

6-2-1923

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PROCEEDINGS

OF THE

CALIFORNIA ACADEMY OF SCIENCES

FOURTH SERIES

VOL. XII, No. 7, pp. 73-103

JUNE 2, 1923

VII

EXPEDITION OF THE CALIFORNIA ACADEMY OF SCIENCES TO THE GULF OF CALIFORNIA IN 1921¹

THE BEES (I)

BY

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The bees recorded below were collected by Mr. E. P. Van Duzee, and are remarkable for their excellent condition and scientific interest. The types are in the California Academy of Sciences where they may be compared with those of Fox from the same region.

ANTHOPHORIDÆ

Mr. Wm. J. Fox published three reports on the bees of Lower California and adjacent regions (Proc. Cal. Acad. Sci., Ser. 2, Vols. IV (1893-1894) and V (1895). The Anthophoridæ there recorded are:

Melissodes suffusa Cresson. San José del Cabo, Mesa Verde.

Melissodes 4 spp. indet. Some doubtfully referred to *M. menuacha* Cresson.

**Diadasia diminuta* Cresson (*apacha* Cresson). San Julio, San Esteban, San José de Gracias.

Diadasia enavata Cresson. Comondu.

Anthophora maculifrons Cresson. San José del Cabo.

Anthophora sp. (aff. *urbana*). San Esteban.

Anthophora sp. (aff. *exigua*). San José del Cabo.

¹ A map showing the islands, etc., visited by this Expedition will be found in Vol. XII, No. 6, of these Proceedings, copies of which can be had at nominal cost.

June 2, 1923

Rym. - *apacha*

Anthophora capistrata Cresson. El Taste.

Centris lanosa Cresson. San José del Cabo, Calmalli Mines, Calamujuet.

Also Hermosillo, Sonora, Mexico.

Centris n. sp. San José del Cabo.

**Centris eisenii* Fox. Guaymas.

Xenoglossa mustelina (Fox). Described as *Centris*. San José del Cabo.

Later erroneously referred to *X. fulva* Smith.

**Exomalopsis pulchella* Cresson. San José del Cabo.

Ancylosceles toluca (Cresson). San José del Cabo.

The material examined by Mr. Fox was partly in bad condition, rendering some of the determinations difficult or uncertain. The species marked with an asterisk are also in the present collection.

Including all the species, we have 11 which are identical with those of the Southwestern United States, 5 subspecies of species of Southwestern States, 10 distinct species allied to those of S. W. States, 5 species (*Exomalopsis*, *Ancylosceles*, *Centris eisenii*) of tropical affinities, and two isolated species with no close relatives known.

Intensive collecting in this region will undoubtedly yield results of great scientific interest. Some of the questions to be answered are:

- (1.) What is the relation of the bees to the peculiar flora of the gulf region? Probably many are oligotropic, more or less restricted to particular genera or species. To what extent are their peculiarities adaptive?
- (2.) There is evidence that factor-mutations occur, giving rise to distinct races, differing in eye-color, etc. Do such mutations occur at random? And how do they become established as racial or specific characters?
- (3.) What evidence is there of particular trends of variation, in response to climatic conditions?
- (4.) Are there any precinctive species or varieties on the different islands? The records suggest an affirmative answer, but more collecting may show that all the insular forms also occur on the main land.
- (5.) What are the natural enemies of these bees?
- (6.) The nesting habits and larvæ are unknown.

CENTRIS Fabricius

1. *Centris eisenii* Fox

Guaymas, April 11.

2. *Centris rhodopus* (Cockerell)

Guaymas, April 11, ♂ ♀; Tiburon Island, April 23, ♂; Angeles Bay, May 7, ♂, June 27, ♂, June 26, ♀; Tortuga Island, May 11, ♀; Escondido Bay, May 24, ♀; San Carlos Bay, July 8, ♀.

3. *Centris atripes* Mocsary

Guaymas, April 11, ♂; I have expressed the opinion that *C. foxi* Friese is a synonym, but it differs in the color of the flagellum ("testaceous beneath from apex of first joint"), and is probably a valid species, or at least a distinct race.

4. *Centris vanduzeei* Cockerell, new species

Female (type): Length about 13.5 mm., anterior wing 10.4 mm.; robust, black, including face, mandibles and antennæ; mandibles quadridentate, the two inner teeth much smaller than the others, and on a different plane; eyes brown; face and front polished and shining, the clypeus polished and impunctate in middle; front rather broad, but distance from anterior ocellus to apex of clypeus greater than width of front; labrum with brownish hair; cheeks, occiput and region of antennæ with white hairs, vertex with pale fulvous; third antennal joint very long, about as long as the next five together; thorax densely hairy, the hair pale fulvous above, otherwise white, pale reddish in middle of sternal region; tegulæ subpiceous; wings dusky hyaline, nervures fuscous; legs black, with pale hairs, long and white on anterior femora beneath; anterior tarsi with dense reddish (almost coppery) hair, and long pale reddish hairs posteriorly; apical part of middle tibiæ and whole of basitarsi with red hairs; hind tibiæ and basitarsi with a large light red scopa, the basitarsi very broadly and squarely truncate at apex, with a very long and even comb; small joints of tarsi red; abdomen thinly covered with erect white hairs, not hiding the surface, but with distinct white hair-bands on apices of segments; apex with bright orange-fulvous hair.

Male: Length about 15 mm.; clypeus, mandibles and antennæ black as in female; eyes reddish, very large, strongly converging above; wings clearer; hind femora very robust, covered with dull white hair, their tibiæ and tarsi relatively slender; hind spurs bright ferruginous, the inner curved and much longer than the outer; hind basitarsi obliquely truncate at end, with a comb; posterior half of tegulæ pale. The only male is denuded of pubescence.

San José Island (type locality), May 28, 1921 (E. P. Van Duzee), 1 ♀, 1 ♂. Also 3 females from Monserrate Island, May 25 (Van Duzee). All the females have collected extremely bright orange pollen on their hind legs, possibly from one of the Solanaceæ.

A very distinct species, somewhat like *C. hoffmannseggiae* Ckll., but easily separated by the black face in both sexes, and other characters.

Type: Female, No. 931, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 28, 1921, on San José Island, Gulf of California.

5. *Centris rhodoleuca* Cockerell, new species

Male: Length about 14 mm.; anterior wing 11.2 mm.; head and thorax black, the clypeus, labrum, greater part of mandibles, scape in front, and a line along anterior orbits from level of antennæ down (broadening below) all very bright yellow; legs ferruginous; abdomen with first two segments and base of third suffusedly ferruginous, the rest black, except that hind margins of segments are broadly pallid; head and thorax with abundant shaggy white hair, but clypeus nude; legs with some white hair, long and abundant on hind legs; abdomen with abundant, erect white hair, except on second segment which is only hairy apically; mandibles slender, quadridentate, the apical teeth long and slender, the others short and triangular, the third much larger than second or fourth; eyes ferruginous; scape above and third antennal joint ferruginous, third joint short, hardly so long as next two together; orbits parallel; front rather broad, but not as broad as distance from anterior ocellus to lower margin of clypeus; tegulæ reddish testaceous, darkened basally; wings hyaline, nervures dark fuscous; basal nervure falling far short of transverse median; spurs red.

A beautiful and interesting species, related to *C. morsei* Ckll., but with narrower face, red legs and other differences.

Type: Male, No. 932, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 3, 1921, at Willard's Point Bay, Tiburon Island, Gulf of California.

6. *Centris cockerelli resoluta* Cockerell, new subspecies

Female: (Type) Similar to *cockerelli* Fox from New Mexico, but clypeus and labrum apricot-color or reddish orange instead of pale yellow; hind knee plate with a bright red mark; under side of thorax with brownish gray hairs (it is not entirely pale in typical *cockerelli*); eyes dark brown.

Male: Resembles *C. atripes* Mocs. (the male of *cockerelli* is not known), but the front is narrower, the eyes more prominent above, a strong depression or channel laterad of lateral ocelli, and space between eyes and orbits entirely black.

In the tables of Fox the female runs nearest to *cockerelli* and the male (which has entirely pale hair on the thorax beneath) to *lanosa* Cresson. The eyes are quite differently colored from those of *lanosa*. The clypeus in one La Paz male is clear yellow, in the other reddened, apparently by cyanide.

Type: Female, No. 933, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, June 3, 1921, at **La Paz, Lower California**. Another female obtained by Mr. Van Duzee May 5, 1921, at Angeles Bay.

7. *Centris cockerelli* Fox, variety B

Female: Similar to the La Paz form, but eyes (in dead specimens) pale greenish gray instead of brown. Hair of thorax grayish-brown beneath.

This is intermediate between the *cockerelli* of New Mexico and the *resoluta* form, and is the form of *cockerelli* which Dr. Davidson took in southern California.

Generally speaking, differences in eye-color in the same sex in anthophorid bees are indicative of distinct species; but in one case at least (*Anthophora porterae thalassina* Ckll. 1920), the difference can only be regarded as varietal. Unfortunately the dried specimens do not show the colors so clearly as the fresh insects. In *Centris* species seem to be modified by a series of factorial mutations, as in *Drosophila*, and it requires biological observations in difficult cases to determine whether the segregates are behaving as distinct species, or are still capable of inbreeding, with Mendelian results. It is quite possible that such segregates, when isolated, may remain constant and have the aspect of distinct species, but may freely cross when the ranges of two overlap. Thus it might be necessary to collect a form in all parts of its range in order to determine its exact status.

Two specimen collected by E. P. Van Duzee, April 11, 1921, at Guaymas.

8. *Centris pallida callognatha* Cockerell, new subspecies

Female: Looks exactly like *C. pallida* Fox from Arizona, except that the hair on thorax above is redder; the clypeus, however, has only a minute pyriform yellow mark, the face is rather broader, the mandibles have a larger bright red patch externally just before the apex, the eyes appear to have been sea-green in life, and the pygidial plate is conspicuously broader.

Type: Female, No. 934, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, April 11, 1921, at **Guaymas, Sonora, Mexico.**

9. *Centris tiburonensis* Cockerell, new species

Female: Length about 14 mm., anterior wing 9 mm.; very close to *pallida* Fox, of which it at first sight appears to be a small example, but the wings are unusually short, the clypeus is entirely black, the abdomen is without the distinct yellowish tint on basal half, and the fifth segment, instead of having a broad apical dark band, is suffusedly blackened over the greater part, leaving the laterobasal areas pallid. The mandibles have no red subapical patch; the antennæ are entirely black. In *C. pallida callognatha* there is a rather distinct band of fulvous hair across the front, below the ocelli; this is wanting in *tiburonensis*, which has the hair of the front white, but that of the vertex pale fulvous-tinted.

Type: Female, No. 935, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, April 23, 1921, at **Freshwater Bay, Tiburon Island, Gulf of California.**

10. *Centris trichosoma* Cockerell, new species

Male: Length about 14 mm., but appearing less bulky than *C. rhodoleuca*; black, including antennæ and legs (tarsi dusky reddish apically); clypeus bright yellow; labrum yellow, densely covered with white hair; mandibles with a large yellow area on either side; insect densely covered with white pubescence, on thorax above pale yellowish. Eyes reddish brown or greenish, strongly converging above, the front narrow; mandibles tridentate; third antennal joint long and slender; hind tibiae and basitarsi with long white hairs. Very close to *C. hoffmannseggiae* Ckll., and possibly to be considered a race of that species, but easily distinguished by the bright lemon-yellow clypeus, the color of the eyes and the upper border of the mandibles black. The Californian form, *C. hoffmannseggiae davidsoni* Ckll., equally differs in the clypeus and mandibles; its mandibles are black with a broad cream-colored stripe along upper border.

Type: Male, No. 936, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee at **Angeles Bay, Lower California.** Another

male was taken at Freshwater Bay, Tiburon Island, April 23, 1921.

The above species of *Centris* may be separated as follows:

- | | | |
|--|---|----|
| Abdomen with broad yellow tegumentary bands..... | <i>eiseni</i> Fox. | |
| Abdomen without yellow bands..... | | 1 |
| 1. Clypeus black (or with a minute yellow spot)..... | | 2 |
| Clypeus yellow or red..... | | 5 |
| 2. Hind tibiae (except base) and tarsi with black hair..... | | 3 |
| Hind tibiae and tarsi with hair not black..... | | 4 |
| 3. Larger, mandibles with a bright red patch below apex..... | | |
| <i>pallida callognatha</i> Ckll. ♀ | | |
| Smaller, mandibles with no such red patch..... | <i>tiburonensis</i> Ckll. ♀ | |
| 4. Eyes converging above, orbits close to lateral ocelli..... | | |
| <i>vanduzeei</i> Ckll. ♂ | | |
| Eyes not converging above, orbits not close to lateral ocelli..... | <i>vanduzeei</i> Ckll. ♀ | |
| 5. Abdomen covered with gray or whitish pile; clypeus yellow..... | | 6 |
| Abdomen nearly or quite bare of pale hair, except basally, so appearing black..... | | 7 |
| 6. Front broad, legs red..... | <i>rhodoleuca</i> Ckll. ♂ | |
| Front narrow, legs black..... | <i>trichosoma</i> Ckll. ♂ | |
| 7. Femora entirely red, clypeus red..... | <i>rhodopus</i> Ckll. ♀ | |
| Femora partly or wholly dark, or clypeus yellow or orange..... | | 8 |
| 8. Hind tibiae with pale hair on outer side; scape with a yellow mark; legs largely red..... | <i>rhodopus</i> Ckll. ♂ | |
| Hind tibiae with black or very dark hair on outer side..... | | 9 |
| 9. Clypeus reddish; third antennal joint long..... | | 10 |
| Clypeus yellow, third antennal joint shorter..... | | 11 |
| 10. Eyes brown..... | <i>cockerelli resoluta</i> Ckll. ♀ | |
| Eyes greenish gray..... | <i>cockerelli</i> Fox, var. <i>B.</i> ♀ | |
| 11. A yellow mark between clypeus and eye; front broader..... | | |
| <i>atripes</i> Mocs. ♂ | | |
| No yellow mark between clypeus and eye; front narrower..... | <i>cockerelli resoluta</i> Ckll. ♂ | |

ANTHOPHORA Latreille

All the species collected belong to the subgenus *Micranthophora* Ckll.

11. *Anthophora curta* Provancher

San Francisquito Bay, May 10, 5 ♀, 2 ♂; La Paz, June 3-5, 4 ♀, 1 ♂; Mulegé, May 14, 1 ♀; Palm Cañon, Angel de la Guardia Island, May 3, 1 ♀; San Nicolas Bay, May 16, 1 ♀, 1 ♂; Guaymas, April 11, 1 ♂.

12. *Anthophora phenax* Cockerell

Loreto, May 20, 1 ♂. Described from New Mexico.

13. *Anthophora leucostomella* Cockerell, new species

Male: Length about 10 mm.; black, with clypeus, transverse sub-clypeal band (widening in middle), lateral face-marks (filling space between clypeus and eye, and broadly emarginate or excavated above), labrum (except basal spots and narrow apical margin), large patch on base of mandibles, and scape in front, all white. Abdomen with thin but entire marginal hair-bands, the margins beneath the bands hyaline. Very like *A. phenax*, for which I at first took it, but differing thus: face-marks, although white, with a faint creamy tint; lateral face-marks with upward extension along orbits longer and narrowly pointed; hair of head and thorax above white, without any black; hair on inner side of hind tarsi pale fulvous; the two apical teeth of abdomen small but prominent, pale fulvous with dark tips. The eyes in the dried specimen are pale gray.

Type: Male, No. 937, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 1, 1921, at **Puerto Refugio, Angel de la Guardia Island, Gulf of California.**

14. *Anthophora pachyodonta* Cockerell, new species

Male: Length about 10 mm.; black, with broad band on lower part of clypeus, labrum (except two spots, and narrow apical border), and mandibles (except rufous apex) yellow, or rather orange in the type, perhaps altered by cyanide; eyes deep reddish-ferruginous, perhaps affected by cyanide; antennæ entirely black, last joint somewhat broadened, flattened, and broadly truncate; hair of head and thorax abundant, pure white, with no admixture of black hairs; femora with long white hair beneath; tibiæ and tarsi densely clothed with creamy-tinted pubescence, orange-ferruginous on inner side of tarsi, and with a good deal of same color on inner side of hind tibiæ; tegulæ testaceous; wings hyaline, nervures piceous; abdomen densely covered with short creamy-tinted hair; hind margins of apical segments broadly pellucid; apical teeth two, very broad, rounded at end, pale fulvous.

Intermediate between *A. maculifrons* Cresson and *A. flavocincta* Huard. The dark tarsi (small joints obscurely reddish), black flagellum, etc. readily separate it from *flavocincta*. The apical teeth of abdomen are smaller and less divergent than in *flavocincta*.

Type: Male, No. 938, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 16, 1921, at **San Nicolas Bay, Lower California.**

15. *Anthophora xanthochlora* Cockerell, new species

Female: Length about 10 mm.; black, with a very broad band covering lower half of clypeus, and sending a broad median band to upper margin, narrow transverse supra clypeal band, labrum (except two small

spots and narrow lower margin), and mandibles (except apex), all bright chrome-yellow; eyes bright yellowish green; scape black, with two small yellow spots; flagellum short, very obscurely reddish beneath, truncate at end; head and thorax with white hair; legs with white hair, slightly creamy on tibiae and tarsi, hair on inner side of hind tarsi ferruginous; tegulae translucent ferruginous; wings hyaline, nervures piceous; abdomen densely covered with appressed creamy-white hair; triangular patch on fifth segment small and pale fulvous.

This appears at first sight to be the female of *A. pachyodonta*, but it certainly is distinct. In *pachyodonta* the first recurrent nervure joins the second submarginal cell about the beginning of its last third, in *xanthochlora* at or beyond beginning of last fourth. In *pachyodonta* the labrum is depressed and shining in middle, in *xanthochlora* it is rugose, and also not trilobed at apex. *A. xanthochlora* is also related to *A. arthuri* Ckll. from Colorado, but is larger. In *arthuri* the face-marks are very pale yellow, and the lower inner angles of the black on clypeus are acute; in *xanthochlora* the face-marks are bright yellow, and the lower inner corners of black on clypeus are very obtuse.

Type: Female, No. 939, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 3, 1921, at Willard's Point Bay, Tiburon Island, Gulf of California.

16. *Anthophora estebana* Cockerell, new species

Male: Length about 10 mm.; black, with rather narrow band on clypeus (broadened in middle), labrum (except two large spots and narrow apical margin), mandibles (except apex) and narrow line on scape, all pale yellow; flagellum black, faintly reddish beneath; eyes pea-green; hair of head and thorax white, a little black intermixed on mesothorax and scutellum; legs with pale hairs, dull fulvous on inner side of tarsi; middle tarsi long, but not excessively so; tegulae testaceous; wings hyaline, nervures piceous; abdomen with entire white hair-bands; apex quadridentate, the middle teeth light red and obtuse, the outer black and sharp, curved inward. The scape may be entirely black. The labrum is trilobed at apex.

Closely related to *A. peritomæ* (Ckll.), but the face-markings are much brighter yellow, the apical teeth of abdomen are much larger, and the abdominal bands are narrower.

Type: Male, No. 940, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, April 19, 1921, on San Esteban Island, Gulf of California. Another male obtained at same time.

17. *Anthophora hololeuca* Cockerell, new species

Female: Length about 8 mm.; black, with a very broad apical band on clypeus, sending a broad lobe upward in median line, labrum (except two small spots and apical margin), and mandibles (except apex), cream-color; flagellum ferruginous beneath except at base; third antennal joint very slender; hair of head, thorax, abdomen and legs pure white, ferruginous on inner side of tarsi; abdomen entirely covered with appressed hair, the patch on fifth segment hardly darkened; eyes pale gray; head very broad; tegulae testaceous hyaline; wings hyaline, nervures brown, stigma red, marginal cell very short; tibiae at apex, and tarsi ferruginous. The clypeal mark varies greatly.

Male: Length about 6.5 mm.; face entirely covered with silky white hair; labrum and mandibles yellowish-white, but clypeus with only a small light spot; middle tarsi ordinary; apex of abdomen with a short, rounded red plate, and close to it on either side, a slender spine-like red tooth. Hair of abdomen occasionally (Tiburon Island) fulvous.

A remarkable feature in both sexes is that the scape is densely covered in front with pure white hair, which produces the same effect as a tegumentary white stripe.

At Puerto Refugio, Angel de la Guardia Island, one male and fifteen females were taken at flowers of *Parosela spinosa*. Other localities are Gonzales Bay, April 29, two females; Freshwater Bay, Tiburon Island, April 23, three females, four males; Pond Island Bay, Angel de la Guardia Island, June 30, three males; Loreto, May 20, 1 male; San Nicolas Bay, May 16. Related to *A. arthuri* Ckll., *A. albata* Cress., and *A. petrophila* Ckll., but quite distinct. The broader head (female) and color of tarsi distinguish it from *arthuri*. The tarsi and hair on fifth abdominal segment separate it from *albata*. The red tarsi and armature of male abdomen at once separate it from *petrophila*.

Type: Female, No. 941, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, June 29, 1921, at Puerto Refugio, Angel de la Guardia Island, Gulf of California.

The above species of *Anthophora* may be separated by means of the following table:

Clypeus entirely white.....	1
Clypeus not thus white.....	2
1. Hair on inner side of hind tarsi black.....	<i>phenax</i> Ckll.
Hair on inner side of hind tarsi pale fulvous.....	<i>leucostomella</i> Ckll.
2. Abdomen covered with very short white or whitish pubescence..	3
Abdomen distinctly banded, not wholly covered with pale hair..	5
3. Face-marks cream-color; flagellum red beneath.....	<i>hololeuca</i> Ckll.
Face-marks bright yellow.....	4

4. Eyes reddish brown; flagellum pure black...*pachyodonta* Ckll. ♂
 Eyes pea-green; flagellum obscurely reddish beneath.....*xanthochlora* Ckll. ♀
5. Eyes pea-green (becoming brown in cyanide specimens); apex of
 abdomen without spines.....*curta* Prov. ♀
6. Apex of abdomen with spines..... 6
 Apex of abdomen with a median plate and pair of lateral spines
 *curta* Prov. ♂
 Apex of abdomen with four spines.....*estebana* Ckll. ♂

EXOMALOPSIS Spinola

18. *Exomalopsis pulchella arida* Cockerell, new subspecies

Female: Length about 6.5 mm.; agreeing with *E. pulchella* Cresson (type locality Cuba), except that the pale hair of thorax is white, that on scutellum pure white, not at all fulvous, the wings not so dark apically, the hair-bands on abdomen white (not yellowish), and the long scopa on hind tarsi pale gray. From the Brazilian *E. manni* (Ckll.) it differs by the lack of black hair on scutellum, of fulvous hair at apex of abdomen, etc.

It is possible that the characters of this form are due to the direct effect of the environment.

Type: Female, No. 942, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 14, 1921, at Mulegé, Lower California.

19. *Exomalopsis similis* Cresson

Guaymas, April 8, one female; Bay at south end of Tiburon Island, July 4, 1921, one female. Differs from *pulchella* by having the long scopa of hind legs pale ferruginous instead of black or sooty. It is perhaps only a subspecies or variety.

ANCYLOSCELES Haliday

For the true characters and position of this genus see Entomological News, 1921, p. 76.

20. *Ancylosceles melanostoma* Cockerell, new species

Male (type): Length about 6 mm.; similar to *A. armata* Smith, but the antennæ, clypeus, labrum and mandibles black; eyes dark gray; stigma piceous; tegulæ piceous.

Female: Length about 7.5 mm.; similar to *A. armata*, but mesothorax more shining; antennæ dark and mandibles black.

It is surprising to find this more melanic than the common tropical *A. armata*.

Type: Male, No. 943, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, June 3, 1921, at **La Paz, Lower California**. A female was obtained at the same time.

The following table separates this from a series of related species which I have recently erroneously referred to *Leptergatis*:

Males	1
Females	5
1. Hind basitarsi piceous; clypeus entirely black... <i>wheeleri</i> (Ckll.) Hind basitarsi ferruginous.....	2
2. Clypeus with an apical transverse whitish band; labrum whitish <i>armata</i> Smith	3
3. Labrum with a large round cream-colored spot; thorn-like tooth on hind basitarsus smaller..... <i>toluca</i> (Cresson)	4
4. Labrum entirely black; thorn-like tooth larger.....	
4. Mandibles with a large cream-colored spot; wings smoky..... <i>globulifera</i> (Ckll.)	
Mandibles entirely black; wings clear..... <i>melanostoma</i> Ckll.	
5. Antennae black; flagellum obscurely reddish beneath..... <i>melanostoma</i> Ckll.	
Antennae bright ferruginous beneath..... <i>armata</i> Sm. and <i>globulifera</i> (Ckll.)	

DIADASIA Patton

21. *Diadasia australis petrinus* Cockerell, new subspecies

Female (type): Size and general appearance of the Californian *D. australis opuntiae* Ckll., but with the tegulae black or brownish black and the elevated black areas at sides of second and third abdominal segments dull and covered with short black hair instead of polished and shining. The abdominal banding is very distinct.

Male: Distinguished by the dark tegulae and the process at end of hind basitarsus pure black.

San Pedro Martir Island, April 18, 1921 (type locality), 16 females, 5 males (Van Duzee), at flowers of *Abutilon*. There is also a smaller female scarcely over 12 mm. long, from La Paz, June 3. A female from Guaymas, April 7, is small, like *D. australis rinconis* Ckll., but has dark tegulae. It is intermediate between *petrinus* and *rinconis*.

Type: Female, No. 944, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, April 18, 1921, on **San Pedro Martir Island, Gulf of California**.

22. *Diadasia diminuta* Cresson

San Francisquito Bay, May 10, one male.

The above species may be separated thus:

- | | | |
|--|-----------------------------------|---|
| Length less than 9 mm..... | <i>diminuta</i> (Cress.) ♂ | |
| Length 12 mm. or over..... | | 1 |
| 1. Abdomen appearing black-banded from lack of pale hairs at bases of segments | <i>australis petrinus</i> Ckll. ♀ | |
| Abdomen with pale hairs all over..... | <i>australis petrinus</i> Ckll. ♂ | |

MELISSODES Romand

23. *Melissodes communis gratior* Cockerell, new subspecies

Female (type): Length about 10 mm.; mandibles red in middle; head very broad, face and front covered with white hair; cheeks and occiput with white hair, but vertex with long black hair; thorax anterior to middle of tegulæ with pale fulvous hair, bright at sides; scutellum and disc of mesothorax (but separated from tegulæ by space equal to latter) with black hair; tegulæ ferruginous; wings faintly dusky, not yellowish; flagellum dusky reddish beneath, except at base; hair on outer side of hind tibiæ and tarsi white, on inner side (except base of tibiæ) orange-fulvous; hair bands of abdomen rather narrow, straight, white, very faintly tinged with yellowish.

Male: Clypeus, labrum and large spot on base of mandibles lemon yellow; tibiæ at apex and all the tarsi, ferruginous; hair of mesothorax pale fulvous, except a transverse band of black posteriorly; scutellum with much black hair; flagellum very long, clear fulvous, black above. Hind margins of abdominal segments more or less brownish or pallid.

Guaymas (type locality), April 8 and 11 (Van Duzee). Two females (one with hair on thorax in front paler fulvous than in the other) and 12 males (two of which have dark tegulæ). Four females from San Francisquito Bay, June 23, and La Paz, June 4 and 5, somewhat larger and more robust than the Guaymas ones, have dark tegulæ, and the hair of the thorax in front with only a very slight yellowish tint. The numerous males are certainly all conspecific, but they differ in the length and stoutness of the antennæ, though in all the antennæ are very long. They also differ in the color of the tegulæ as follows:

Tegulæ reddish; 10 from Guaymas, April 8 and 9; 3 from Tiburon Island, July 4; one from Pond Island Bay, Angel de la Guardia Island, July 1.

Tegulae dark; five from Pond Island Bay, Angel de la Guardia Island, July 1; two from Guaymas, April 8 and 15; one from Puerto Refugio, Angel de la Guardia Island, June 29; one from San Marcos Island, June 19.

Robertson noticed similar variation in a related form occurring in Illinois and gave it the name *M. variabilis*.

Type: Female, No. 945, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, April 11, 1921, at **Guaymas, Sonora, Mexico.**

24. *Melissodes catalinensis vanduzeei* Cockerell, n. subsp.

Female: Eyes brown, evidently reddish in life (in *catalinensis* they appear to have been green in life); depression on second abdominal segment broader in middle, the band more arcuate; abdominal bands nearly white (instead of fulvous tinted); hind margin of first abdominal segment not rufous.

Angeles Bay, June 26, 1921, (Van Duzee), one female. *M. catalinensis* (Ckll.) was described from Catalina Island, California, as *M. intermediella catalinensis*. Later it was referred to *M. humilior* Ckll. as a subspecies. Renewed comparisons indicate that it is a distinct species, distinguished by the robust flagellum and very small hind knee-plate.

Type: Female, No. 946, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, June 26, 1921, at **Angeles Bay, Lower California.**

M. c. vanduzeei differs from various similar species thus:

- (1) From *M. confusiformis* Ckll. by the white (not red) hair on hind tibiae and tarsi; much narrower, pure black, apical plate of abdomen, and more arcuate band across second segment.
- (2) From *M. pallidicincta* Ckll. by the much narrower head.
- (3) It is smaller than *nigrosignata* Ckll., and the apical plate is quite different.
- (4) The apical plate agrees with *grindelia* Ckll., which is allied, but it differs from *grindelia* by the less transverse head, color of eyes, light hair on outer side of middle tarsi, and arcuate band on second abdominal segment.
- (5) It differs from *humilior* Ckll. by the very small hind knee-plate, color of eyes, and much more robust flagellum.
- (6) From *intermediella* Ckll. by the large amount of white hair at sides of fifth abdominal segment, much broader depression on second abdominal segment, color of eyes, long black hair on vertex, and dark stigma and nervures.

25. *Melissodes callophila* Cockerell, new species

Female: Length about 11 mm., anterior wing 8; black, not very robust, the head and thorax with long shaggy white hair, the posterior disk of mesothorax and anterior part of scutellum bare and shining, with widely scattered punctures; labrum with sparse yellowish hair, and furnished at apex with a rather large light red dentiform process; head very broad, facial quadrangle broader than long; eyes pale gray, slightly greenish (in the dry state); clypeus convex, shining, with small, moderately close punctures; mandibles black, with an obscure reddish band; flagellum dark obscure red beneath, except at base; tegulae densely covered with pale hairs, except a shining exposed reddish area; wings faintly dusky, nervures and stigma piceous; third submarginal cell very broad above; marginal cell very obtuse at end; legs with pale hair, red on inner side of tarsi; anterior tarsi with dark brownish hair on outer side; hind legs with scopa filled with sticky bright orange-red (probably solanaceous) pollen, as in *Centris vanduzeei*; abdomen with hind margins of segments dark, second very narrowly brownish; second segment rugulose from very fine punctures; first segment with long white hair except apically; second and third each with a single broad even basal band of white tomentum, extended caudad at sides, but no median or marginal bands; fourth segment covered with white tomentum, except a transverse band in middle, not reaching sides; fifth and sixth with pure black hair, except a tuft of white at extreme sides.

Type: Female, No. 947, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 28, 1921, at **San José Island, Gulf of California.**

26. *Melissodes callophila nanula* Cockerell, new subspecies

Female: Length 9 mm.; slender; mandibles simple; maxillary palpi 4-jointed, the joints measuring in microns (1) 145, (2) 95, (3) 80; (4) 80; hair on inner side of hind tarsi partly red and partly dark fuscous, the general effect dark reddish; eyes reddish-gray.

Type: Female, No. 948, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 28, 1921, on **San José Island, Gulf of California.**

An isolated species, not close to any known to me. The abdominal banding suggests *Tetralonia*, but the maxillary palpi (which I examined in var. *nanula*) have only four joints. The variety looks distinct but differs in no essential character except size. It may represent a small race with a different food-plant, or it may be merely an individual variation. In my tables in Trans. Amer. Ent. Soc., xxxii (1906) this falls in group J (p. 84) if the hair on inner side of hind tarsi is considered red. Among the *Melissodes* there listed,

it falls near *M. tepaneca* and *M. galvestonensis* but is very distinct. If placed in group K it fits no better.

27. *Melissodes idonea* Cockerell, new species

Male: Length 10 mm., or rather more; black, including clypeus, labrum and mandibles (except subapical dark red band), but antennæ very peculiar; scape short and stout, shining black; flagellum long (about 7 mm.) and slender, the first two short joints black, the others pale orange, suffusedly blackened behind, the dark color fading toward apex of antennæ, so that beyond the middle the flagellum is dull orange behind, except that just before the apex it is broadly black on both sides, but the extreme apex is orange, and is slightly hooked; head broad; eyes dull yellowish green; hair of face and front entirely black, of cheeks and occiput white; labrum shining; clypeus shining, with scattered minute punctures; hair of thorax long and white, a little dusky on posterior middle of mesothorax; tegulæ piceous, with much pale hair; wings clear hyaline, unusually pointed, nervures and stigma ferruginous, the outermost nervures infuscated; legs black with white hair, ferruginous on inner side of hind tarsi; abdomen black, the hind margins of segments dark; first segment with long white hair; second and third each with a broad even basal band of white tomentum, curved posteriorly at sides; fourth covered with white hair; fifth with an apical white hair-band, and thin hair anterior to this in middle; sixth broadly fringed with white hair.

Another quite isolated species, with no known close relatives. From the locality and abdominal banding I wondered whether it could not be the male of *M. callophila*. This may indeed be the case, but the difference in the wings is so striking that I can only treat them as distinct, in the absence of any proof to the contrary.

Type: Male, No. 949, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 28, 1921, on San José Island, Gulf of California. Two males obtained.

The above species of *Melissodes* may be separated by the following table:

Females; clypeus black, antennæ short.....	1
Males; antennæ long.....	4
1. Hair of scutellum white.....	2
Scutellum with much black hair.....	3
2. Length 11 mm., or rather more.....	<i>callophila</i> Ckll.
Length 9 mm.....	<i>callophila nanula</i> Ckll.
3. Hind basitarsi with black hair on inner side; clypeus brown or reddish.....	<i>catalinensis vanduzeei</i> Ckll.
Hind basitarsi with clear ferruginous hair on inner side; eyes gray or black, not brown or reddish....	<i>communis gratior</i> Ckll.
4. Clypeus black; face and front with black hair.....	<i>idonea</i> Ckll.
Clypeus yellow.....	<i>communis gratior</i> Ckll. ♂

MEGACHILIDÆ

STELIDINÆ

28. *Stelis perpulchra* Crawford

Agua Verde, Lower California, May 28, two males, three females; Mulegé, Lower California, June 3-5, 10 males; Guadalupe Point, Concepcion Bay, June 17, six males; Coyote Cove, Concepcion Bay, June 18, one male; Angeles Bay, June 26, one male; Puerto Ballandra, Carmen Island, May 22, one male; Las Animas Bay, May 8, two males. Previously known only from two males, the type from Yuma, Arizona, and one from an unknown locality in Arizona. The female is about 10 mm. long, marked like the male. A transverse yellow line behind the ocelli may be present or absent. The males vary in size.

ANTHIDIINÆ

DIANTHIDIUM Cockerell

Subgenus ANTHIDIELLUM Cockerell

29. *Dianthidium ehrhorni* Cockerell

Angeles Bay, May 5, one male; known from southern California.

30. *Dianthidium eiseni* Cockerell

Angeles Bay, June 26, two females; Tiburon Island (bay at south end), July 5, one female; La Paz, June 3-5, three males. Described from San José del Cabo, Lower California. It was originally recorded by Fox as a variety of *notatum*. The male has the anterior tibiae yellow in front; those of the type, described as light ferruginous, were probably discolored. The female has the face black except for the large lateral marks. In both sexes the axillae may have a very small yellow spot. The species is very close to the Californian *D. robertsoni* Cockerell, but the female is easily distinguished by the widely separated spots on abdominal segments three and following, the sixth segment all black and the tibiae and tarsi not red. In the male the lateral spots of supraclypeal area are confined to the corners, and do not at all approach the middle line.

Subgenus *DIANTHIDIUM* Cockerell31. *Dianthidium platyurum* Cockerell, new species

Male (type): Length about 9 mm. (abdomen curved downward); black, with pale yellow markings; eyes dark slate-color or slightly reddish; clypeus pale yellow, with or without a very small bilobed black mark on upper border; lateral face-marks going nearly to top of eyes; a stripe behind upper part of eyes, but none on occiput; mandibles mainly yellow on outer side; front, vertex, mesothorax and scutellum finely and densely punctured; two spots on mesothorax anteriorly, axillæ, an interrupted band on scutellum, large mark on the expanded sharp-edged tubercles, and large mark on the otherwise dark tegulæ, all pale yellow; mesopleura immaculate, with coarse punctures; wings dusky fuliginous, with purple iridescence in marginal cell; knees and mark at base of each tibia pale yellow, a minute round spot near apex of middle tibiæ, and a short line at base of their basitarsi; hind basitarsi mainly yellow on outer side; hind coxæ with yellow spines; abdomen shining, with large, not very dense, punctures; first segment with a short median band, and on each side a subquadrate patch, emarginate mesad; second segment similarly ornamented, but the median band narrowly interrupted in middle and the lateral marks shoe-shaped; third and fourth segments each with a pair of large bridge-shaped marks; fifth with a pair of spots in middle and a dot at each side; sixth entirely black; seventh pale yellow, broad, truncate, with rounded corners, with a rather small median lobe.

Female: Length about 8 mm.; clypeus and mandibles entirely black; a small vertical yellow line below middle ocellus; band on middle of second abdominal segment more broadly interrupted, the divisions pointed mesad; fifth segment with two large subtriangular patches and no lateral dots; basitarsi entirely black; mesopleura with a very small pale yellow mark.

San Francisquito Bay, Lower California, May 10, one male, one female, and June 23, one male.

Very closely related to *D. pudicum* Cresson, from the western United States, but the end of the male abdomen is much less trilobed, and the female has the mesothorax more finely punctured, and no light marks at sides of clypeus. The yellow markings are much paler than in *D. provancheri* Titus, and the mesopleura is much more heavily punctured.

Type: Male, No. 950, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 10, 1921, at San Francisquito Bay, Lower California.

32. *Dianthidium profugum* Cockerell, new species

Female: Length about 8.5 mm.; similar to *D. platyurum*, differing thus: wings not so dark; tegulæ clear ferruginous, with a cream-colored mark; extreme sides of clypeus usually with pale marks; anterior tibiæ

with pale stripe extending two-thirds down, and middle tibiae with a stripe the whole length; axillae with only a linear mark; mesopleura immaculate, with a good deal of white hair. The markings of the abdomen are very pale with a buffy tint instead of clear yellow. Ventral scopa pale fulvous.

Puerto Refugio, Angel de la Guardia Island, June 29 and May 1, three females. The June 29 specimen was taken on flowers of *Dahlia spinosa*.

Type: Female, No. 951, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 1, 1921, at Puerto Refugio, Angel de la Guardia Island, Gulf of California.

ANTHIDIUM Fabricius

33. *Anthidium lupinellum* Cockerell

San Francisquito Bay, Gulf of California, May 10, one worn male. This species was described from New Mexico and the specimen collected by Mr. Van Duzee differs in the distinctly paler wings (marginal cell with only a narrow brown stripe along upper edge), hair of vertex white, all the tibiae with a small yellow spot at base, lateral face-marks forming a somewhat larger angle on orbits above, and lateral apical spines of abdomen rather longer and more slender. Whether these differences indicate a distinct race or are merely individual cannot be determined until more specimens are available. The scape is entirely black, in the male of the following species it is yellow in front.

34. *Anthidium sonorensis* Cockerell, new species

Male (type): Length about 11 mm.; robust, black with yellow markings, pale on face but deep chrome-yellow on abdomen; hair of head and thorax abundant, on vertex, mesothorax and scutellum fulvous, elsewhere white; clypeus, triangular lateral face-marks (their upper ends broadly rounded at about level of antennae), mandibles (except apex), a small elongated mark above each eye, and scape in front, all yellow; eyes green; top of head dull and granular, with a shining space laterad of each outer ocellus; mesothorax and scutellum dull and granular, the former entirely black, as also the axillae, but scutellum with a yellow band, greatly constricted in middle, making the scutellum appear as if deeply emarginate; tegulae black with two yellow spots; tubercles with an orange spot; wings dilute fuliginous; knees, tibiae on outer side and the basitarsi densely covered with white hair; hind coxae with a yellow spot; abdomen shining, very finely punctured; segments one to five each with four, nearly equidistant, yellow spots, the median ones

on first segment small, but the laterals on this segment very large and quadrate; on fifth segment the median spots are connected with the laterals by a line and on fourth they are nearly connected; sixth with large quadrate median spots, and small laterals; seventh black with a pair of yellow dots; venter with white hair; sixth segment with sharp, slightly curved, spines at sides; seventh with a slender median spine, and rather narrow, somewhat pointed, lateral lobes, their outer margin straight.

One male. The end of the abdomen is formed nearly as in *A. banningense* Cockerell, from California, but the markings of the thorax and abdomen are conspicuously different. *A. banningense* has the scape entirely black. There is also some resemblance to *A. saxorum* Cockerell and *A. collectum* Huard, but these are readily separated by the apex of the abdomen.

Type: Male, No. 952, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, April 8, 1921, at **Guaymas, Sonora, Mexico.**

The following females from quite other localities are referred to this species, though there is a possibility that they may be distinct:

Female: Length about 10 mm.; similar to the male except in characters which may be regarded as sexual; scape black, with a small yellow streak; clypeus yellow, with a pair of short, thick, black bars on upper part; eyes green; broad yellow stripe behind sides of vertex; hair of vertex brown, but of occiput, mesothorax and scutellum short and white; mesothorax with yellow stripes along margins above tegulae, and also at sides anteriorly; axillae yellow; wings rather clearer; abdominal markings yellow, not chrome or orange, more transverse, the median ones on first segment large, the medians connected with the laterals by a band on segments 3 to 5; sixth segment yellow with an angular median mark at base and a pair of small discal spots; apex of sixth segment obtusely pointed, and margins laterally distinctly angled; ventral scopa white.

Las Animas Bay, May 8, one female. The middle basitarsi are densely covered with white felt, as in *A. maculifrons* Smith, but that species differs greatly in the markings.

35. *Anthidium sonorensis productum* Cockerell, n.var. (?n.sp.)

Female: Similar, but whole middle of upper part of clypeus broadly black; scape entirely black; upper part of head immaculate, except small yellow dots above eyes; hair of vertex white; eyes reddish; anterior marks on mesothorax represented by minute dots, and lateral ones by very short stripes; marks on axillae smaller; band on scutellum much narrower, narrowly interrupted in middle; spots on first three abdominal segments all disconnected; sixth segment with a median black line.

San José Island, June 10, one female (type of variety). Another example from La Paz, June 3, has short stripes above the eyes, a long stripe above tegulæ, more yellow on axillæ and scutellum, and the yellow on abdomen more extensive, thus approaching the female described from Las Animas Bay.

Type: Female, No. 953, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, June 10, 1921, on **San José Island, Gulf of California.**

MELECTIDÆ

ERICROCIS Cresson

36. *Ericrocis arizonensis* Baker

Guaymas, April 11, 1921, one male. Described from Oracle, Arizona.

Fox described *E. rugosa* from Santa Maria, Lower California. Mr. Van Duzee has kindly compared the above *E. arizonensis* with Fox's type and reports: "This species has a strong superficial resemblance to the type of *Ericrocis rugosa* Fox, but as that was an alcoholic specimen the characters of the pile can scarcely be made out, while it is very clear and distinct in my specimen. My specimen is a little smaller, the dorsulum is much more strongly furrowed, the scutellum is less tumid either side than in the Fox type. The little pile remaining on the labrum of the Fox type is pale while it is long, heavy and fuscous in mine. In the type the first recurrent nervure unites almost exactly with the second transverse-cubital, exactly as it does in my specimen."

E. rugosa is doubtless a distinct species. As it stands at present *Ericrocis* consists of four species, *E. lata* (Cresson), Texas to Arizona; *E. arizonensis* Baker, Arizona and Sonora; *E. melectoides* Baker, Arizona; *E. rugosa* Fox, Lower California. *E. arizonensis* is close to *E. lata*, and possibly not to be separated, but it seems to be distinct.

TRIEPEOLUS Robertson

37. *Triepeolus verbesinæ* (Cockerell)

Guaymas, April 6, 8, and 15, six males; Angeles Bay, June 26, two females. Described from southern New Mexico. The scale-like spines on pygidial area (false pygidium) of

female are said in the original description to be brilliantly golden. They are actually dark but shine golden at a certain angle in bright light.

EPEOLUS Latreille

38. *Epeolus permixtus* Cockerell, new species

Male (type): Length about 10 mm.; robust, black, the light markings on abdomen cream-color, the legs red. Eyes dark grayish brown, converging below; face densely covered with appressed, pure white hair; mandibles chestnut red, black apically; labrum black with a red spot at each side; vertex shining, with sparse strong punctures; antennae long, black, the first joint mainly red, shorter than the fourth; pale hairs of thorax dorsally pale ochreous-tinted, ventrally white; mesothorax with a pale margin posteriorly and laterally, the pale hair ending in a point anteromesad, leaving a black band between it and the anterior margin; stripes on disc of mesothorax long and broad, tapering at each end, the anterior end reaching the anterior margin; between the bands along the middle line is a little light hair and there is a very broad triangle of thin pale hair between the bands along the anterior margin, and some very thin pale hair laterad of the bands anteriorly; axillar teeth short, but well developed; pleura with the lower part appearing dark, but thinly covered with hair; tegulae dusky red; wings hyaline, darkened apically, stigma and nervures black; recurrent nervures joining submarginal cells at middle; hind tibiae with a black patch behind; hind basitarsi with orange hair on inner side; spurs dark red; abdomen with entire bands on all the segments except first, where it is narrowly interrupted; black area on first segment a transverse band, pointed laterally, the whole band somewhat semilunar in outline; second segment with black area obtusely pointed (at about 50 degrees) laterally; band on sixth segment white, contrasting with the others; first ventral segment with a small broad white discal triangle; second and third ventrals with much white hair along margins and in middle line; curled fringes pale brownish, the second one darker; apical plate rather broad, dark reddish.

Female: Length about 8.5 mm. (Las Animas Bay) to 10 mm. (Pond Island Bay); similar to the male but differing thus: First three antennal joints chestnut-red in front; stripes on mesothorax short, not nearly reaching anterior margin; lateral pale bands broken above tegulae, and ending obtusely just in front of tegulae, not at all pointed mesad; no scattered pale hair on anterior part of mesothorax; less pale hair along base of scutellum; upper part of dark area on pleura bare, shining and rather closely punctured; fifth abdominal segment with a comparatively large false pygidium, extending to the base of the segment; broad white bands on ventral segments 2 to 4.

Pond Island Bay, Angel de la Guardia Island, Gulf of California (type locality), July 1, 1921, two males, one female; Angeles Bay, Lower California, June 27, 1921, one female. The last mentioned specimen is much smaller but

apparently conspecific. The sexual difference in the marking of the mesothorax is similar to that in *Triepeolus pænepectoralis* Viereck.

This is a remarkable species because, although the false pygidium is rather small for *Triepeolus*, it is distinctly of the type of that genus; while the maxillary palpi (examined in both sexes) are only two jointed, the first joint cup-shaped apically, the second long and cylindrical. Hence it resembles *Epeolus dacotensis* Stevens, but that species is otherwise so different as to suggest that it may have been derived independently from *Triepeolus*.

Superficially *E. permixtus* is very like the Mexican *Triepeolus concinnus* Cockerell, but the latter has much larger false pygidium and is a genuine *Triepeolus*.

Type: Male, No. 954, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 1, 1921, at **Pond Island Bay, Angel de la Guardia Island, Gulf of California.**

PANURGIDÆ

The Panurgid bees collected by Mr. E. P. Van Duzee in the region of the Gulf of California include one *Spinoliella* and eight species of *Perdita*. Of these, four species of *Perdita* and a subspecies each of *Perdita* and *Spinoliella*, are new. In April, 1898, Dr. L. O. Howard collected eight species of *Perdita* at San José de Guaymas, Mexico. Four of these were described as new, *P. howardi* Ckll., *P. ashmeadi* Ckll., *P. sonorensis* Ckll. and *P. luciae* Ckll. The others were *P. tarda* Ckll. (not typical), *P. punctosignata* Ckll., *P. salicis* Ckll. and *P. exclamans* Ckll.

The collection described below includes five species of *Perdita* from Guaymas, one new, one described as a new subspecies of *P. exclamans*, and the other three, *sonorensis*, *punctosignata* and *howardi*. *P. luciae* also occurs in Arizona, where it was collected by Mr. H. G. Hubbard. *P. howardi* extends to New Mexico. The earlier reports of Mr. Wm. J. Fox on the Hymenoptera of the Gulf of California and adjacent Mexico include the following Panurgidæ:

Calliopsis, n. sp. (not described). San Julio.

Calliopsis margaritensis Fox. Margarita Island; now referred to *Panurginus*.

Calliopsis concinnus Fox. El Chinche; now called *Panurginus concinnus*.

Calliopsis scaber Fox. El Taste, 3400 ft.; now called *Pseudopanurgus scaber*.

Calliopsis mexicana Cress. Tepic; now called *Pseudopanurgus mexicanus*.

Perdita sp. Tepic.

Perdita ventralis Fox. Magdalena Island, Margarita Island.

Perdita sparsa Fox. Margarita and Magdalena Islands.

Perdita arcuata Fox. Calmalli Mines.

Perdita sp. Calmalli Mines.

Panurgus sp. Magdalena Island. This could not have been a true *Panurgus*.

The *Panurgus halictoides* of Fox is to be called *Dialictus halictoides*, while *Panurgus manifestus* Fox is referred to *Callandrena*. These two species are Andrenids, not Panurgids.

It will be seen that Mr. Van Duzee did not find one of the species recorded by Fox, unless, perchance, one of the unnamed ones should be the same as one of his. The Panurgid fauna of the Gulf region is an extension of that of the arid southwestern United States, with some specific and subspecific differentiation. Some of the forms at present apparently confined to the peninsula or the Gulf region may yet be found in Arizona, the bee-fauna of which is still very imperfectly known.

PERDITA F. Smith

39. *Perdita sonorensis* Cockerell

Guaymas, Mexico, April 8, 1921, one female. A form with the light abdominal marks more reduced than usual.

40. *Perdita punctosignata* Cockerell

Guaymas, Mexico, April 10, 1921, three females, reddened by cyanide. Dr. L. O. Howard collected this species at San José de Guaymas, April 10, 1898.

41. *Perdita exclamans atramentata* Cockerell, new subspecies

Male: Apex of flagellum (one or two joints) black above and below, contrasting abruptly with the rest. Yellow of cheeks ending above very acutely, or as a line on posterior orbits.

Guaymas, Mexico, April 7, 1921, two males. By the black apex of antennæ this recalls the otherwise quite different *P. miricornis* Cockerell, from Wyoming.

Type: Male, No. 955, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, April 7, 1921, at **Guaymas, Sonora, Mexico.**

42. *Perdita howardi* Cockerell

Guaymas, Mexico, April 8, 1921, two males. Guadalupe Point, Concepcion Bay, June 17, 1921, one female; Las Animas Bay, May 8, 1921, one female, two males. The males from Guaymas differ from the others as shown in the table below, but a cotype male *howardi* (San José de Guaymas) has the margin of stigma slightly darkened, and traces of the lines laterad of ocelli. The females from Concepcion Bay and Las Animas Bay do not have the margin of the stigma darkened. It is thus impossible to distinguish any races. *P. howardi* extends northeast to southern New Mexico.

43. *Perdita vanduzeei* Cockerell, new species

Female: Length about 5 mm.; head and thorax brassy green, with rather abundant white hair; metathorax bluish green; clypeus and labrum black; no light face-markings; mandibles pellucid white, rufous apically; head broad; scape black, with a pale dot at base; flagellum pale yellowish beneath; front shining; mesothorax highly polished; tegulæ hyaline; wings pure hyaline, milky; nervures colorless; stigma very pale yellowish; legs black, anterior tibiæ pale yellow in front, their tarsi reddish; abdomen shining; first segment black; second and third black with very broad narrowly interrupted cream-colored bands, not reaching lateral margins; rest of abdomen bright ferruginous, except that fourth segment is black at extreme base and in middle, and has the interrupted pale band poorly developed; venter with basal two-thirds fuscous, apical third clear ferruginous.

One female. In the New Mexico tables it runs to *P. subfasciata* Ckll., but is very different. It is really very like *P. crotonis* Ckll., but is easily distinguished by the dark face. *P. crotonis* visits Croton in New Mexico from the end of June to August.

Type: Female, No. 956, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, April 25, 1921, at **Tepoca Bay, Sonora, Mexico.**

44. *Perdita clarifacies* Cockerell, new species

Male: Length about 4 mm.; head and thorax greenish blue, the metathorax and mesopleura steel-blue; head large and broad, cheeks unarmed; face below level of antennæ (also labrum and basal half of mandibles) creamy-white, highly polished, with little hair; lateral marks forming broad-cuneate projections above this level, one each side on orbit, the apex nearly half way up front; cheeks entirely dark; scape short, creamy-white in front; flagellum pale dull reddish beneath; front shining; mesothorax highly polished; prothorax with a prominent yellowish white lobe at top on each side, the tubercles of the same color; wings clear, nervures fuscous, except the second recurrent which is pure hyaline; stigma dull white, bounded with fuscous; marginal cell rather long; legs yellow, anterior and middle femora marked with black behind, hind femora black behind and with a broad oblique black band in front; hind tibiæ broadly fuscous behind; abdomen dark brown, with interrupted straight yellow bands (pale dull chrome) on segments 2 to 6, the bands obtuse laterally and not nearly reaching lateral margins; venter pale yellowish, brownish apically.

One male. In the tables it runs nearest to *P. pectidis* Ckll. to which it is not closely allied. It is just possible that it is the male of *P. sonorensis*, but I think not, as the wings are clear and the marginal cell is conspicuously narrower.

Type: Male, No. 957, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, April 6, 1921, at **Guaymas, Sonora, Mexico.**

45. *Perdita vittata* Cockerell, new species

Female (type): Length about 5 mm.; head and thorax dark blue-green, metathorax dark steel-blue; head ordinary, face broad; labrum black; basal half of mandibles and face-markings very pale yellow, the latter consisting of an elongated median mark on clypeus, a large spot at each anterior corner of clypeus, not approaching the median mark, and much larger transverse lateral marks, angulate on orbits below level of antennæ; cheeks hairy, not at all swollen; front shining; scape black, with the base conspicuously pale yellow; flagellum dark brown above, pale yellow beneath; mesothorax shining, with thin, rather long hair; upper margin of prothorax narrowly yellow anteriorly, but posteriorly without markings; tubercles light yellow; tegulæ hyaline; wings clear hyaline, beautifully iridescent, stigma and nervures (except subcosta) colorless; marginal cell with poststigmatal part longer than substigmatal; femora black with knees yellow; anterior and middle tibiæ yellow, with a large dark patch behind, hind tibiæ dark; broadly yellow at base; anterior and middle tarsi yellow, hind tarsi dark; abdomen broad, first segment dark brown with two large, closely approximated oval or subpyriform pale yellow marks; second segment with anterior half dull pale yellowish or cream-color, the posterior half brown (posterior corners pallid), the brown with an upward projecting point in middle; re-

maining segments pale reddish, the third with a linear dark brown band at base, and two dark spots posteriorly; venter pale yellowish red.

Male: Similar, but labrum yellow; face all yellow to fully half-way up front; but not nearly reaching middle ocellus, the upper level of the yellow not far from straight, but depressed in middle and at extreme sides; antennæ entirely yellow, except that first few joints of flagellum are darkened above, lower part of cheeks yellow, a rather broad yellow band going less than half-way up posterior orbits; posterior border of prothorax above broadly yellow, interrupted in middle, but laterally with a linear connection with yellow of tubercles; lower border of stigma dusky; legs yellow, the hind femora nearly all black behind; hind trochanters yellow; abdomen nearly as in female, third segment broadly dusky at sides. In the specimen described the yellow band has been reddened by cyanide.

La Paz, Lower California, June 3 and 4, 1921, four females, one male. Allied to *P. rhodura* Ckll., but the face markings of the female are quite different. The male has the face markings practically as in *rhodura*, though they end at the facial foveæ instead of enclosing them as in *rhodura*. The male *rhodura* also differs from *vittata* in having a yellow mark on mesopleura and the hind tibiæ dark. *P. rhodura* is from New Mexico.

Type: Female, No. 958, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, June 4, 1921, at **La Paz, Lower California.**

46. *Perdita erudita* Cockerell, new species

Male: Length slightly over 5 mm.; head and thorax dark bluish green, front rather yellowish green, metathorax steel-blue; head enormous, quadrate, larger than thorax, cheeks unarmed; clypeus with very long linear lateral extensions; mandibles simple; labrum, mandibles (except black apex and reddish subapical suffusion), clypeus (except usual dots), transverse (obscure) supraclypeal band, large triangular dog-ear marks, and subquadrate lateral face-marks, all white with a slight creamy tint, the lateral marks suffusedly tinged with purplish, and ending above squarely at level of antennæ as do the other markings; cheeks swollen, slightly pallid at lower end; front somewhat shining but with a dull band from eye to eye, enclosing ocelli; vertex black, shining, with scattered punctures; scape with a pale brown apical spot; flagellum obscure brown beneath, appearing banded; mesothorax shining, sparsely and weakly punctured, its posterior disc and the scutellum black; tegulæ hyaline; tubercles white; wings clear hyaline, margin of stigma and marginal vein dusky; stigma as large as usual; marginal cell with poststigmatal portion longest; legs dark brown, with white hair, trochanters and basal part of femora suffusedly pallid above; anterior femora very broad, concave in front; abdomen short and very broad, piceous, with the hind margins of the segments broadly hyaline, the first three segments with a brown line just before the hyaline area; venter pale reddish brown.

A member of the *P. californica* group, but distinct from those previously described. The sculpture of the mesothorax in *P. californica* Cresson is different and the stigma is small. It is nearest to *P. crassiceps* Ckll., and *P. laticeps* Ckll. from New Mexico, especially to the latter, from which it differs in possessing dog-ear marks on the face. The cheeks of *P. erudita* have short, largely appressed hair, a character of *laticeps* as against *crassiceps*. The absence of a transverse ridge behind the ocelli, the punctures on vertex and the hyaline margins of the broad abdomen are all *laticeps* characters. Additional material may show that *P. erudita* is a subspecies of *laticeps*. The hair on thorax above is pure white, not brownish as in *P. crassiceps*.

Type: Male, No. 959, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 3, 1921, in Palm Cañon, Angel de la Guardia Island, Gulf of California.

The above species of *Perdita* may be separated as follows:

- | | |
|--|--------------------------------------|
| Thorax green or dark..... | 1 |
| Thorax yellow (may be reddened by cyanide)..... | 6 |
| 1. Abdomen dark without evident pale markings, but hind angles of segments hyaline; head extremely large..... | <i>erudita</i> Ckll. ♂ |
| Abdomen with distinct pale markings, or mainly pale..... | 2 |
| 2. Face without light marks; apical part of abdomen red..... | <i>vanduzeei</i> Ckll. ♀ |
| Face dark with light marks..... | 3 |
| Face all pale..... | 4 |
| 3. Light marks of abdomen reduced to pairs of small transverse marks on bases of segments 2 and 3; supraclypeal and dog-ear marks present..... | <i>sonorensis</i> Ckll. ♀ (var.) |
| Light marks or areas of abdomen much more extensive; no supraclypeal or dog-ear marks; extreme base of scape light.... | <i>vittata</i> Ckll. ♀ |
| 4. Abdomen beyond third segment light, without bands..... | <i>vittata</i> Ckll. ♂ |
| Abdomen beyond third segment dark or banded..... | 5 |
| 5. Abdomen with three interrupted light bands.... | <i>clarifacies</i> Ckll. ♂ |
| Abdomen with at least five entire yellow bands; flagellum with black apex..... | <i>exclamans atramentata</i> Ckll. ♂ |
| 6. Mesothorax with a pair of parallel black bands..... | <i>punctosignata</i> Ckll. |
| Mesothorax without such bands..... | 7 |
| 7. Facial foveæ elongate; a black stripe from each lateral ocellus to adjacent eye, (Concepcion Bay, Las Animas Bay)..... | <i>howardi</i> Ckll. ♀ |
| Facial foveæ small, punctiform..... | 8 |

8. Margin of stigma distinctly darkened; a black line extending laterad of each lateral ocellus, (Las Animas Bay).....*howardi* Ckll. ♂
*howardi* Ckll. ♂
 Margin of stigma not darkened; no black line from lateral ocelli (Guaymas).....*howardi* Ckll. ♂

SPINOLIELLA Ashmead

The status of this genus is rather uncertain. The type was given as *Camptopoeum nomioides* Spinola, a slip for *nomadoides*. This is a Chilean species with black head and thorax, the abdomen red with white or very pale marks. It is probably not very closely allied to the North American forms placed in *Spinoliella*. The type of *Camptopoeum*, designated by Taschenberg, is the European *frontalis* of Fabricius. For a discussion of this species see Trans. Amer. Ent. Soc., xxxi, (1905) p. 320. Ducke (1912) boldly submerges *Spinoliella* in *Camptopoeum*, but this is unsatisfactory. There are, I believe, three or four genera of this immediate alliance in the New World, and probably none of the nearctic or neotropical species belongs to the true *Camptopoeum*. *Spinoliella* therefore stands, and the only question is whether it should be subdivided.

A complication is introduced by Ashmead's genus *Nomadopsis*. The type is designated as *Perdita zonalis* Cresson, which puts it in another group. But the description refers to specimens from Los Angeles County, California, which Ashmead had determined as *Calliopsis zonalis* Cresson. He wrote *Perdita* through some confusion, arising from the fact that there is also a *Perdita zonalis* Cresson, a species which is not in the U. S. National Museum. I have one of these specimens and it is not even *Calliopsis zonalis*; it is with little or no doubt the male of *Spinoliella euxantha* Ckll., described in 1916 from the female. In the face of all this confusion I think the name *Nomadopsis* may be dropped.

47. *Spinoliella scutellaris peninsularis* Cockerell, n. sp.

Female: Length 7.3 to 8 mm.; black, with cream-colored markings; hair of head and thorax above faintly tinted with pale ochreous; eyes pale green; tongue narrow, elongated, but hardly as long as width of face; labial palpi with first joint long and stout, much longer than the other three together, the second hardly longer than the third; max-

illary palpi long and very slender, 6-jointed, the first short, the second and third longest; labrum black with a shining basin; mandibles simple, cream-colored at base, red in middle, broadly black apically; clypeus broadly excavated apically with a narrow rufous margin, but otherwise cream-color, except two brown spots, and a large black apical area which is sharply bidentate below; large supraclypeal and dog-ear marks; lateral marks more or less semilunar, but excavated on inner side above, ending on orbits at about level of upper side of antennal sockets; malar space black; scape black with small apical and basal pale spots; flagellum broadly pale ferruginous beneath, dusky and banded basally; mesothorax polished with scattered small punctures; upper border of prothorax with an interrupted pale band, but tubercles dark; postscutellum and narrow line on posterior margin of scutellum cream-color; tegulae dark rufous, with a cream-colored stripe; wings hyaline with a faint reddish-gray color; stigma rather narrow, pale reddish; nervures pale fuscous; apex of marginal cell oblique; legs black, the tarsi more or less reddish, the knees and stripe on anterior tibiae cream-color; abdomen shining with broad cream-colored bands, broadly excavated sublaterally behind; band on first segment narrowly, and on second very broadly, interrupted; fifth segment without light markings.

La Paz, Lower California, June 4, 1921, six females. This is allied to *zonalis* (Cresson), as shown, for instance, by the color of the tegulae; but is especially related to *S. scutellaris* Fowler, based on males from Fresno, California. As the female of *scutellaris* is unknown comparisons are difficult, but to the best of my judgment part of the differences are sexual and part racial.

Type: Female, No. 960, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, June 3, 1921, at **La Paz, Lower California.**

ANDRENIDÆ

NOMINÆ

NOMIA Latreille

48. *Nomia californica* Cockerell

This was described in 1910 from the female collected in southern California. Six males from Las Animas Bay, Lower California, are referred here with confidence. They closely resemble *N. acus* Cockerell, differing by the color of the abdominal bands, the presence of a narrow but very distinct band on the first segment, and the very dark brown

tegulæ. The band on the first segment, as often happens in *Nomia*, sometimes fails to become colored. The wings agree with *californica*. *Nomia howardi* Crawford and *N. moctezumæ* Crawford were taken by Dr. L. O. Howard at San José de Guaymas, Mexico, but were not met with by Mr. Van Duzee.

APIDÆ

APIS Linnæus

49. *Apis mellifera ligustica* Spinola

Tiburon Island, July 4, one worker. The genus *Apis* is not native in America.