.

Head rotund, about as broad as long; cheeks strongly receding, two-thirds as wide as eyes. Posterior ocelli somewhat more than half their distance apart from margin of eyes and somewhat closer to occipital margin. Facial foveae punctiform, very close to margin of eyes. Face gently convex, with disk of clypeus somewhat broader than high, broadly rounded at summit, with lateral extensions visible in frontal aspect. Supraclypeal area broader than high, well elevated above over level of frons. Mandibles acute and reaching far margin of labrum. Venation as in female. Head and thorax shining except frons and vertex minutely tessellate and dull, and face impunctate. Mesonotum faintly tessellate, except strongly in prescutellar area and with scattered strong fine punctures; mesopleura and propodeum more distinctly tessellate. Pubescence white, thin, moderately long and erect, that on anterior border of scutum about twice as long as diameter of ocelli. Abdomen about two and one-half times longer than wide, convex above; apical tergite broadly rounded at apex. Subgenital plate nearly twice as long as wide and gently rounded at apex. Genital armature distinctive in very large basal orifice of caulis and very short broad parameral lobes; sagittae fused, short, acute at apex and much exceeding parameral lobes.

Length 4.75 mm, anterior wing 3.7 mm, width of abdomen 1.3 mm.

Holotype female. 17 miles west of Moose Jaw, Saskatchewan, on *Helianthus petiolaris*, August 3, 1971 (C. D. Michener).

Allotype male. Same data except taken on *Chrysopsis arvensis*.

Paratypes. 2 females taken with type, one on *Chrysopsis* and one on *Helianthus*.

Types in collection of the University of Kansas, Lawrence, except one paratype retained at Riverside.

***Perdita subrufiventris*, n. sp.**

(Figs. 1442, 1443, 1471)

This species belongs in the *Octomaculata* Group and in the 1960 key, the male runs out at couplet 121 (p. 15) as the abdomen is ferruginous without distinct bands. The female runs to *dilecta* Timb. and *labergei* Timb., in couplet 22, (p. 4) but has the face and thorax entirely dark except for the yellow tubercles. The name chosen for this species has no reference to *P. rufiventris* (Friese) as the "sub" qualifies "rufus."

Male. Head and thorax dark green, with pale yellow markings on face, cheeks and thorax, including anterior end of underside of head, with orbital extension to middle of eyes, mandibles except reddish tips, labrum, face to general level of foveae, pronotum except broad dark band from flank-to-flank, broad T-mark on mesosternum, with slender anterior arms not reaching tubercles, but in some cases, a small spot just behind tubercles. Yellow on frons with slender orbital extensions above foveae nearly to level of anterior ocellus. Abdomen ferruginous, except lateral foveae of tergite 2 fuscous, and basal half of tergites 2 and 3 tinged with yellowish. Legs yellow, except hind tarsi, posterior side of hind tibiae except basal third, and large blotch on underside of hind femora fuscous. Antennae yellow, pedicel fuscous above, and flagellum narrowly darkened above, more definitely at junction of segments. Tegulae testaceous, with yellow mark at base. Wings subhyaline, nervures testaceous, subcosta darker.

Head somewhat broader than long, cheeks nearly one-half as wide as eyes and widest opposite upper fourth of eyes. Posterior ocelli nearly their distance apart from nearest eye and about one-half that distance from occipital margin. Facial foveae minutely punctiform, and close to margin of eyes. Face gently convex, slightly ridged between antennae. Antennae inserted below middle of face, flagellum slightly clavate, with middle joints slightly broader than long. Clypeus broader than high and broadly inflexed on each side. Mandibles tapering, acute, and reaching far margin of labrum. Proboscis moderately long. Pterostigma rather small, hardly more than three times longer than wide, and barely more than half as wide as first submarginal cell; marginal cell nearly equal beneath and beyond stigma, with metacarpus about twice as long as apical truncation.

Face below level of antennae minutely alutaceous, moderately shining and impunctate; frons, vertex and mesonotum finely tessellate and dullish, with minute punctures very obscure on frons and sparse on mesonotum. Pubescence white, short, erect and thin, most evident on cheeks and occiput. Abdomen strongly convex above, hardly more than twice as long as wide, tapering toward apex and widest across second segment. Tergite 7 tapering to obtuse apex. Subgenital plate triangular, as long as wide at base, apical part of disk with short very fine pubescence. Genital armature most similar to parts of *variegata*; caulis as broad as long, with parameral lobes slender, as long as caulis, and slightly ovally expanded at apex; sagittae exceeding parameral lobes, with slender rods discrete almost to base, and with downward curve at apex.

Length 3-3.2 mm, anterior wing 2.3-2.4 mm, width of abdomen .75 mm.

Female. Head and thorax dark green, with bronzy reflections on frons, and entirely dark, except for yellow tubercles. Labrum and clypeus black. Mandibles yellow except reddish tips. Abdomen ferruginous, except for blackish lateral foveae of tergite 2. Legs fuscous, with apex of all femora briefly, front and middle tibiae and tarsi and base of hind tibiae yellow. Antennae dark, with flagellum slightly brownish. Tegulae and wings as in male.

Head rotund, slightly broader than long; cheeks about one-third as wide as eyes. Posterior ocelli about half their distance apart from occipital margin and slightly less than that distance from nearest eye. Facial foveae linear, slightly more than their width from margin of eyes and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted below middle of face, flagellum moderately clavate, with middle joints as long as thick. Clypeus gently convex and broadly inflexed at outer ends. Mandibles tapering, acute and reaching far margin of labrum. Pterostigma about three-fourths as wide as first submarginal cell; marginal cell slightly longer beyond than beneath stigma with metacarpus slightly less than twice as long as apical truncation.

Head and thorax finely tessellate and moderately dullish, frons and vertex virtually impunctate, meso-scutum with minute sparse punctures becoming a little stronger and closer on scutellum. Clypeus with sparse, fine shallow punctures, and parocular areas to level of antennae with moderate punctures mostly in line close to margin of eyes. Pubescence white, moderately dense and most evident on cheeks and thin, short and erect on mesonotum, but face almost bare. Hair of front coxae rather thin and a little longer than hair of cheeks or mesopleura. Abdomen depressed, gently convex above, elongate oval, more than twice as long as wide, and nearly bare, except for marginal hair and thin apical fimbria. Pygidial plate narrowed to notched apex, with notch about as wide as point on each side.

Length about 4 mm, anterior wing 2.8 mm, width of abdomen about 1.3 mm.

Holotype male and allotype. Samalayuca, Chihuahua, Mexico, on *Euphorbia*, Sept. 22, 1970 (G. E. and R. M. Bohart).

Paratypes. 7 males, 17 females collected with the type.

Types and five paratypes in collection of the University of California, Riverside; other paratypes in collection of G. E. Bohart.

Ventralis Group

Perdita nasuta Timberlake

New records. Utah, Washington Co.: 2 females, Dixie State Park, July 26, 1926 (W. J. Hanson); 5 males, 14 females, 3.4 miles west of Hurricane, on *Eriogonum trichopes*, August 31, 1967 (Timberlake).

These females from Utah have small but distinct lateral face marks which are lacking in material from southern California.

Perdita nigridia Timberlake

Perdita nigridia Timberlake, 1962, Univ. Calif. Publ. Entomol., 28:18, ♀.

Perdita sodalis Timberlake, 1968, Univ. Calif. Publ. Entomol., 49:97, 101, ♂ (new synonym of *nigridia*).

Perdita politissima, n. sp.

This species seems to be allied to *acaciae* Timb. and *ichelbacheri* Timb., from which it differs in the mainly black head and thorax with a highly polished impunctate sculpture.

Female. Head and thorax shining black, with slight bluish luster on part of face and on sides of thorax and propodeum. Basal half of mandibles, tubercles, collar of pronotum and narrow line on hind margin of disk, often more or less obsolete, creamy white. Mandibles shading into testaceous and becoming slightly red at apex. Abdomen testaceous yellow, with tergite 1, lateral margin of tergite 2, more or less confluent with subapical mark on each side, and small spot on lateral margins of tergites 3 and 4, fuscous. Legs fuscous, apex of front and middle femora, their tibiae except beneath, and all tarsi pale yellow. Antennae dark, scape black, flagellum whitish beneath. Tegulae testaceous, with white mark at base. Wings milky hyaline, with pallid nervures and stigma.

Head distinctly broader than long; cheeks strongly receding and about half as wide as eyes. Posterior ocelli their distance apart from eyes and two-thirds as far from occipital margin. Facial foveae, well impressed, elongate oval, about three to four times longer than wide, close to margin of eyes, and above level of antennal sockets. Antennae inserted below middle of face, flagellum moderately clavate, with middle joints as long as thick. Antennal sockets a little closer together than to margin of eyes. Face below level of antennae strongly convex, with disk of clypeus broader than high and rounded at summit. Mandibles moderately thick, slightly tapering and a little narrowed on inner margins close to apex. Proboscis moderately long, galeae about as long as stipites. Tarsal claws with small inner tooth. Pterostigma large, almost as broad as first submarginal cell; marginal cell distinctly but not greatly longer beneath than beyond stigma, with metacarpus slightly longer than apical truncation. Abdomen oval, depressed, more than twice

as long as wide and widest across third segment. Pygidial plate apparently about as long as wide at base, with apex moderately narrow and rounded.

Head and thorax highly polished, with weak tessellation visible on propodeum. Frons, vertex and mesonotum virtually impunctate; clypeus with fine, moderately close punctures, and parocular areas of face minutely punctured. Mesopleura with sparse minute punctures, closer toward sternum. Frons, vertex and mesonotum bare, face below level of antennae with very thin, short appressed hair, and cheeks and underside of head with comparatively dense white hair, antrose on cheeks and erect beneath, and mesopleura with thin hair. Hair of front coxae dense and moderately long. Scopal hair of hind legs no longer than greatest width of tibia, with hair on anterior side of tibia strongly curved.

Length about 4.5 mm, anterior wing 3-3.2 mm, width of abdomen 1.4 mm.

Holotype female. 3 to 5 miles southwest of Apache, 4,300 ft., Cochise Co., Arizona, on *Baccharis glutinosa*, Sept. 1, 1959 (H. E. Evans).

Paratypes. 15 females, same data as type; one female, 7 miles south of Cochise, Arizona, 4,000 ft., August 24, 1959 (Evans).

Types in collection of Cornell University, Ithaca, New York, except two paratypes in collection of the University of California, Riverside, and two in American Museum of Natural History, New York.

Perdita rudei, n. sp.

This little bee found near Simmler, California, is closely allied to *claypolei* Ckll., and runs near *claypolei limatula* Timb. in the 1962 (pp. 2-14) key. A couplet should be interpolated just before couplet 42 (p. 6) to distinguish it as follows:

- 41a. Abdomen dark with basal yellow bands, that on tergite 2 reaching lateral foveae, and on three following segments not quite reaching lateral margins 42
 Abdomen yellow, with apical dark bands narrowed close to lateral margins;
 head and thorax shining dark green, except for large yellow mark on
 tubercles; antennae dark, but scape mainly yellow *rudei*, n. sp.

Female. Head and thorax dark green, face entirely dark, large mark on tubercles pale yellow. Abdomen yellow, with broad fuscous band at apex of tergites 1 to 5, with outer ends of each band rather abruptly narrowed, that on tergite 1 with small exterior lobe on each side. Legs black, apex of front femora, front tarsi brownish. Antennae dark, scape yellow except narrowly above, flagellum brownish yellow beneath. Tegulae pale testaceous, but broadly yellow at base. Wings partly dusky hyaline, but pale yellowish at extreme base, nervures fuscous. Pygidial plate rufotestaceous. Mandibles and proboscis dark.

Head distinctly broader than long; cheeks rounded, about half as wide as eyes. Posterior ocelli about their distance apart from eyes and half as far from occipital margin. Facial foveae slightly 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, rather short and clavate, with joints of flagellum broader than long. Face below antennae gently convex, disk of clypeus broader than high, with lateral extensions gradually inflexed and partly visible in frontal aspect. Proboscis short, galeae shorter than stipites. Pterostigma small, about half as wide as first submarginal cell; marginal cell as long as stigma, with parts beneath and beyond stigma nearly equal; metacarpus somewhat longer than apical truncation; second submarginal cell narrowed one-half above. Abdomen oval, depressed, widest across third segment, and shining; pygidial plate triangular, plane, a little longer than wide at base and acute at apex.

Head and thorax shining; frons and vertex minutely tessellate, with minute scattered punctures becoming close between foveae and antennal sockets; face below antennae smoother, with fine moderately close punctures, slightly coarser on clypeus; cheeks smooth and closely, minutely, punctured except for impunctate orbital stripe. Thorax polished, but mesoscutum weakly tessellate, more distinctly around margins and with minute, widely spaced punctures; propodeum minutely tessellate. Pubescence fine, erect, white and rather short, abundant on face and cheeks and slightly coarser and thin on mesonotum. Apical fimbria of abdomen rather dense and moderately long, scopal hair of hind legs, somewhat longer than greatest width of tibia.

Length 4.5 mm, anterior wing 2.7 mm, width of abdomen 1.3 mm.

Holotype female. 14 miles west of Simmler, San Luis Obispo Co., California, on *Gutierrezia*, Oct. 7, 1967 (P. A. Rude). Pollen borne in tibial scopa unquestionably from *Eriogonum*.

Type in collection of the University of California, Riverside.

***Perdita suavis*, n. sp.**

(Figs. 1444, 1445, 1472)

This is a small desert species closely allied to *claypolei*, Ckll., but with distinctive characters of color and structure. In the 1962 key (pp. 2-14) to the *Ventralis* Group, the female runs to *claypolei australior* Timb., but it is entirely dark with whitish wings. The male runs to *lucens* Timb., but it has the face white for a short distance straight across above the level of the antennae and has the labrum very narrow and transverse.

Female. Entirely dark without light markings; head and thorax dark green, with clypeus and supraclypeal area black, and mesopleura and propodeum more bluish. Abdomen and legs brownish fuscous, pygidial plate testaceous, apex of front femora, front tibiae except beneath and front tarsi pale yellow. Antennae dark, flagellum hardly paler beneath. Mandibles testaceous, shading into red at apex. Proboscis fuscous, with galeae, palpi and glossa testaceous. Tegulae testaceous. Wings whitish hyaline, nervures pale testaceous, with margins of stigma and subcosta more brownish.

Head distinctly broader than long; cheeks strongly receding and about one-half as wide as eyes. Posterior ocelli about their distance apart from eyes and little less than half that distance from occipital margin. Facial foveae oval, about halfway between level of antennal sockets and level of anterior ocellus, but a little longer in holotype and reaching closer to upper level of antennal sockets, and smaller and less broad than in typical *claypolei*. Antennae inserted a little below middle of face, flagellum only slightly clavate, with middle joints about as long as thick. Face below level of antennae moderately convex; disk of clypeus much broader than high and rounded at summit; lateral extensions of clypeus visible in frontal aspect. Mandibles evenly curved, tapering and with acute inner tooth close to blunt apex. Proboscis short, galeae nearly as long as stipites, but hardly longer than maxillary palpi. Pterostigma about as long and nearly as wide as first submarginal cell; marginal cell longer beneath than beyond stigma, with metacarpus slightly longer than apical truncation. Abdomen oval, twice as long as wide; pygidial plate apparently about as long as wide at base, with sides converging to narrowly obtuse apex.

Head and thorax moderately dullish, minutely tessellate and with minute punctures, those of frons moderately close, becoming denser on supraclypeal area and sparse on vertex and mesonotum, with nearly impunctate space on posterior middle of scutum. Clypeus with comparatively coarse, shallow and close punctures. Pubescence white, fine, moderately long and thin, although dense on cheeks and occiput. Hair on sides of propodeum and on front coxae long but thin. Scopal hair of hind tibiae distinctly longer than greatest width of tibia, with hair on anterior side strongly curved.

Length 3.8 mm, anterior wing 2.9 mm, width of abdomen 1 mm.

Male. Head and thorax dark, with mark on postgena and orbital margin of cheeks to middle of eyes, mandibles, except red tips, labrum, face to level of foveae, collar of pronotum, large triangular mark on each side of disk of pronotum, almost meeting on hind margin, large mark of tubercles and major part of antennae and legs pale yellow. Abdomen fuscous at base and apex, but tergites 2 to 4 yellow, with broad, dilute fuscous band across apex of each, that on tergite 4 broader. Pedicel of antennae with fuscous spot above, first four joints of flagellum with dilute fuscous ring above at base, with traces of similar mark on following joints. Large mark on hind coxae black, outer side of hind tibiae dilute fuscous, and hind tarsi dusky yellow. Tegulae yellow across base and testaceous subhyaline on outer margin. Wings whitish hyaline, nervures testaceous, margins of stigma and subcosta brown.

Head broader than long; cheeks receding, about two-thirds as wide as eyes. Posterior ocelli their distance apart from eyes and about half as far from occipital margin. Facial foveae very minute and obscure. Antennae short, inserted below middle of face; scape about twice as long as wide and broadening toward apex, hardly reaching above yellow part of face; flagellum strongly clavate with middle joints thicker than

long. Antennal sockets a little closer together than to margin of eyes. Parocular area on each side of face strongly impressed, producing a median ridge, with supraclypeal area most elevated, subantennal plates as wide as long; clypeus truncate at summit, with disk broader than high and tapering outward to base of mandibles. Anterior margin of clypeus lacking distinct emargination and labrum very narrowly transverse, and involving about three-fourths of space between anterior ends of eyes. Mandibles dilated at base, tapering beyond base to acute apex and reaching beyond middle of each other. Proboscis and venation as in female. Abdomen subovate, depressed, twice as long as wide and widest at junction of third and fourth segments.

Head and thorax moderately shining, with dark part of frons and vertex minutely tessellate and duller than other parts; mesonotum delicately tessellate and shining. Puncturation of face and mesonotum very minute and sparse. Pubescence white, moderately long, fine, erect, and moderately abundant; denser on cheeks and occiput, thin but conspicuous on mesonotum, short and very thin on frons, and absent on yellow part of face, except for several hairs on each side of labrum. Hair of hind tibiae fine, erect and mostly as long as greatest width of tibia. Subgenital plate as long as wide, slightly rounded at apex, disk with numerous very fine erect hairs. Genital armature very thin dorsoventrally, and similar to same part of *claypolei*, but parameral lobes very slender, acute at apex and curving slightly outward instead of inward; broad apical part of sagittae fused and slightly narrowed to rounded apex as seen from above.

Length 3.3 mm, anterior wing 2.4 mm, width of abdomen 0.9 mm.

Holotype female and allotype. San Felipe Valley, at Scissors Crossing, San Diego Co., California, on *Eriogonum fasciculatum*, May 4, 1968 (E. I. Schlinger).

Paratypes. 2 females, same data as types.

Types in collection of the University of California, Riverside.

SPHAERALCEAE GROUP
SUPPLEMENTARY KEY TO SPHAERALCEAE GROUP
 (See Key, Univ. Calif. Publ. Entomol., 1964, 28:126-158)

- | | |
|--|----------------------|
| 1. Females | 2 |
| Males | 16 |
| 2. Face entirely dark | 3 |
| Face marks more or less developed | 11 |
| 3. Abdomen fuscous or black, with or without pale markings | 4 |
| Abdomen flavous; head and thorax shining dark green, thorax dark
except for white mark on tubercles; legs dark, anterior side of front tibiae
pale yellow; wings dusky hyaline | fulviventris, n. sp. |
| 4. Head rotund, as broad or broader than long | 5 |
| Head distinctly longer than wide; head and thorax dark blue-green, with
clypeus, supraclypeal area, disk of mesoscutum, scutellum and meta-
notum black; mandibles with blunt inner tooth; wings nearly clear hyaline | cracens, n. sp. |
| 5. Abdomen dark, without maculation | 6 |
| Abdomen with pale yellow or whitish bands, either entire or interrupted | 10 |
| 6. Mandibles abruptly narrowed on inner margin before apex, or with inner
tooth | 7 |
| Mandibles simple on inner margin | 9 |
| 7. Frons minutely tessellate but shining, and with minute or obscure punctures | 8 |
| Frons strongly shining, with close strong punctures; mesonotum polished,
with fine sparse punctures; pubescence of face and mesonotum fine and
very thin; wings subhyaline, with large broad stigma | pernitens, n. sp. |
| 8. Frons with minute, but distinct punctures; face with depressed white
pubescence; facial foveae finely linear, close to margin of eyes; flagellar
joints mostly broader than long; pterostigma about half as wide as first
submarginal cell | gillaspyi, n. sp. |

- Frons obscurely and sparsely punctured; face with very thin hair; facial foveae their own width from margin of eyes and diverging from eyes below; flagellar joints as long as thick; pterostigma three-fourths as wide as first submarginal cell. *elimata*, n. sp.
9. Slender dark species, except for white spot on tubercles; mesonotum minutely tessellate, moderately dull, and dark green; facial foveae finely linear and well removed from margin of eyes; wings strongly dusky; length hardly 3 mm *hiemalis*, n. sp.
- Rather robust, entirely dark species; mesonotum minutely tessellate, but shining, with bronzy luster; facial foveae wider than narrow space between them and eyes; wings clear hyaline; length about 4 mm. *morula*, n. sp.
10. Head and thorax dark green, with mesonotum black with small white mark on each side; clypeus polished, broadly impunctate in middle; flagellum of antennae three times as long as scape, with joints mostly longer than thick; mandibles rather slender, but not tapering to rounded apex; length nearly 7 mm *janzeni*, n. sp.
- Head and thorax similar in color, but pronotum not marked, clypeus moderately shining, with close fine punctures; flagellum of antennae no more than twice as long as scape, with joints thicker than long; mandibles tapering to acute apex, length about 4 mm *brevicornis*, n. sp.
11. Face marks restricted mainly to area below level of antennae, although lateral marks may reach to anterior end of foveae and intrude slightly between them and eyes. 12
- Face marks extending between antennae for short distance onto frons, or lateral marks reaching almost to summit of eyes. 15
12. Thorax with white or yellow marking on pronotum or tubercles 13
- Thorax entirely dark; head and thorax dark green, with dark part of clypeus, supraclypeal area, disk of mesoscutum and scutellum black; three marks on clypeus and small lateral marks white; abdomen black, but ferruginous on tergites 5 and 6, with interrupted white band on tergites 2 to 4; frons tessellate but shining and sparsely punctured, mesonotum polished and nearly impunctate *pygidialis*, n. sp.
13. Pronotum dark with white mark on each side or on tubercles 14
- Pronotum yellow, with dark cross band covering most of flanks; clypeus except two stripes on disk, supraclypeal mark, small subantennal spots and lateral marks much higher than wide and reaching anterior end of foveae, yellow; abdomen yellow with dark band at base of tergite 1 and at junction of segments; mesonotum polished, with close fine punctures and short erect white hair; wings whitish, with pallid stigma and nervures. *cingulata*, n. sp.
14. Clypeus, except more or less large median dark area, triangular lateral marks barely reaching level of antennae, white, and in some cases transverse supraclypeal mark or two spot, and small subantennal spots, all in transverse row; thorax dark except white mark on tubercles; frons and mesonotum polished, finely punctured and with thin erect white hair; abdomen dark, with enclosed white band on tergites 2 to 5 *mimosae efferta*, n. subsp.
- Head and thorax dark blue-green, clypeus and mesonotum black; face marks restricted to small white spot near base of mandibles; pronotum with small white mark on each side, but tubercles dark; abdomen with basal white band on tergites 2 to 4, narrow medially but broadening outwardly, especially on tergite 2; wings dusky, margins of stigma and subcosta fuscous. *submaerens*, n. sp.
15. Lateral marks of face extending between foveae and eyes nearly to upper end of foveae, and supraclypeal mark extending for short distance onto frons; light parts of head, thorax and abdomen creamy white, with pronotum pale except for dark mark on flanks; abdomen with fuscous band

- at junction of tergites 1-2 and 3-4, segments 4 to 6 fulvescent; mesonotum polished, with very sparse, minute punctures *fulvescens*, n. sp.
- Face mainly yellow below level of antennae, with lateral marks extending between foveae and eyes almost to summit of eyes; pronotum yellow except for large dark marks on flanks; abdomen dark, with yellow band on tergites 2 to 4, slightly narrowed across middle of segments; tergite 1 with two quadrate yellow marks, close together and emarginate on outer margin; length about 5.5 mm *venustella*, n. sp.
16. Face marks extending above level of antennae only on each side if at all 17
- Face marks going above level of antennae in middle or straight across 19
17. Pale banding of abdomen well exposed and more or less abbreviated or interrupted 18
- Tergites 2 to 6 with very narrow basal yellow band, often nearly or partly concealed by preceding segment; face yellow to level of antennae, except green of frons intruding between lateral and subantennal marks; frons tessellate and dull, disk of mesoscutum and scutellum polished *submaerens*, n. sp.
18. Head and thorax dark blue or blue-green; clypeus except dark mark across summit, lateral marks hardly higher than wide and transverse supraclypeal mark white; thorax entirely dark except for trace of yellow on hind margin of disk of pronotum; abdomen with narrow white band on tergites 1 or 2 to 6, abbreviated and interrupted on tergites 1 and 2, and interrupted but reaching lateral margins on tergites 3 to 6 *pygidialis*, n. sp.
- Face entirely white below level of antennae, with upper margin of the white curving very slightly upward on each side; thorax dark, except for white mark on tubercles; abdomen with enclosed white band on tergites 2 to 4, narrowly interrupted at middle and that on tergite 4, in some cases, evanescent or absent *mimosae efferta*, n. subsp.
19. Face yellow to level of foveae, with green of frons extending to antennal socket on each side; pronotum dark, except large mark on tubercles yellow; abdomen dark, with yellow basal band on tergites 2 to 6, that on tergite 6 broadening medially to apical depression, others moderately wide, perfectly straight and even; head much broader than long, frons strongly tessellate, dull and impunctate; wings dusky hyaline, stigma dark except at base *recticincta*, n. sp.
- Face yellow to level of anterior ocellus or almost to summit of eyes; pronotum, pleura and sternum of thorax, antennae and legs yellow; mesonotum dark, but lateral margins of scutum and interrupted band on anterior border of scutum yellow; abdomen yellow, with narrow band at junction of segments and at base of tergite 1 dilute fuscous or brownish; frons shining very minutely punctured, mesonotum polished *chemsaki*, n. sp.

Perdita brevicornis, n. sp.

This is a small black species, with an entirely dark head and thorax, but with an interrupted light band on first three segments of the abdomen. In the key (1964: 126-158) to the *Sphaeralceae* Group, it runs to *eximia* Timb., couplet 36 (p. 129) from which it differs in restricted markings of the abdomen and shorter antennae.

Female. Head and thorax dark blue, suffused with black on head, with clypeus, posterior half of mesoscutum and scutellum black. Abdomen black, with transverse white marks on each side of tergites 1 to 3, marks much more separated on tergites 1 and 3 than on 2. Legs dark, anterior side of front tibiae suffused with pale yellow except at apex, front tarsi dusky yellowish and middle and hind tarsi brownish. Antennae dark, flagellum brown beneath. Mandibles, tegulae and pygidial plate testaceous brown. Wings whitish hyaline, nervures pale testaceous, inner margin of stigma and subcosta dilute fuscous.

Head rotund but distinctly broader than long; cheeks receding, not more than half as wide as eyes. Posterior ocelli fully their distance apart from occipital margin and nearly as far from nearest eye. Facial foveae about twice as wide as interval between them and eyes and reaching from level of upper margin of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae short, inserted below middle of face, flagellum moderately clavate, less than twice as long as scape, with most of joints thicker than long. Antennal sockets about equidistant from each other and eyes. Face below level of antennae gently convex. Clypeus strongly inflexed and bluntly produced on each side of labrum, with lateral extensions not visible in frontal aspect and disk slightly broader than high. Mandibles tapering, simple, acute. Proboscis moderately long, galeae slender, as long as stipites and distinctly longer than maxillary palpi. Tarsal claws with small inner tooth. Pterostigma strongly rounded within, less than three times longer than wide, and almost as wide as first submarginal cell; marginal cell as long beneath as beyond stigma, with metacarpus nearly twice as long beneath as beyond stigma, with metacarpus nearly twice as long as apical truncation; second submarginal cell narrowed two-thirds above. Abdomen ovate, subdepressed, less than twice as long as wide; pygidial plate probably about twice as long as wide at base, with sides converging to moderately narrow, rounded apex.

Head and thorax minutely tessellate and rather dull; frons with minute moderately close punctures, but vertex impunctate; face below level of antennae similar to frons, except clypeus more shining, with comparatively coarse shallow punctures, mostly about one puncture-width apart. Thorax above more shining than head, especially on posterior half of scutum and scutellum, punctures of scutum minute and widely spaced, becoming weaker and very sparse behind on scutellum. Pubescence whitish, short and very thin, with frons, vertex and mesonotum bare (probably with hair denuded); anterior part of face with thin short hair. Apical fimbria of abdomen moderately dense and long. Scopal hair of hind tibia moderately thin and rather long, the longest hairs gently curved and nearly twice as long as greatest width of tibia.

Length 4.8 mm, anterior wing 3.5 mm, width of abdomen 1.5 mm.

Holotype female. 9 miles west of Beaumont, Hardin Co., Texas, July 4, 1964 (D. R. Smith and C. M. Baker).

Type from collection of the Oregon State University; it will be deposited in collection of the California Academy of Sciences, San Francisco.

***Perdita chemsaki*, n. sp.**

(Figs. 1446, 1447, 1473)

This distinctively marked species of the *Sphaeralceae* Group runs to *atrata* Timb., couplet 241 (p. 155), in the 1964 key, but differs in having the head yellow except broadly on vertex and occiput, the thorax greenish above, but yellow on sides and beneath, with the pronotum, anterior border and lateral margins of mesoscutum also yellow, and the abdomen yellow with six fuscous bands.

Male. Most of head, sides and sternum of thorax including flanks of propodeum yellow. Vertex and occiput broadly black, with anterior margin of dark color descending in broad curve on frons, except for median triangular notch, with the yellow reaching anterior ocellus; yellow of frons enclosing dark foveae and almost reaching summit of eyes on each side. Thorax black above with greenish tinge, most pronounced on propodeum; anterior border of mesoscutum except narrowly at middle and lateral margins yellow; pronotum, sides and under surface of thorax yellow, except for narrow dark streak from base of wings to hind coxae. Abdomen yellow, with base of tergite 1 and narrow band at junction of tergites 1-2 to 5-6 fuscous. Labrum, mandibles except reddish tips, proboscis, antennae and legs yellow. Tegulae and base of wings yellow, wings otherwise nearly clear hyaline; nervures pale testaceous, margins of stigma and subcosta dilute fuscous.

Head much broader than long and broader than thorax; cheeks strongly receding, rounded, wider than eyes and widest nearly opposite middle of eyes. Posterior ocelli slightly more distant from eyes and occipital margin than their distance apart. Facial foveae large for male sex and triangular in shape. Antennae inserted below middle of face, flagellum rather slender, joints 3 to 6 thicker than long. Antennal sockets distinctly closer to each other than to margin of eyes. Face below level of foveae depressed, only slightly more elevated between antennal sockets; subantennal plates almost as broad as long; clypeus much

broader than long, slightly convex from side to side, lateral extensions visible in frontal aspect to base of mandibles; disk broader than high, rounded above and with short subovate process on each side of base of labrum. Mandibles long, tapering, acute, but reaching only slightly beyond far margin of labrum. Proboscis short, galeae reaching no more than halfway to base of stipites. Flanks of pronotum moderately impressed, but posterior corner of disk not at all prominent. Tarsal claws with strong inner tooth. 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 more than twice as long as apical truncation. Abdomen oval, depressed, about twice as long as wide.

Head and thorax shining, frons very minutely tessellate, mesonotum polished, and both frons and mesoscutum with sparse, minute obscure punctures. Pubescence white and thin; face and cheeks almost bare, vertex and occiput with short erect hair, mesonotum with thin suberect moderately short hair, and sides of propodeum with longer hair. Subgenital plate somewhat longer than wide at base, narrowed toward strongly bilobed apex, with lobes longer than wide, narrowed toward apex and subequal to median notch. Parameral lobes of genital armature blunt at apex and not much longer than wide as seen in lateral view; sagittae fused and compacted together, tapering to very acute apex and longer than parameral lobes.

Length 4 mm, anterior wing 2.8 mm, width of abdomen 1.5 mm.

Holotype male. 2 miles south of Mazatlán, Sinaloa, Mexico, June 30, 1965 (J. A. and M. A. Chemsak and E. G. and J. M. Linsley).

Type in collection of the University of California, Riverside.

Perdita cingulata, n. sp.

This species from Texas has the general appearance of a member of the *Zonalis* Group, but by the simple acute mandibles, it belongs in the *Sphaeralceae* Group and agrees with members of the *martini* subgroup in having the mesonotum closely punctured with short erect hair. In the key (1964), it runs out near *punctulata* Timb., couplet 111 (p. 139), because of the yellow color, but it is more allied to *albiventris* Timb. and *panocheana* Timb.

Female. Head and thorax blue-green; basal half of mandibles, labrum, clypeus except for two broad fuscous stripes not quite reaching summit, lateral marks much higher than wide, gradually narrowed above and intruding between foveae and eyes, supraclypeal mark broader than high, and small, oblique subantennal spot enclosed by green on each side, yellow. Disk of pronotum yellow on anterior and posterior margins including tubercles, with flanks mainly dark. Abdomen yellow, both basal declivity of tergite 1 and band at junction of tergites 1-2 to 4-5 fuscous, with yellow bands even and successively broadened. Legs yellow, with small blotch on posterior side of front and middle femora and tibiae, hind femora above, and hind tibiae and tarsi fuscous. Scape of antennae yellow, but spot at apex above, pedicel and flagellum fuscous, with flagellum paler beneath. Mandibles dark rufous at apex. Proboscis mostly infuscated. Tegulae testaceous. Wings whitish hyaline, nervures pale testaceous.

Head large and broad, but no broader than long; cheeks receding, about half as wide as eyes. Posterior ocelli about half their distance apart from eyes and occipital margins. Facial foveae elongate oval, pointed at each end, much wider than interval between them and eyes and reaching from slightly above level of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted slightly below middle of face; flagellum moderately clavate, with middle joints as thick as long. Face below level of antennae evenly convex, with disk of clypeus distinctly broader than high, rounded at summit, and with lateral extensions mostly visible in frontal aspect. Mandibles large, strongly curved, tapering to acute apex. Proboscis moderately long, galeae about as long as stipites. Pterostigma large, broadest beyond middle, about three times as long as wide, and nearly as wide as first submarginal cell; marginal cell about as long beneath as beyond stigma with metacarpus one-fourth longer again than apical truncation. Abdomen elongate oval, depressed, gently convex above; pygidial plate probably longer than wide at base, narrowed to moderately wide rounded apex.

Head and thorax shining, polished for most part, but vertex with delicate minute tessellation and impunctate, frons and mesonotum with close but separated minute punctures. Pubescence whitish, moderately long and erect, abundant on cheeks and sides of thorax, thinner on face, and abundant but short,

erect and more mosslike on mesoscutum. Apical fimbria of abdomen moderately long but thin. Scopal hair of hind tibiae thin, longer than greatest width of tibia by not more than one-half its own length, that on inferior margin curved and thickened at base.

Length 5.6 mm, anterior wing 3.6 mm, width of abdomen 1.8 mm.

Holotype female. 1.5 miles north of Armstrong, Kennedy Co., Texas, June 19, 1948 (H. E. Evans).
Type in collection of the Michigan State University, East Lansing.

***Perdita cracens*, n. sp.**

This is a small, entirely dark species, with the head distinctly longer than wide. It is placed tentatively in the *Sphaeralceae* Group and in the key (1964), it runs out at couplets 25 or 26 (p. 128), where it can be distinguished by the shape of the head with facial foveae descending to the level of the middle of the antennal sockets, by the sparse minute puncturation and thin pubescence, and by the slightly dusky wings.

Female. Head and thorax dark blue-green; labrum, clypeus, supraclypeal mark and mesoscutum except anterior part, scutellum and metanotum black. Abdomen fuscous, apical depression of tergites slightly paler. Legs blackish, entirely dark. Antennae dark, flagellum somewhat brownish. Mandibles black, moderately reddened at apex. Tegulae testaceous. Wings slightly dusky hyaline, nervures and margins of stigma testaceous, subcosta fuscous.

Head distinctly longer than wide; cheeks receding, rounded, and about three-fourths as wide as eyes. Posterior ocelli their distance apart from nearest eye and somewhat closer to occipital margin. Facial foveae linear, their own width from margin of eyes, reaching from lower level of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae short, inserted below middle of face, scape reaching halfway to level of anterior ocellus and flagellum clavate, with basal joints wider than long and subapical joints as broad as long. Face gently convex, with clypeus more strongly convex, its outer ends strongly inflexed, its disk broader than high and rounded at summit; supraclypeal area also broader than high. Mandibles tapering, with small blunt inner tooth, and reaching far margin of labrum. Proboscis moderately long, galeae reaching base of stipites. Pterostigma not much more than three times longer than wide and about one-half 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 above. Tarsal claws acute with inner expansion at base. Abdomen slightly more than twice as long as wide, widest across third segment; pygidial plate mostly concealed in type, its apex moderately narrow and rounded.

Head and thorax shining, with minute tessellation generally weak, but stronger on anterior part of mesoscutum. Frons with very sparse minute punctures and mesoscutum with similar punctures mostly concentrated on anterior third. Clypeus with comparatively coarse and mostly well separated punctures. Pubescence whitish, fine, suberect and thin on head and thorax, with face nearly bare. Apical fimbria of abdomen long, recumbent and moderately dense. Hair of legs and scopa of hind tibiae ordinary; hair of front coxae moderately long and rather thin.

Length 4.4 mm, anterior wing 2.8 mm, width of abdomen 1.3 mm.

Holotype female. 5 miles south of Las Vegas, 3,300 ft., Clark Co., Nevada, on *Mentzelia tricuspis*, May 25-26, 2969 (R. R. Snelling).

Type in collection of the Los Angeles County Museum, Los Angeles.

***Perdita elimata* Timberlake**

Perdita elimata Timberlake, 1964, Univ. Calif. Publ. Entomol., 28:183, ♀ (excluding ♂).

Perdita pulla Timberlake, 1964, Univ. Calif. Publ. Entomol., 28:217, ♀ (new synonymy).

In 1968 (p. 118), I renamed the male associated with *elimata* and described it as a new species under the name of *aculeata* Timb., and now I am convinced that *elimata*

belongs in the *drymariae* subgroup and is identical with *pulla* over which it has priority. The species is known from Puebla and Oaxaca in Mexico, but its male has not been recognized.

***Perdita flaviventris*, n. sp.**

This species belongs with the six species (*heliotropii* Ckll., *covilleae* Timb., *punctulata* Timb., *blanda* Timb., *zebrata* Cress., and *wilmattae* Ckll.) distinguished in couplets 46 to 53 (pp. 309-310) in the key of Part III (1958) of my revision and later referred to the *Sphaeralceae* Group. In the key to the *Sphaeralceae* Group (Part VI, 1964), it runs to and agrees best with *blanda* Timb. (couplet 96, p. 137), but differs in the more shining and more punctured frons, more punctured and hairy mesonotum, and in the broadly dilated and interrupted light band of the first tergite.

Female. Head and thorax dark green, more bluish green on propodeum. Mandibles except reddened apical third, clypeus, lateral marks, two small supraclypeal spots, collar of pronotum, broad and interrupted band on hind margin of pronotum and tubercles, yellow. Very narrow band across summit of clypeus, continuous with two submedian stripes and narrow anterior margin of median part of apex fuscous, with yellow of clypeus divided into three parts, median part enclosed and narrowed toward summit. Lateral marks of face broad anteriorly and ending very acutely at level of antennae. Abdomen yellow, with four fuscous bands, three narrow and at apex of tergites 1 to 3, and one broader, at base of tergite 1; yellow band on tergite 1 linearly interrupted by median dark line, narrowed subapically to lateral margins, with quadrate part on each side broader than long and mostly on basal declivity of segment; base of first tergite also with marginal yellow mark on each side. Legs fuscous, with apex of all femora, front and middle tibiae, except dark blotch beneath, their tarsi and base of hind tibiae yellow, and narrow anterior margin of remainder of hind tibiae and anterior side of hind basitarsi testaceous. Antennae fuscous, scape broadly yellow beneath and flagellum narrowly dull yellow beneath. Tegulae hyaline, with yellow mark at base. Wings milky hyaline, nervures colorless except apical part of subcosta slightly darkened and wing base yellow.

Head distinctly broader than long, cheeks less than half as wide as eyes, and occiput very gently concave. Lateral ocelli somewhat closer to margin of eyes than their distance apart. Facial foveae rather broad and very close to margin of eyes, and reaching from level of upper part of antennal sockets about halfway to level of anterior ocellus. Antennae inserted below middle of face, flagellum slightly clavate, with distal joints, except terminal one, only slightly longer than thick. Clypeus much broader than high, broadly and gradually inflexed on each side. Mandibles tapering and acute. Proboscis moderately long, galeae about as long as stipites. Pterostigma about three-fourths as wide as first submarginal cell; marginal cell with parts equal beneath and beyond stigma, with metacarpus distinctly longer than apical truncation. Pygidial plate longer than wide, with sides converging to narrowly rounded apex. Tarsal claws small, with small inner tooth.

Head and thorax shining, finely punctured. Frons very minutely and rather faintly tessellate, with punctures dense next to foveae on each side and separated medially and toward level of ocelli; dark part of face more coarsely punctured on each side, especially on clypeus, but supraclypeal area impunctate. Mesoscutum polished, with punctures numerous, but separated, and those of scutellum and mesopleura close. Pubescence white, thin on face, longer and denser on cheeks and sides of thorax and thin, erect, rather coarse and moderately long on mesonotum. Apical fimbria of abdomen more ochreous, thin and long.

Length nearly 5 mm, anterior wing 3.5 mm, width of abdomen 1.7 mm.

Holotype female. 2 miles southeast of Willcox, Cochise Co., Arizona, swept from *Wislizenia*, August 21, 1972 (G. C. Eickwort).

Type in collection of Cornell University, Ithaca, New York.

***Perdita fulvescens*, n. sp.**

This species is placed in the *Sphaeralceae* Group, where it apparently belongs, and in the 1964 key, it runs to *calloleuca* Ckll., couplet 120 (p. 140), with which it

has considerable resemblance; but the dark part of the face extends only to the clypeus and the abdomen has only three dark bands with the apical segments fulvescent.

Female. Head and thorax dark green with slight bluish tinge. Base of mandibles, labrum, face below level of antennae except for extension of the green across subantennal plates to clypeus, creamy white. Lateral marks ending broadly above where notched by foveae. Supraclypeal mark with triangular extension for short distance onto frons. Clypeus with two pale brownish blotches on anterior half of disk. Pronotum and tubercles creamy white except for large dark mark on flanks. Abdomen creamy white, shading into fulvous on three apical segments; rather narrow dilute fuscous band at junction of tergites 1-2 to 3-4. Legs whitish, line on outer side of middle tibiae and hind tibiae and tarsi dilute fuscous. Scape of antennae white, pedicel and flagellum fuscous, paler beneath. Mandibles red on apical third. Tegulae pale testaceous, with white mark at base. Wings whitish hyaline, nervures pallid.

Head distinctly broader than long; cheeks strongly receding, less than half as wide as eyes. Posterior ocelli about their distance apart from eyes and slightly more than half that distance from occipital margin. Facial foveae twice as broad as interval between them and eyes and reaching from level of antennal sockets about halfway to level of anterior ocellus. Antennae inserted below middle of face, flagellum slender, with middle joints as long as thick. Antennal sockets distinctly closer to each other than to margin of eyes. Face below level of antennae gently convex, with supraclypeal area much broader than high; disk of clypeus also broader than high, rounded above, with lateral extensions inflexed, but visible in frontal aspects. Mandibles tapering, acute and gently curved. Proboscis moderately short, galeae shorter than stipites. Tarsal claws small and obscurely dentate. Pterostigma about three times as long as 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.

Head and thorax shining, mesonotum polished, but frons and vertex minutely tessellate and slightly dullish. Punctures sparse and very fine, mostly absent on frons and vertex, more evident below level of foveae and antennae, and widely and irregularly spaced on mesoscutum. Mesopleura minutely tessellate and with sparse minute punctures. Abdomen oval, depressed, widest at junction of segments 3 and 4; pygidial plate about as long as wide at base, with sides converging somewhat less than rectangularly. Pubescence whitish fine and thin, most evident but short and erect on cheeks, thin on sides of thorax, very thin on face, with frons and vertex bare, and thin and short on mesoscutum, most evident in prescutellar area. Apical fimbria of abdomen thin and moderately long. Scopal hair of hind tibiae moderately dense, not much longer than greatest width of tibia, and fine and straight.

Length 4 mm, anterior wing 2.8 mm, width of abdomen 1.2 mm.

Holotype female. Moapa, Clark Co., Nevada, August 31, 1961 (F. D. Parker).

Type in collection of the University of California, Riverside.

Perdita fulviventris, n. sp.

This little species has a strong resemblance to *chamaesarachae* Ckll., but the face is entirely dark and the maxillary palpi are six-jointed. Although without the male its position is not entirely certain, it cannot be placed elsewhere than in the *Sphaeralceae* Group. In the key to this group (1964), it runs to *vittata tricolor* Timb. (couplet 39, p. 130), but differs in the highly polished mesonotum and lack of pale markings on the abdomen. It can hardly be the opposite sex of *irwini* Timb., because of too much difference in the shape of the marginal cell.

Female. Head and thorax dark blue, disk of mesoscutum, scutellum and metanotum blackish and clypeus fuscous. Head and thorax without pale markings, except for white tubercles. Abdomen fulvoferruginous; tergite 1 slightly infuscated on each side of upper part of basal declivity, and weak oval dark mark on each side of disk. Legs black, with upper anterior margin of front tibiae and front tarsi pale yellow. Antennae dark, flagellum brownish beneath. Labrum testaceous. Mandibles testaceous, somewhat infuscated at base and reddened at apex. Tegulae testaceous with small white spot at base. Wings strongly dusky, nervures testaceous, margins of stigma brown, subcosta slightly infuscated except at base.

Head somewhat broader than long; cheeks very strongly receding, about one-third as wide as eyes. Posterior ocelli about their distance apart from eyes and half as far from very indefinite occipital margin. Facial foveae small, about their own width from margin of eyes and reaching from above level of antennal sockets about halfway to level of anterior ocellus. Antennae inserted below middle of face and below level of middle of eyes, flagellum slightly clavate, with middle joints as thick as long. Face below level of antennae gently convex, disk of clypeus slightly broader than high and subtruncate at summit. Mandibles nearly reaching far margin of labrum, and blunt at apex but probably worn. Proboscis short, galeae broad on basal half tapering to acute apex and half as long as stipites; maxillary palpi with six joints and longer than galeae. Pterostigma about three and one-half times longer than wide and three-fourths as wide as first submarginal cell; marginal cell equally long beneath and beyond stigma, with metacarpus nearly twice as long as apical truncation. Abdomen rather broadly ovate, nearly twice as long as wide.

Head and thorax highly polished, with sparse minute puncturation. Punctures of frons restricted mostly to area between each fovea and adjacent antennal socket, those of mesoscutum to anterior border. Clypeus with larger sparse shallow punctures. Pubescence short, erect, white and thin, most evident on occiput; face with fine hair between each antennal socket and adjacent eye; a few short hairs on anterior border of mesoscutum and on scutellum; hair of mesopleura very thin and sides of propodeum apparently bare. Scopal hair of hind tibiae fine, moderately thin and about as long as greatest width of tibia.

Length 3.5 mm, anterior wing 2.4 mm, width of abdomen 1.1 mm.

Holotype female. San Carlos, Sonora, Mexico, on *Euphorbia*, Sept. 3, 1970 (G. E. and R. M. Bohart). Type in collection of the University of California, Riverside.

***Perdita gillaspyi*, n. sp.**

This belongs to an assemblage of small dark species which, being without distinctive markings, are difficult to distinguish. In the 1964 key to the *Sphaeralceae* Group, it falls next to *salviae* Timb., couplet 25 (p. 128), and differs by the broader head, closer punctures on the face with much more abundant hair, and by the dusky wings.

Female. Head and thorax dark green, without light markings, clypeus, disk of mesoscutum and scutellum black. Abdomen blackish, without marking, pygidial plate testaceous brown. Legs dark, tinged with brown, spot on middle knees and all tarsi more testaceous. Antennae dark, but flagellum brown and only slightly darker above. Mandibles testaceous becoming red at apex. Tegulae testaceous. Wings dusky hyaline, nervures and margins of stigma testaceous brown, subcosta more fuscous.

Head distinctly broader than long; cheeks evenly rounded and about two-thirds as wide as eyes. Posterior ocelli about their distance apart from margin of eyes and somewhat closer to occipital margin. Facial foveae about their own width from margin of eyes and reaching from slightly above level of antennal sockets somewhat more than halfway to level of anterior ocellus. Antennae short, inserted below middle of face, scape reaching above level of posterior end of foveae, flagellum clavate, with middle joints broader than long. Face gently convex; disk of clypeus distinctly wider than high, broadly rounded at summit, with lateral extensions strongly inflexed and not much visible in frontal aspect. Mandibles moderately thick, evenly curved, and with small inner tooth before acute apex. Proboscis short, galeae blunt at apex and shorter than maxillary palpi; labial palpi with first joint no longer than next three together. Tarsal claws small, with small inner tooth. Pterostigma small, hardly over three times longer than wide and about one-half 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 strongly narrowed above and receiving recurrent nerve one-fifth of its length from base. Abdomen oval, subdepressed, about twice as long as wide; pygidial plate longer than wide at base, with sides converging to almost acute apex.

Head and thorax minutely tessellate and moderately shining. Frons with minute close punctures between foveae and antennal sockets, and with remote punctures above level of foveae. Face below level of antennae smooth, with comparatively coarse and moderately well separated punctures. Punctures of mesonotum minute like those of frons and widely spaced. Pubescence white, rather short and erect on cheeks and sides of thorax, shorter, finer and thin on mesonotum, but longer and denser on metanotum and sides of propodeum. Sides of face with rather dense subappressed hair, radiating from antennal sockets, but not

dense enough to conceal surface. Abdomen minutely shagreened, dullish, with minute, obscure punctures on tergite 4. Apical fimbria rather long and dense for a *Perdita*.

Length 3.6 mm, anterior wing 2.4 mm, width of abdomen 1 mm.

Holotype female. 1 mile west of Lajitas, Brewster Co., Texas, April 23-30, 1963 (J. E. Gillaspay). Type in collection of the University of California, Riverside.

Perdita hiemalis, n. sp.

This is very small, almost entirely dark species from Guerrero, Mexico, collected in December, and belonging evidently in the *Sphaeralceae* Group. In the 1964 key, it runs near *pumila* Timb., couplet 14 (p. 127), but has the head broader than long, a white spot on the tubercles, the mandibles black at the base, and the wings dusky hyaline.

Female. Head and thorax dark green, labrum and clypeus black, disk of mesoscutum and scutellum blackish. Abdomen black. No pale marking except for white spot on tubercles. Legs dark, extreme apex of front femora and anterior side of front tibiae at base pale yellowish. Antennae dark, scape black, flagellum slightly brownish. Mandibles thick, shading into rufotestaceous on apical half. Proboscis dark. Tegulae testaceous, with whitish mark at base. Wings dusky hyaline, nervures testaceous, margin of stigma and subcosta infuscated. Pygidial plate rufotestaceous.

Head rotund, distinctly but not strongly broader than long; cheeks strongly receding, about one-fourth as wide as eyes. Posterior ocelli slightly more than their distance apart from eyes and about half as far from occipital margin. Facial foveae finely linear, diverging and distant from margin of eyes anteriorly, and not more than one-third as long as space between antennal sockets and anterior ocellus. Antennae short; inserted below middle of face, flagellum slightly clavate, with joints no longer than wide except apical joint. Antennal sockets distinctly closer to each other than to margin of eyes. Face gently convex from ocellar region to clypeal margin and more strongly convex below from side to side; disk of clypeus broader than high, with lateral extensions strongly inflexed and not visible in frontal aspect. Mandibles slightly curved, tapering, and slightly blunt at apex. Proboscis retracted in type apparently with galeae much shorter than stipites. Pterostigma not more than three times longer than wide, emitting radius slightly before middle, and about three-fourths as wide as first submarginal cell; marginal cell longer beneath than beyond stigma, with metacarpus only slightly longer than apical truncation; second submarginal cell narrowed about two-thirds above. Tarsal claws small, with minute inner tooth. Abdomen oval, depressed, about two and one-half times longer than wide; pygidial plate distinctly longer than wide, with sides converging to almost acute apex.

Head and thorax minutely tessellate, moderately shining, with face below level of antennae smoother. Punctuation minute and very sparse, mesonotum with few scattered punctures, mostly on anterior part of scutum, and those on face below level of antennae well separated; sides of face with some minute punctures extending upward between foveae and margin of eyes, and others between foveae and antennal sockets. Mesopleura tessellate, with few minute punctures. Abdomen moderately shining. Pubescence short, fine, erect and thin, most apparent on face and cheeks, with mesonotum bare except for few hairs on anterior border of scutum. Apical fimbria of abdomen long but thin.

Length (with head stretched forward) 3.4 mm, anterior wing 2 mm, width of abdomen 0.8 mm.

Holotype female. Zihuatanejo, Guerrero, Mexico, Dec. 12, 1966 (G. E. Bohart). Type in collection of the University of California, Riverside.

Perdita janzeni, n. sp.

This bee is closely allied to *sphaeralceae* Ckll., and very similar, but differs in the simple mandibles (inner tooth subject to wear, but specimen in prime condition); the frons with low ridges converging below, enclosing slight triangular median impression; the light abdominal bands reaching the lateral margins on tergites 3 and 4, and

embracing the full length of the lateral foveae on tergite 2; and the erect hair on mesoscutum is distinctly longer. When more adequately known, this may prove to be a form of *sphaeralceae*, but it must be held distinct for the present.

Female. Head and thorax dark blue-green, with clypeus, supraclypeal area, meso- and metanotum black. Face entirely dark. Cuneate mark on each side of disk of pronotum and small spot on inner side of apex of tubercles pale yellow. Abdomen dullish black with broad pale yellow band at base of tergites 2 to 5, that on tergite 5 slightly abbreviated, others reaching lateral margins, although that on tergite 2 is kept from touching lateral margins by black lateral foveae. Legs black, apex of front femora briefly and anterior side of front tibiae pale yellow. Antennae dark, flagellum brownish beneath, scape with tiny yellow spot at base beneath. Mandibles pale yellow at base, testaceous at middle, shading to fuscous on both margins and into red at apex. Proboscis fuscous. Tegulae testaceous, darker at base. Wings somewhat dusky hyaline, with brownish tinge, nervures testaceous, margins of stigma brownish, subcosta fuscous.

Head slightly broader than long, cheeks strongly receding, about two-thirds as wide as eyes. Posterior ocelli their distance apart from eyes, and two-thirds as far from occipital margin. Facial foveae slender, close to margin of eyes, and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Antennae inserted slightly below middle of face, flagellum clavate, with middle joints about as long as thick. Antennal sockets much closer to each other than to margin of eyes. Disk of clypeus strongly convex, about as broad as high, rounded above, with lateral extensions broadly and strongly inflexed and only partly visible in frontal aspect; supraclypeal area convex and elevated over subantennal plates; these plates only slightly longer than wide, and strongly rounded out on both inner and outer margins. Frons slightly protuberant above on each side to form small impression for anterior ocellus. Labrum much broader than long and rounded on apical margin. Mandibles gently curved, but little tapering, blunt at apex, without inner tooth, but possibly worn. Proboscis moderately long, galeae as long as stipites. Tarsal claws with strong inner tooth. Wings ample, pterostigma distinctly more than four times as long as wide, widest beyond middle, and about three-fourths as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus more than twice as long as apical truncation; second submarginal cell narrowed about one-third above.

Head and thorax very minutely tessellate, moderately dull, including sculpture of subantennal plates, but supraclypeal area, and clypeus polished. Clypeus with a few minute punctures on each side, but middle of disk impunctate. Punctures of frons and mesonotum sparse and obscure. Pubescence white, long, erect and fine, densest on cheeks and sides of thorax and shorter and thin on mesonotum. Basal declivity of tergite 1 of abdomen with thin erect hair as in *sphaeralceae*. Hair of front coxae and apical fimbria of abdomen long but thin. Abdomen elongate oval and depressed, widest at junction of tergites 3 and 4 and longer than head and thorax combined. Pygidial plate plane, about as long as wide at base, with sides converging to obtuse apex.

Length 7 mm, anterior wing 5 mm, width of abdomen 2 mm.

Holotype female. 4 miles south of Perote, Veracruz, Mexico, August 9, 1964 (D. H. Janzen).

Type received from R. B. Roberts, held at present at Riverside, but will go to California Academy of Sciences, San Francisco.

Perdita mimosae efferta, n. subsp.

The female of *efferta*, discovered in New Mexico at flowers of *Tamarix*, is closely allied to *mimosae* and *sonorensis*, and the three forms are distinguished in the following key:

1. Frons shining, with close setiferous punctures, especially between foveae and adjacent antennal socket 2
- Frons minutely tessellate, somewhat dullish, with only a few fine punctures between foveae and adjacent antennal socket; abdomen dark, with two oval white marks on tergites 2 and 3 *mimosae* Timberlake

2. Underside of scape, in some cases, tubercles and band on tergites 2 to 4, or 5, at most only narrowly interrupted medially, white; punctures of anterior part of frons mostly no more than one puncture-width apart; facial foveae not much wider than interval between them and eyes; wings whitish *efferta*, n. subsp.
 Scape dark, but tubercles and mark on each side of pronotum white; tergites 2 to 4 with transverse white mark on each side; punctures of frons numerous, but distinctly separated; facial foveae three or four times broader than interval between them and eyes; wings dusky hyaline *sonorensis* Cockerell

These three forms, judging from the above characters, appear to be specifically distinct, but the male of *efferta* is identical with the male of *mimosae*. It seems evident that the sexes of either *mimosae* or *efferta* are misassociated, but more material and observation is needed to resolve this problem. It is almost certain that the true male of *mimosae* is unknown, and that *efferta* should stand as a distinct species.

Female. Head and thorax dark green, dark part of clypeus and supraclypeal area, and disk of mesoscutum, and scutellum black. Clypeal and lateral marks and in some cases supraclypeal and subantennal spots white; two stripes or large median mark on clypeus dark, with at least outer ends and lateral margins of disk remaining white; lateral marks usually a little broader than high, but in some cases with orbital extension; supraclypeal region dark or in some cases with two or four slightly separated white spots in transverse row. Thorax dark, except for white mark on tubercles. Abdomen fuscous, with even white band at base of tergites 2 to 4, or 5, not quite reaching lateral margins and more or less notched medially behind, or narrowly interrupted. Legs fuscous, extreme apex of front and middle femora, anterior side of front and middle tibiae yellowish white, front tarsi testaceous brown. Antennae black, scape entirely dark or at least partly white beneath, flagellum brownish yellow beneath. Labrum dark. Mandibles white, with apical half rufotestaceous and red. Tegulae testaceous hyaline, white at base. Wings whitish, slightly opaque, nervures and margins of stigma testaceous, subcosta brown.

Head distinctly broader than long; cheeks rounded, moderately receding and about two-thirds as wide as eyes. Posterior ocelli about two-thirds of their distance apart from eyes and somewhat closer to occipital margin. Facial foveae well impressed, about half their own width from margin of eyes and reaching about two-thirds of distance from level of antennal sockets 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 strongly convex; disk of clypeus broader than high, truncate at summit, and broadly inflexed on side of labrum, but with lateral extensions partly visible in frontal aspect. Mandibles tapering, acute and gently curved. Proboscis rather short and robust, galeae equal to stipites. Pterostigma about as long and two-thirds as wide as first submarginal cell; marginal cell a little longer beyond than beneath stigma, with *metacarpus* nearly twice as long as apical truncation. Abdomen ovate, about twice as long as wide, convex above; pygidial plate about as long as wide, with sides converging to narrowly rounded apex.

Head and thorax shining; frons and vertex obscurely tessellate, finely punctured, with punctures rather dense on anterior part of frons; mesoscutum polished, with sparse, well separated and evenly distributed punctures. Pubescence white, fine, moderately long and mostly erect, rather thin on face and mesonotum, but conspicuous and denser on cheeks and occiput. Apical fimbria of abdomen long and abundant. Scopal hair of hind tibiae fine, hair on anterior side gently curved, and hair on outer margin longer than greatest width of tibia.

Length 4-5 mm, anterior wing 3-3.9 mm, width of abdomen 1.5-1.7 mm.

Male. Not distinguishable from typical *mimosae*.

Holotype female and allotype. Bottomless Lakes, 10 miles east of Roswell, Chaves Co., New Mexico, at flowers of *Tamarix gallica*, May 20, 1969 (Brothers, Krueger, and Michener).

Paratypes. New Mexico, Chaves Co.: 12 females, 12 males, same data as type; 2 males, 5 miles east of Roswell, on *Aplopappus heterophyllus*, Sept. 11, 1961 (Timberlake). Eddy Co.: 5 females, 5 males, Carlsbad, on *Tamarix*, May 20; one male on *Lepidium integrifolium* and one male on *Prosopis glandulosa*, 22 miles southwest of Carlsbad, May 21, 1969 (Brothers, Krueger, and Michener). Santa Fe Co.: one male,

Santa Fe, on *Tamarix gallica*, July 11, 1963 (C. Henninger). Colorado, Pueblo Co.: 2 females, Pueblo, 5,000 ft., August 19, 1960 (R. K. Dreisbach). Mexico, Chihuahua: one female, 5 miles north of Escalon, Sept. 20, 1970 (G. E. and R. M. Bohart). The 6 male paratypes of *mimosae* recorded from Loving, New Mexico, agree with above males.

Types in collection of the University of Kansas, Lawrence, and paratypes in collection of the University of California, Riverside.

The face markings of the female of *efferta* vary widely from having four supra-clypeal and subantennal spots in a transverse row, with the clypeus largely pale, to an extreme melanic condition seen in one female from the type locality, which has the face entirely dark except for a small white mark on each side adjacent to the clypeus.

Perdita morula, n. sp.

This is a small robust species from Utah, almost entirely dark, that is assigned to the *Sphaeralceae* Group. In the 1964 key, it runs out at couplet 24 (p. 128) and differs from *chihuahua* Timb. and *fremonti* Timb., var., by having the mesoscutum changing to bronze in different lights.

Female. Dark green, more bluish on propodeum; mesonotum and metanotum with a reddish bronze luster changing to greenish in different lights and frons slightly bronzy. Small white spot on each side of face, adjacent to sides of clypeus. Abdomen black, pygidial plate testaceous. Legs dark, front tibiae broadly in front, middle tibiae narrowly, and front and middle tarsi yellow. Antennae dark, flagellum pale yellow beneath. Mandibles with small yellowish white mark at base and shading through testaceous to dark red at apex. Tegulae testaceous. Wings slightly whitish hyaline, nervures pale testaceous, margins of stigma and subcosta dilute fuscous.

Head slightly broader than long; cheeks moderately receding, about two-thirds as wide as eyes. Posterior ocelli somewhat less than their distance apart from nearest eye and considerably closer to occipital margin. Facial foveae wider than narrow interval between them and eyes, and reaching from level of middle of antennal sockets about halfway to level of anterior ocellus. Antennae inserted short distance below middle of face, flagellum moderately clavate, with middle joints as long as thick. Antennal sockets distinctly closer together than to margin of eyes. Face below level of antennae rather strongly convex, with outer ends of clypeus strongly inflexed and not visible in frontal aspect; disk of clypeus much broader than high and rounded at summit. Mandibles robust, tapering in apical third to blunt apex. Proboscis moderately long, galeae as long as stipites, and exceeding maxillary palpi, but not labial pair. Pterostigma about three times longer than wide, widest beyond middle and about three-fourths as wide as first submarginal cell; marginal cell subequal in length beneath and beyond stigma, with metacarpus one and one-half times as long as apical truncation. Abdomen ovate, widest across third segment, about twice as long as wide and moderately convex above. Pygidial plate apparently about as long as wide at base, with sides converging to moderately narrow and rounded apex.

Head and thorax shining, except frons and vertex minutely tessellate and dullish; mesonotum, mesopleura and propodeum with increasing degree of delicate tessellation. Punctures of frons minute and moderately close, those of mesonotum sparse but more distinct, and widely spaced with posterior middle of scutum impunctate, and those of clypeus coarser but shallow and well separated. Pubescence whitish, fine, moderately short and mostly erect; densest on cheeks, thin and suberect on face opposite antennae, and very thin and reclinate on mesoscutum. Apical fimbria of abdomen thin and rather long. Scopal hair of hind tibiae fine, somewhat longer than greatest width of tibia.

Length 3.8 mm, anterior wing 2.8 mm, width of abdomen 1.3 mm.

Holotype female. Island in the Sun Park, Grand Co., Utah, May 20, 1966 (G. F. Knowlton).

Paratype. Female, 19 miles north of Gallup, McKinley Co., New Mexico, August 19, 1972 (Rozen and McGinley). Paratype differs in having mesonotum with weak metallic luster, margins of stigma colorless, and anterior parocular area in front of foveae very weakly instead of strongly tessellate.

Type in collection of the University of California, Riverside, and paratype in American Museum of Natural History, New York.

***Perdita pernitens*, n. sp.**

This species from Jalisco, Mexico, runs near *leucophylli* Timb. in the key to the *Sphaeralceae* Group (1964), couplet 27 (p. 128). It differs from *leucophylli* and other similar species in being larger, and in having more strongly punctured frons, elongate facial foveae, and a large pterostigma.

Female. Head and thorax dark bluish green; clypeus, supraclypeal area, disk of mesoscutum, scutellum, metanotum and abdomen black, without markings. Legs and antennae dark, flagellum slightly brownish beneath, tibial spurs and tarsal claws testaceous. Mandibles black at base, shading into testaceous at middle and red at apex. Labrum and proboscis black. Tegulae testaceous. Wings hyaline, nervures testaceous, margins of stigma brown, subcosta fuscous.

Head distinctly broader than long; cheeks moderately receding, about two-thirds as wide as eyes. Posterior ocelli slightly more than their distance apart from eyes and slightly less than that distance from occipital margin. Facial foveae strongly impressed, slender, their own width from margin of eyes, and reaching from level of middle of antennal sockets about three-fourths of distance to level of anterior ocellus. Antennae inserted below middle of face, flagellum moderately slender, with middle joints as long as thick. Face below level of antennae convex, with sutures very fine and dim; clypeus broader than high and truncate at summit; lateral extensions strongly inflexed and not much visible in frontal aspect. Mandibles thick at base, tapering to acute apex, and with small acute inner tooth. Proboscis retracted in type, moderately long, galeae nearly reaching base of stipites. Tarsal claws with small acute inner tooth. Pterostigma large, about as long and nearly as wide as first submarginal cell; marginal cell slightly longer beneath than beyond stigma, with metacarpus and apical truncation about equal; second submarginal cell large, narrowed about one-fourth to one-third above. Abdomen normal for group; pygidial plate about as long as wide and narrowed to acute apex.

Head and thorax shining, mostly polished, but vertex minutely tessellate, dullish and impunctate, and frons faintly tessellate. Punctures of face close, strong but fine, occurring up to level of anterior ocellus on frons but more sparsely above, and sparse below level of antennae, becoming finer and very sparse on clypeus and supraclypeal area. Mesoscutum with sparse minute punctures, mostly on anterior border, with disk nearly impunctate. Mesopleura with minute punctures arranged in well separated rows. Propodeum finely tessellate as usual. Pubescence whitish, fine, moderately short and erect; most evident on cheeks and occiput, and thin on face and mesonotum; hair on sides of propodeum very thin and short. Apical fimbria of abdomen long but thin. Scopal hairs on anterior side of hind tibiae strongly bent over, and longer than greatest width of tibia.

Length 5 mm, anterior wing 3.6 mm, width of abdomen 1.2 mm.

Holotype female. Ixtlahuacan del Rio, Jalisco, Mexico, Sept. 17, 1970 (G. E. and R. M. Bohart).

Paratypes. 2 females, same data as type.

Type in collection of the University of California, Riverside; paratypes in collection of G. E. Bohart.

***Perdita pinguis*, n. sp.**

(Figs. 1448, 1449, 1474)

This is a small robust species from Plumas County, California, that merits the name *pinguis*, which is used here in the sense of plumpness. In the key to the *Sphaeralceae* Group, it runs to *leucosticta* Timb., couplet 168 (p. 146), but it is not closely allied and has a different pattern of abdominal markings.

Male. Head and thorax dark blue-green. Mandibles except reddish tips, labrum, clypeus, quadrate lateral marks, two supraclypeal spots, close together, but slightly higher than wide, scape of antennae broadly beneath collar, small cuneate mark on each side of disk of pronotum and tubercles, creamy white. Lateral marks slightly higher than wide, rounded on inner margin, truncate above and reaching barely above level of summit of clypeus. Clypeus entirely pale, without tentorial dots. Abdomen black with narrow white band on tergites 1 to 5, those on tergites 4 and 5 reduced to short transverse marks touching

middle of lateral margins, that on tergite 1 abbreviated, rather narrowly interrupted and at summit of basal declivity; that on tergite 2 basal, slightly more interrupted than one on tergite 1 and with small cut-off part touching lateral margin and that on tergite 3 much more widely interrupted, thickened and bent backward at outer ends, and touching middle of lateral margins of segment. Legs black, apex and anterior side of front and middle femora, and their tibiae and tarsi creamy white, except tibiae partly tinged with pale brown behind and beneath; hind knees white, and hind tarsi pale brownish. Antennae otherwise brown, with flagellum much paler beneath, and pedicel white beneath. Tegulae pale translucent testaceous, with small white spot at base. Wings dusky hyaline, nervures testaceous, margins of stigma and subcosta fuscous.

Head slightly broader than long; inner orbits of eyes slightly diverging above; cheeks evenly rounded in outline and nearly as wide as eyes. Posterior ocelli their distance apart from margin of eyes and slightly closer to occipital margin. Antennae inserted below middle of face, scape reaching less than halfway to level of anterior ocellus, flagellum slightly clavate, with middle joints as long as thick. Face below level of antennae moderately convex; disk of clypeus somewhat broader than high and well rounded at summit; lateral extensions broad and strongly inflexed but partly visible in frontal aspect. Mandibles ordinary. Proboscis elongate, galeae about as long as head. Flanks of pronotum rather strongly impressed, and posterior corners of disk almost acute and prominent. Pterostigma about three times longer than wide and half as wide as first submarginal cell; marginal cell longer beyond than beneath stigma, with metacarpus distinctly longer than apical truncation; second submarginal cell narrowed about four-fifths above. Abdomen oval, strongly convex above, about one-half longer again than wide, with apex strongly recurved and contracted.

Head and thorax shining except frons and vertex minutely tessellate, dull and almost impunctate; mesonotum polished, with few minute punctures, mostly on anterior border of scutum. Pubescence white, short, fine, thin and erect, most evident on cheeks, occiput and sides of thorax, very thin on mesonotum, and face nearly bare, except for very short hair opposite antennal sockets. Abdomen bare. Subgenital plate narrowed to rounded apex and unusually hairy. Caulis of genital armature deeply divided dorsally, with lobes merging into parameral lobes, these appearing slender but truncate at apex in dorsal view, and very broad at base and tapering to acute apex in lateral view; parameral lobes lacking apical fimbria; sagittae divided in apical half, with rods tapering to acute apex and as seen from side moderately thin dorso-ventrally; volsellae well exposed, dorsal pair extending over sagittae and nearly meeting.

Length 3.6 mm, anterior wing 2.5 mm, width of abdomen 1.5 mm.

Holotype male. Clio, Plumas Co., California, July 8, 1952 (M. Cazier and R. Schrammel).
Type in collection of American Museum of Natural History, New York.

***Perdita pygidialis*, n. sp.**

(Figs. 1450, 1451, 1475)

This new species from Arizona runs best to *mimosae* Timb. in the 1964 key to the *Sphaeralceae* Group, and the male runs to *leucosticta* Timb. and *propinqua* Timb., couplet 210 (p. 151). The female differs from *mimosae* by having the apex of the abdomen ferruginous and the pale banding much more extensive, reaching the lateral margins on tergites 3 and 4. The male differs from *leucosticta* and *propinqua* in the dark color of the frons that reaches to the clypeus on each side, and in having the abdominal banding less developed, with the band on tergite 2 much abbreviated and interrupted.

Female. Dark blue-green, with dark part of face below level of antennae, pronotum, mesoscutum and scutellum black. Three marks on anterior part of clypeus and lateral marks extending on orbits to level of antennae, white; marks on clypeus in some cases confluent and forming anterior band distinctly trilobed above, with lateral lobes sometimes exposing dark tentorial dots. Thorax entirely dark. Abdomen black with apex bright ferruginous, except for dark mark on each side at base of tergite 5; tergites 1 to 4 each with white band, that on tergite 1 reduced to two transversely oval spots, sometimes obsolete, those on following segments successively less broadly interrupted at middle, that on tergite 2 not reaching lateral

foveae, and those on tergites 3 and 4 touching lateral margins; bands on tergites 3 and 4 very slightly but broadly emarginate behind on each side and narrowed to outer ends. Legs dark, apex of front and middle femora, anterior side of front tibiae very broadly and middle tibiae less broadly pale testaceous whitish. Antennae dark, flagellum brown, becoming yellowish brown beneath. Tegulae testaceous. Wings slightly dusky hyaline, nervures testaceous, margins of stigma and subcosta dilute fuscous.

Head slightly broader than long; cheeks rounded, slightly receding and nearly as broad as eyes. Posterior ocelli about their distance apart from margin of eyes and much closer to occipital margin. Facial foveae well impressed, much wider than interval between them and eyes and reaching from level of middle of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted below middle of face, flagellum slightly clavate, with middle joints as long as thick. Face below antennae gently convex; disk of clypeus broader than high and rounded at summit; lateral extensions strongly inflexed and not much visible in frontal aspect. Mandibles broad, tapering, simple and acute. Proboscis moderately long, galeae reaching base of stipites. Pterostigma about three-fourths as wide as first submarginal cell; marginal cell as long beneath as beyond stigma, with metacarpus only slightly longer than apical truncation. Tarsal claws with small inner tooth. Pygidial plate narrowly triangular and longer than wide, plane above, subacute at apex.

Head and thorax shining, frons and vertex minutely tessellate and dullish, frons with minute punctures near antennal sockets, and middle of face below antennae with few stronger punctures. Mesonotum polished, with very remote, minute punctures, mostly restricted to anterior third of scutum. Pubescence white, fine, moderately long and erect, most evident on cheeks and sides of propodeum, short and thin on face and thin on anterior part of mesoscutum. Apical fimbria of abdomen thin and moderately long. Scopal hair of hind tibiae not much longer than greatest width of tibia, but row of fine hairs on outer margin about twice as long as other hairs, and similar long hairs on basitarsi.

Length about 4.5 mm, anterior wing 2.5-2 mm, width of abdomen 1.5 mm.

Male. Head and thorax dark blue or blue-green, disk of mesoscutum, scutellum and metanotum black. Clypeus, lateral marks, as broad as high and rounded within, and supra-clypeal mark twice as broad as high, white; clypeus in some cases with two short fuscous stripes. Thorax entirely dark, or in some cases posterior margin of disk of pronotum edged with white on each side. Abdomen black, except ferruginous on tergites 6 and 7, or on 7 only; other segments in most cases marked with spots or bands of white; tergite 1 with two transverse marks well separated at summit of basal declivity or in some cases absent; bands on following segments interrupted medially, those on tergites 3 and 4 broadly and shallowly emarginate behind on each side and reaching lateral margins, that on tergite 2 abbreviated, and that on tergite 5 in some cases interrupted on each side as well as in middle, or sometimes entire. Antennae dark, scape white beneath, flagellum brown and brownish yellow beneath. Mandibles shading from whitish at base to rufotestaceous at apex. Labrum pale testaceous or tinged with white. Tegulae testaceous. Wings dusky hyaline, nervures testaceous, margins of stigma and subcosta dilute fuscous.

Head rounded, as broad as long; cheeks receding, about two-thirds as wide as eyes. Posterior ocelli slightly closer to margins of eyes than their distance apart and somewhat less distant from occipital margin. Facial foveae elongate oval, nearly as long as space between antennal sockets. Antennae inserted below middle of face, with middle joints of flagellum as long as thick. Face gently convex below level of antennae; disk of clypeus much broader than high, and rounded above. Mandibles simple, acute and reaching far margin of labrum. Proboscis and wings about as in female. Abdomen oval, strongly convex above, tergite 7 evenly narrowed to acute apex.

Head and thorax shining except frons and vertex distinctly tessellate and rather dull, mesonotum polished, and mesopleura and propodeum minutely tessellate and shining; puncturation minute, sparse and obscure, most evident on frons near base of antennae. Pubescence whitish, fine and erect, long and abundant on cheeks, short and thin on face, and moderately long and thin on mesonotum. Subgenital plate as broad as long and truncate at apex. Genital armature much as in *leucosticta* and *propinqua* (Figs. 981-984), but sagittae angularly widened before tapering to acute apex.

Length 3-3.9 mm, anterior wing 2.7-2.9 mm, width of abdomen 1.2-1.3 mm.

Holotype female and allotype. 7 miles south of Ajo, Pima Co., Arizona, on *Phacelia*, March 27, 1968 (Torchio and Youssef).

Paratypes. 10 females, 7 males, collected with types; one female, 3 males, Sabino Canyon, Santa Catalina Mts., 3,000 ft., April 15, 1965 (R. B. Roberts).

Types in collection of the University of California, Riverside, and paratypes in collections of G. E. Bohart and R. B. Roberts.

***Perdita recticincta*, n. sp.**

(Figs. 1452, 1453, 1476)

This species, remarkably distinct in both coloration and structural characters, belongs in the *Sphaeralceae* Group. In the 1964 key, it runs without equivocation to couplet 220 (p. 152), where it can be taken out by the dark pterostigma; otherwise it goes on best to *wislizeniae* Timb. in couplet 222 (p. 153), but differs in the broad, even, light bands of the abdomen.

Male. Head and thorax dark, slightly bluish green, with disk of mesoscutum, scutellum and metanotum black; narrow band on anterior margin of underside of head, extending on cheeks to middle of eyes, mandibles except red tips, labrum and face to level of foveae pale yellow. Yellow of face ending very broadly on each side at level of foveae, with slight intrusion between foveae and eyes, and in middle ending acutely at same level, with the green descending narrowly on each side to antennal sockets. Thorax dark, except tubercles and margin of flanks of pronotum below tubercles pale yellow. Abdomen fuscous, with very even, broad pale yellow band at base of tergites 2 to 5; apical depression of tergite 5 and that of preceding segments successively less broadly testaceous; tergite 6 pale yellow, with oblong fuscous mark on each side, its apical depression and tergite 7 testaceous. Front and middle legs pale yellow, except broadly fuscous behind on femora and tibiae; hind legs fuscous, with narrow apex of coxae, trochanters, femora except behind, and underside of tibiae and basitarsi pale yellow. Scape of antennae yellow except triangular fuscous mark at apex above, and flagellum duller pale yellow, narrowly brownish above, becoming paler toward apex. Tegulae testaceous except small yellow spot at base. Wings slightly dusky hyaline. Nervures and stigma testaceous brown, except base of stigma pale yellow, subcosta more infuscated but pale at base.

Head much broader than long; cheeks broad, evenly rounded, about three-fourths as wide as eyes. Posterior ocelli about their distance apart from occipital margin and distinctly more remote from eyes. Facial foveae large for male sex, longer than wide and about half their width from margin of eyes. Antennae inserted somewhat below middle of face, scape almost reaching level of anterior ocellus, flagellum slightly clavate, with middle joints as long as thick. Face gently convex, except outer ends of clypeus broadly and strongly inflexed; disk of clypeus broader than high and broadly rounded above; supraclypeal area below level of antennal sockets twice as broad as high. Flanks of pronotum normal. Pterostigma about three-fourths as wide as first submarginal cell; marginal cell almost equally long beneath and beyond stigma, with metacarpus twice as long as apical truncation; second submarginal cell about half as wide above as below. Abdomen oval, a little more than twice as long as wide and convex above; tergite 7 with moderately narrow apical lobe, rounded at apex.

Head and thorax finely tessellate, moderately dullish, with extremely minute and very sparse punctures, obscure on frons. Pubescence white, fine and mostly long, but short and thin on face, with that on frons very short and fine; mesoscutum with long erect scattered hairs, that of occiput also long, but that of cheeks and mesopleura very long. Abdomen bare, except for long hair on sides and apex. Subgenital plate broader than long, with sides converging to angulato-truncate apex, with microscopically short fine hair; basal stalk very slender. Caulis of genital armature with basal orifice large and dorsal lobes deeply divided; parameral lobes very broad at base and narrowed at apex, with marginal fringe, and dorsal margin of lobes with small notch near middle visible in lateral view; sagittae depressed, rods separated except for short union before middle, then slender, widely separated, slightly biarcuate extending beyond apex of parameral lobes.

Length 4.75 mm, anterior wing 4 mm, width of abdomen 1.6 mm.

Holotype male. Coronado Peak Trail, 66-6,875 ft., Cochise Co., Arizona, August 17, 1969 (R. R. Snelling).

Type in collection of the Los Angeles County Museum, Los Angeles.

***Perdita submaerens*, n. sp.**

(Figs. 1454, 1455, 1477)

In the keys to the *Sphaeralceae* Group (1964 and 1968), the male of *submaerens* runs best near *supranitens* Timb., couplet 173 (1964:147), and the female near *schwartzii* Timb., couplet 7 (1968:113). The male differs from *supranitens* in having the face yellow below the antennae, except between the lateral and subantennal marks; the abdomen dark except for the yellow band at the base of tergite 2, which is often concealed; and the stigma yellow except for a dark margin. The female differs from *schwartzii* in having the face dark except for a small spot at the anterior corners, the pronotum with a yellow spot on each side of the disk, and the abdominal bands basal but widened at the outer ends and passing over on the ventral side of the segments.

Male. Head and thorax dark blue-green, disk of mesoscutum, scutellum and metanotum black. Line on interior orbits nearly to middle of eyes, mandibles, except red tips, labrum and face below level of antennae yellow, except for short broad intrusion of dark color between lateral and subantennal marks. Lateral marks triangular, broad at anterior end and ending bluntly at anterior end of foveae. Thorax dark except for small cuneate mark on each side of pronotum and mark on tubercles yellow. Abdomen black, but testaceous beneath and on tergite 7, and with narrow yellow band at base of tergites 2 to 6, reaching lateral margins, but one or more bands often concealed by preceding segment. Legs fuscous, with front coxae, apex of middle and hind coxae, trochanters, front femora except large blotch behind, middle femora except small mark beneath at apex, hind femora except irregular mark on apical fourth to half and front and middle tibiae, except on outer margin, yellow. Antennae black, scape broadly yellow beneath, flagellum more brownish and brownish yellow beneath. Proboscis dark. Tegulae testaceous. Wings dusky hyaline, nervures testaceous, margins of stigma and subcosta fuscous, disk of stigma opaque and yellowish.

Head much broader than long; cheeks slightly receding, rounded and about two-thirds as wide as eyes. Posterior ocelli somewhat less than their distance apart from occipital margin and one-half more than that distance from nearest eye. Facial foveae oval, about half as long as space between posterior ocelli. Antennae inserted slightly below middle of face, flagellum slightly clavate, thick, with middle joints slightly longer than thick. Face below level of antennae gently convex; supraclypeal area about one-half wider again than high, subantennal plates large and oval; disk of clypeus broader than high, truncate at summit, and outer extremities broadly inflexed, but partly visible in frontal aspect. Mandibles tapering with slight indication of inner tooth and reaching far margin of labrum. Proboscis short, galeae half as long as stipites. Tarsal claws strongly bifid. Pterostigma four times as long as wide, about three-fourths as wide as first submarginal cell; marginal cell almost equally long beneath and beyond stigma with metacarpus about twice as long as apical truncation.

Head and thorax shining, except frons and vertex minutely alutaceous and dull; mesonotum polished, but with faint minute tessellation on anterior border of scutum; cheeks, mesopleura and propodeum minutely tessellate. Puncturation extremely minute, moderately close on face between foveae and antennal sockets and very sparse on anterior part of mesoscutum. Pubescence whitish, fine, rather long and erect; moderately abundant on cheeks and sides of thorax, and very sparse and shorter on anterior part of mesoscutum. Hair of hind tibiae about as long as greatest width of tibia, with row of thickened hairs on outer margin. Abdomen oval, gently convex above and thinly hairy toward apex; tergite 7 strongly narrowed to obtuse apex. Subgenital plate as broad as long, with sides curving inward apically to broad rounded emargination, disk convex above with few fine hairs fringing apical margin. Caulis of genital armature nearly as broad as long, thick dorsoventrally; dorsal lobes strongly convex and separated by deep furrow; parameral lobes, thick, inserted on sides of caulis, blunt at apex, with fringe of short hair on inferior margin; sagittae with separated rods surpassing apex of parameral lobes; inferior pair of vibrissae large, broad at base and obliquely narrowed to acute apex, and ending about opposite middle of parameral lobes.

Length 5-5.1 mm, anterior wing 3.8-3.9 mm, width of abdomen 1.4-1.5 mm.

Female. Head and thorax dark blue-green, labrum, clypeus, supraclipeal area, disk of mesoscutum, scutellum and metanotum black. Basal half of mandibles, small lateral marks, scape of antennae broadly beneath, cuneate mark on each side of pronotum, and mark on tubercles (absent in type) creamy white. Lateral marks emarginate on inner margin with orbital extension nearly to level of antennae. Abdomen black, with creamy white band at base of tergites 2 to 4, broad at outer ends, passing over on reflexed part of tergites, and gradually narrowed mesad. Pygidial plate reddish brown. Legs black, apex of front femora and anterior side of front tibiae white. Antennae partly black on scape, flagellum fuscous and dusky yellowish beneath. Mandibles reddened at apex. Proboscis dark. Tegulae testaceous. Wings strongly dusky, nervures testaceous, margin of stigma fuscous, subcosta testaceous brown.

Head distinctly broader than long; cheeks rounded, moderately receding, about three-fourths as wide as eyes. Posterior ocelli about their distance apart from eyes and somewhat closer to occipital margin. Facial foveae linear, their own 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 inserted slightly below middle of face, flagellum cylindrical, with middle joints distinctly longer than thick. Face below level of antennae strongly convex, disk of clypeus broader than high, rounded across summit and with lateral extensions strongly inflexed and only partly visible in frontal aspect. Mandibles tapering and acute at apex. Tarsal claws with small acute inner tooth. Proboscis and wing venation about as in male, but pterostigma more than four times as long as wide. Pygidial plate apparently about as long as wide at base and moderately narrowed to rounded apex.

Head and thorax moderately shining and weakly tessellate, with frons and vertex more alutaceous and duller than other parts. Puncturation minute, moderately close on face, sparser on clypeus, and sparse on mesonotum, with posterior half of scutum nearly impunctate. Pubescence whitish, erect and moderately long; thin on mesonotum, denser on cheeks, and shorter on face. Abdomen longer than head and thorax combined, gently convex, with apical fimbria thin and moderately long. Hair on outer face of hind tibiae strongly curved, thickened and darkened toward base and about as long as greatest width of tibia. Hair of front coxae long and moderately thin.

Length, with head stretched forward, 7 mm, anterior wing 4.8 mm, width of abdomen 1.75 mm.

Holotype male and allotype. Chapilillo, Nayarit, Mexico, Sept. 15, 1970 (G. E. and R. M. Bohart).

Paratypes. 47 males, 7 females, collected with types; 12 males, one female, 15 miles northeast of Guadalajara, Jalisco, Sept. 17, 1970; and one male, 10 miles south Jalpa, Zacatecas, Sept. 17, 1970 (G. E. and R. M. Bohart).

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

***Perdita tumida*, n. sp.**

(Figs. 1456, 1457, 1478)

This species is closely allied to *koebeli* Timb., but the thorax is entirely dark, except for pronotal markings, and the dark part of the head is much larger, descending on the cheeks to the middle of the eyes. The species is based on a macrocephalous male, with broad swollen cheeks, armed anteriorly with large blunt tubercles. In the key to Part VI (1964), it runs out at couplets 222-224 (p. 153) and differs from *wislizeniae* Timb. and *vittata* Ckll. in having the abdomen dusky yellow, marked with fuscous at the base.

Male. Dark part of head and thorax dark blue-green. Anterior part of head yellow almost to level of anterior ocellus, dark part descending on each side and enveloping foveae; beneath on sides the yellow reaching slightly above middle of eyes, with mark on cheeks about as long as wide (in *koebeli*, the yellow almost reaching summit of eyes). Thorax dark except collar of pronotum, large cuneate marks on each side of disk and tubercles yellow. Abdomen brownish yellow (probably clearer yellow in life) with tergite 1, except apical middle, and mark on each side of tergite 2 fuscous. Legs yellow, with large mark behind on front and middle femora, hind femora except beneath and hind tibiae and tarsi fuscous. Tegulae pale

testaceous. Wings whitish hyaline, nervures very pale testaceous, margins of stigma and subcosta testaceous.

Head large, quadrate, with cheeks nearly twice as broad as eyes and produced anteriorly into blunt tubercle. Posterior ocelli about their distance apart from occipital margin, and much more remote from eyes. Facial foveae twice as long as wide and distinctly larger than in *koebelei*. Antennae short, inserted below middle of face; scape about three times longer than wide, funicle joints slightly broader than long for most part. Antennal sockets much closer to each other than to margin of eyes, with parocular area very broad. Disk of clypeus broader than high, but narrow lateral extensions distinctly longer than width of disk. Mandibles large, only slightly curved on outer margin, acute at apex and reaching somewhat beyond far margin of labrum. Flanks of pronotum deeply furrowed, but disk normal with posterior corners rounded. Pterostigma about two-thirds as wide as first submarginal cell; marginal cell distinctly longer beneath than beyond stigma, with metacarpus and apical truncation equal.

Head and thorax shining, impunctate, frons and vertex microscopically tessellate, and anterior part of mesoscutum weakly tessellate. Face and cheeks bare but occiput with few short erect hairs. Pubescence of mesonotum very thin, fine, erect and short. Abdomen ovate, convex above, about as long and as wide as thorax. Subgenital plate and genital armature about as in *koebelei concinna*, but parameral lobes curved inward at tips and meeting beneath fused sagittae.

Length 3.5 mm, anterior wing 3 mm, width of abdomen 4 mm.

Holotype male. Box Canyon, 18 miles east of Mecca, Riverside Co., California, April 17, 1964 (R. H. Crandall).

Type in collection of the University of California, Riverside.

Perdita venustella, n. sp.

This species from Sinaloa, Mexico, seems to be undoubtedly a member of the *Sphaeralceae* Group and runs to *salicis* Ckll., couplet 124 (p. 141), in the 1964 key. However, it is not closely allied to *salicis* and may not belong in the *exclamans* subgroup. It differs in having a thin head, a broadly rounded pygidial plate, the marginal cell broad at the base and much narrowed to the apex, and a broad and broadly banded abdomen.

Female. Head and thorax dark green, with markings of face, pronotum, legs and antennae yellow, reddened by cyanide in type. Mandibles, except red on apical third, labrum and face below level of antennae yellow, except for the green intruding strongly on each side below that level. Lateral marks extending on orbits just beyond posterior end of foveae, and very thin line of yellow at middle of upper half of frons. Supraclypeal and subantennal area completely yellow, ending level with interior margin of antennal sockets. Disk of pronotum yellow, confluent with yellow on tubercles, but flanks dark, with the green extending narrowly onto each side of disk behind collar. Abdomen black, with broad yellow band on tergites 1 to 4, and another on tergite 5 abbreviated and concealed by preceding segment; band on tergite 1 narrowly interrupted medially and deeply erose in front at outer ends; band on tergite 2 encompassing full length of lateral foveae on each side and moderately narrowed across middle; band on tergite 3 less narrowed across middle, and emarginate at outer ends, not quite reaching lateral margins, except at basal corners; band on tergite 4 similar but more even. Legs fuscous, with apex of front and middle femora, anterior side of their tibiae and front tarsi yellow. Antennae dark, flagellum brownish beneath, scape yellow except dark above on apical half. Tegulae testaceous, but yellow at base and on inner margin. Wings hyaline, nervures testaceous, margins of stigma (more broadly on inner margin) and subcosta brown.

Head broader than long, thin fronto-occipitally; cheeks strongly receding, about one-third as wide as eyes. Posterior ocelli slightly less than their width apart from eyes and about one-third less from occipital margin. Facial foveae broadly oval, broader than unusually wide yellow interval between them and eyes, and reaching from upper level of antennal sockets about two-thirds of distance to level of anterior ocellus. Antennae inserted below middle of face, flagellum moderately clavate, with middle joints as long as thick. Face below level of antennae strongly convex; disk of clypeus broader than high, rounded at summit, with lateral extensions visible in frontal aspect. Mandibles moderately thick, gently curved, narrowed apically

and subacute. Proboscis short, galeae half as long as stipites, acute at apex and distinctly shorter than maxillary palpi. Tarsal claws with small acute inner tooth. Pterostigma about four times as long as wide, and four-fifths as wide as first submarginal cell, and emitting radius well beyond middle; marginal cell much shorter beneath than beyond stigma, much narrowed toward apex, with inner margin strongly curved on basal half; metacarpus more than twice as long as apical truncation. Abdomen broadly ovate, hardly more than twice as long as wide; pygidial plate apparently about as long as wide, with sides converging to rather broadly rounded apex.

Head and thorax shining, with frons, vertex and anterior part of mesoscutum minutely tessellate and slightly dullish, but disk of mesonotum more polished. Sides of thorax, including flanks of propodeum distinctly tessellate and more dullish than other parts. Puncturation extremely fine and sparse, almost evenly distributed on frons and mesonotum, and nearly absent on vertex except between ocelli. Pubescence whitish, moderately fine and short; moderately abundant, and thin but conspicuous on face and mesonotum. Scopal hair of hind tibiae fine and distinctly longer than greatest width of tibia.

Length 5.5 mm, anterior wing 3.6 mm, width of abdomen 3.8 mm.

Holotype female. Teacapan, Sinaloa, Mexico, June 29, 1956 (R. and K. Dreisbach).

Paratype female. Culiacán, Sinaloa, 250 ft., July 21, 1959 (H. E. Evans).

Type in collection of Michigan State University, East Lansing; paratype in collection of Cornell University, Ithaca, New York.

Dear Mother
I received your letter of the 10th and was
glad to hear from you. I am well and
hope these few lines will find you the same.
I have not much news to write at present.
The weather here is very pleasant now.
I must close for this time. Write soon.
Your affectionate son,
John Doe

Received of Mother \$5.00 on the 15th

Dear Mother
I received your letter of the 15th and was
glad to hear from you. I am well and
hope these few lines will find you the same.
I have not much news to write at present.
The weather here is very pleasant now.
I must close for this time. Write soon.
Your affectionate son,
John Doe

Received of Mother \$5.00 on the 20th

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Index to Figures

(References are to figure numbers.)

1418-1457, dorsal and lateral views of genitalia, males

1458-1478, ventral view of subgenital plate, males

1479, dorsal view of apical tergite, males

quadridentata (Cockerellula), 1418, 1419, 1458,
1479

pilonotata (Macroterella), 1420, 1421, 1459

albomarginata (Epimacrotera), 1422, 1423, 1460

mazatlanica (Epimacrotera), 1424, 1425, 1461

pauxilla (Epimacrotera), 1462

moabensis (Allomacrotera), 1426, 1427, 1463

glamis (Hexaperdita), 1428, 1429, 1464

compactilis (Zonalis Group), 1430, 1431, 1465

abbreviata (Halictoides Group), 1432, 1433, 1466

albescens (Octomaculata Group), 1434, 1435, 1467

algodones (Octomaculata Group), 1436, 1437, 1468

flavicornis (Octomaculata Group), 1438, 1439,
1469

pretiosa (Octomaculata Group), 1440, 1441, 1470

subrufiventris (Octomaculata Group), 1442, 1443,
1471

suavis (Ventralis Group), 1444, 1445, 1472

chemsaki (Sphaeralceae Group), 1446, 1447, 1473

pinguis (Sphaeralceae Group), 1448, 1449, 1474

pygidialis (Sphaeralceae Group), 1450, 1451, 1475

recticincta (Sphaeralceae Group), 1452, 1453, 1476

submaerens (Sphaeralceae Group), 1454, 1455,
1477

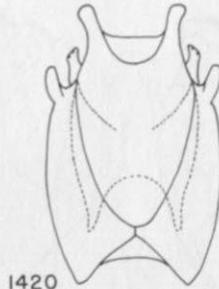
tumida (Sphaeralceae Group), 1456, 1457, 1478



1418



1419



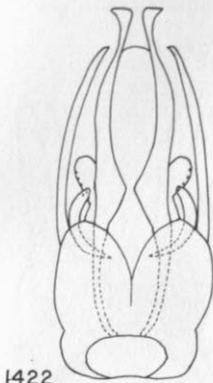
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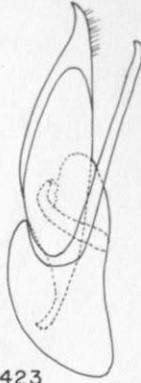
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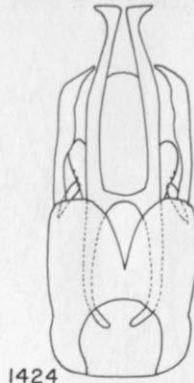
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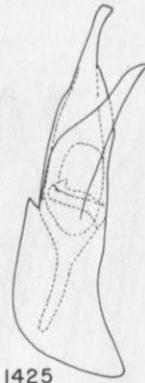
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1423



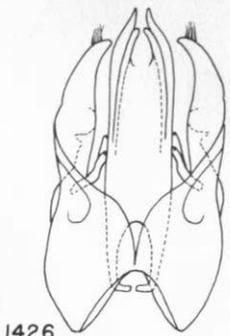
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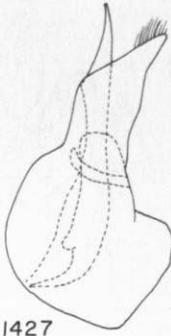
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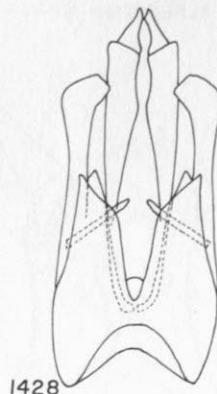
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1426



1427



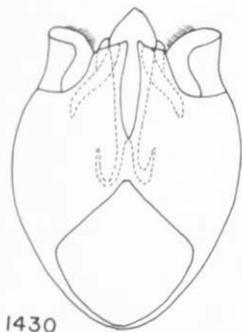
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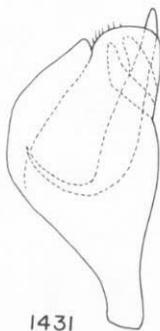
1429

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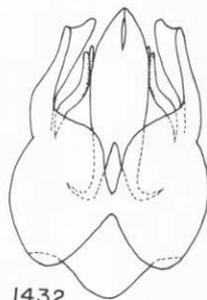
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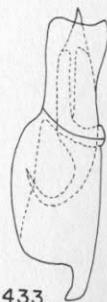
1430



1431



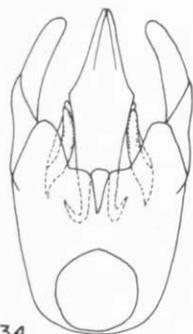
1432



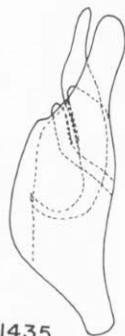
1433

COMPACTILIS

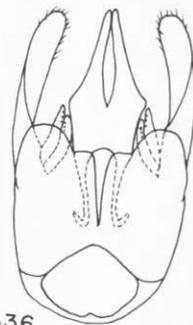
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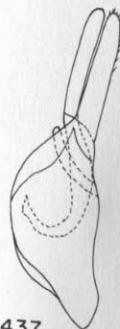
1434



1435



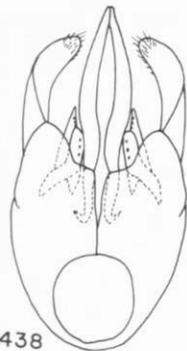
1436



1437

ALBESCENS

ALGODONES



1438



1439



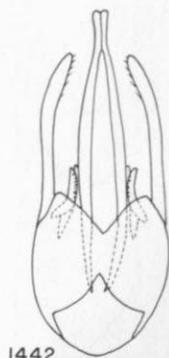
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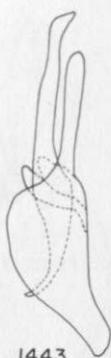
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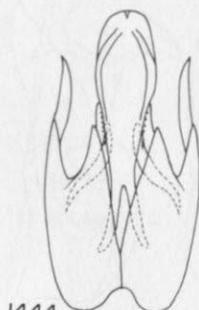
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1442



1443



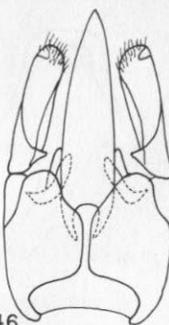
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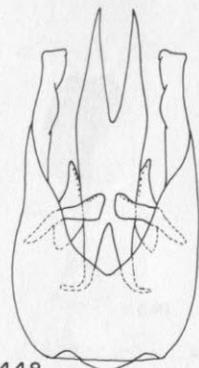
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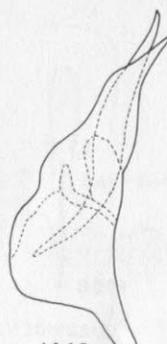
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1447



1448



1449

CHEMSAKI

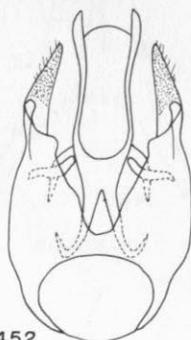
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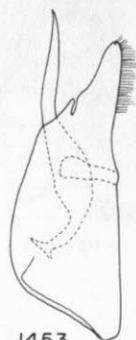
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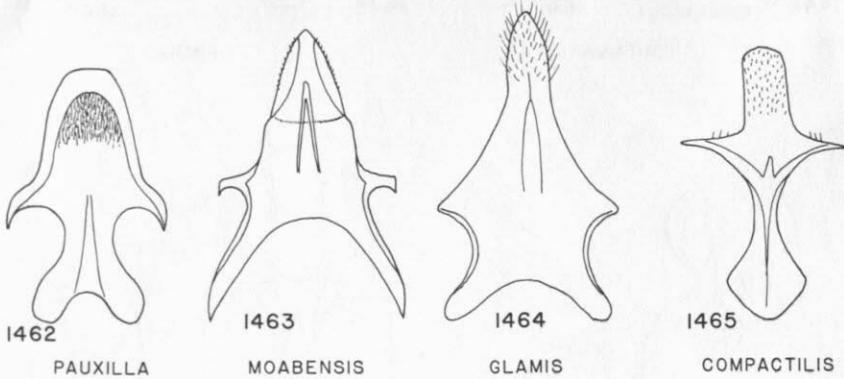
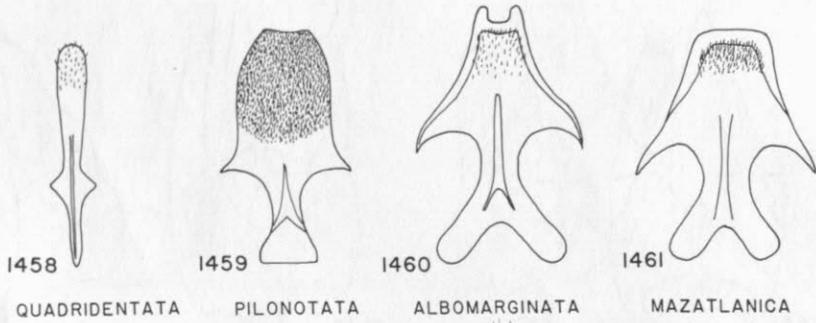
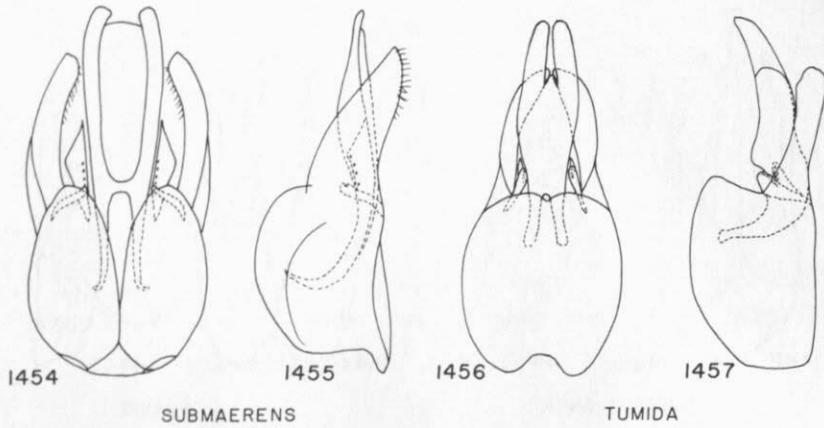
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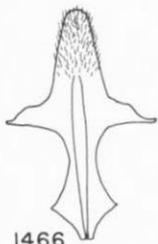


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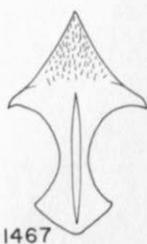
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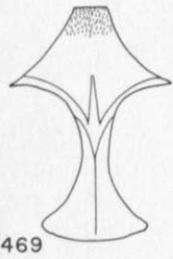
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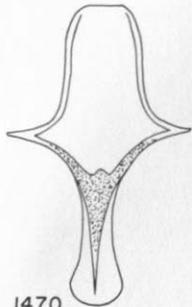
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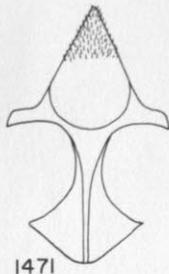
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1469
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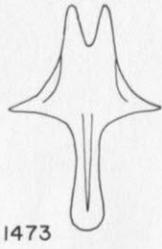
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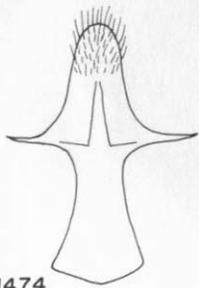
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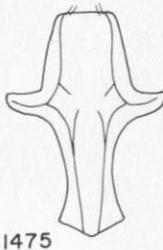
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SUAVIS



1473
CHEMSAKI



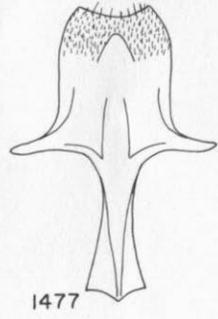
1474
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1475
PYGIDIALIS



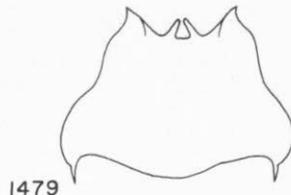
1476
RECTICINCTA



1477
SUBMAERENS



1478
TUMIDA



1479
QUADRIDENTATA