

# Proceedings of the United States National Museum



SMITHSONIAN INSTITUTION • WASHINGTON, D.C.

Volume 115

1964

Number 3481

## CHIRONOMID MIDGES OF CALIFORNIA II. TANYPODINAE, PODONOMINAE, AND DIAMESINAE

By JAMES E. SUBLETTE<sup>1</sup>

Subsequent to publication of Part I of this series (Proc. U.S. Nat. Mus., vol. 112, no. 3435, 1960), I have received several additional collections. Rather than delay publication until all the remaining subfamilies can be treated, I am presenting here the results of study of three subfamilies. A projected third part will treat the Orthocladiinae and addenda to Parts I and II.

For making the additional collections available to me I should like to thank George W. Byers, Snow Entomological Museum, University of Kansas, Lawrence, Kansas; Gail Grodhaus, California Department of Public Health, Berkeley, California; Ernest C. Bay and E. I. Schlinger, University of California, Riverside, California.

Names of collections and collectors which are abbreviated in the text of this paper are as follows: U.S. National Museum (USNM); British Museum (Natural History) (BMNH); University of California at Davis (UCD); University of California at Los Angeles (UCLA); University of California at Riverside (UCR); California Department of Public Health, Berkeley (CDPH); University of Kansas (KU); Illinois Natural History Survey (INHS); Willis W. Wirth (W); R. E. Darby (D); J. N. Belkin (B); Gail Grodhaus (G); Ernest C. Bay (Bay); E. I. Schlinger (S); James E. Sublette (JES).

<sup>1</sup>Eastern New Mexico University, Portales, New Mexico.



All localities mentioned are in California unless otherwise noted. The deposition of material is indicated immediately before locality data of the specimens studied.

I should like again to thank my wife Mary Smith Sublette for her assistance in preparation of the manuscript and Dr. Willis W. Wirth for reading and constructively criticizing the manuscript.

### Subfamily Tanypodinae

#### *Pentaneura (Ablabesmyia) monilis* (Linnaeus) Johannsen

*Tipula monilis* Linnaeus, Systema naturae, ed. 10, p. 587, 1758.

Males: Wing length, range 2.29–3.15; mean 2.85 mm. (14); fore leg ratio, range 0.77–0.83; mean 0.79 (9); antennal ratio, range 1.50–2.17; mean 1.95 (9); venarum ratio, range 0.80–0.87; mean 0.84 (13); aedeagus blade length, range 0.72–0.090; mean 0.081 (10). Prealar bristles 19 to 23; dorsolateral bristles mostly in single row; occasionally doubled for 1 or 2 bristles; anterolateral bristles 9 to 13.

Females: Wing length, range 2.29–3.00; mean 2.66 mm. (4); fore leg ratio, range 0.75–0.85; mean 0.80 (4); venarum ratio, range 0.84–0.86; mean 0.85 (3).

Material examined: In USNM: 1 male, 1 female, Berkeley, May 1, 1948, W; 2 males, 2 females, Shafter, Kern Co., June, 1946, B. Brookman; 1 male, King's River Bridge, Stratford, July 15, 1947, W. In KU: 3 males, Mammoth Lakes, July 29, 1940, D. E. Hardy; 1 male, Mammoth Lakes, July 29, 1940, R. H. Beamer; 1 female, Tioga Pass, July 31, 1940, R. H. Beamer. In UCLA: 1 male, Arcata, Humboldt Co., Sept. 9, 1950, B. In UCD: 1 male, Cobb's P.O., Forest Lake, June 22, 1953, D; 1 male, Pope Valley, Duvall Lake, June 22, 1953, D. In CDPH: 1 male, Puddingstone Reservoir, Los Angeles Co., June 22, 1952, G; 18 males, Lake Tenaya, Mariposa Co., Aug. 20, 1960, L. L. Lewallen; 2 males, 3 miles south of Woodside, San Mateo Co., Apr. 20, 1960, G. In UCR: 3 males, Whittier, Rio Hondo, May 15, 20, 1960, Bay.

#### *Pentaneura (Ablabesmyia) mallochi* (Walley)

*Tanypus mallochi* Walley, Canadian Ent., vol. 57, p. 273, 1925; Ann. Ent. Soc. Amer., vol. 21, p. 589, 1928.

Males: Wing length, range 2.11–2.52; mean 2.37 mm. (7); antennal ratio, range 2.00–2.28; mean 2.14 (7); fore leg ratio, range 0.78–0.82; mean 0.79 (6); venarum ratio, range 0.79–0.83; mean 0.83 (7); anterolateral bristles, range 13–19; mean 16 (4).

Female: Wing length 2.26 mm.; fore leg ratio 0.74; venarum ratio 0.90; anterolateral bristles 19.

Material examined: In USNM: 2 males, 1 female, Stratford, July 8, 1947, W; 1 male, Corcoran, Aug. 22, 1947, W. In D: 3 males, Rio



Linda, July 25, 27, 31, 1957. In CDPH: 1 male, 2 miles east, 4 miles north of Manteca, San Joaquin Co., June 3, 1957, G.

I have examined five specimens, four of them paratypes from the Canadian National Collections, through the kindness of Dr. J. R. Vockeroth, Entomology Research Institute, Canadian Department of Agriculture, Ottawa. He also has sent me notes on the holotype. Measurements for these specimens are:

Males: Wing length, range 2.52–2.85; mean 2.65 mm. (4); fore leg ratio 0.77–0.85; mean 2.65 (4); antennal ratio, range 2.11–2.22; mean 2.15 (4).

Female: Wing length 2.26 mm.; fore leg ratio 0.85.

Material examined in Canadian National Collections: 3 males, paratypes, 1 male, Aylmer, Ont., Aug. 8, 1924, C. H. Curran; 1 male, Aylmer, Ont., Sept. 7, 1924, C. H. Curran; 1 male, Ottawa, Ont., June 31, 1924, C. H. Curran; 1 male, Ottawa, Ont., July 14, 1926, G. S. Walley; 1 female, locality not recorded.

Measurement data for this species (male) is summarized as follows (those for the Georgia and New York specimens, fide Roback, 1959, p. 123):

	Wing length (mm.)	Antennal ratio	Fore leg ratio	Anterolateral bristles
Type series	2.52–2.85	2.11–2.22	0.77–0.85	18–20
Georgia	2.10–2.40			
New York	2.20–2.70	1.85	0.79	
California	2.11–2.52	2.00–2.28	0.78–0.82	13–19

Previous California records: Fallen Leaf, Lake Tahoe, Sept. 13, 1915 (USNM), Roback, 1959, p. 123.

***Pentaneura (Ablabesmyia) peleensis* (Walley)**

*Tanypus peleensis* Walley, Canadian Ent., vol. 58, p. 64, 1926.

Through the courtesy of Dr. J. R. Vockeroth I have examined paratypes of *Tanypus peleensis* Walley. Dr. Vockeroth also kindly provided me with the notes on the holotype.

The California material that I am referring to this species differs from the type series by having the scutellum concolorous with the dark reddish-brown vittae and postnotum, and by having the blade of the aedeagus more strongly curved.

Male: Wing length 3.00 mm.; fore leg ratio 0.76; antennal ratio 2.30; fore tibia: tarsals 1+2, 52:52; venarum ratio 0.75; anterolateral bristles 13.

Female: Wing length 2.59 mm.; venarum ratio 0.87.

Material examined: In UCD: 1 male, Cobb's P.O., Forest Lake, June 22, 1953, D; 1 female, Pope Valley, Duvall Lake, June 22, 1953, D.



*Pentaneura (Pentaneura) fluminalis*, new species

FIGURES 1a,b

*Pentaneura carnea* (Fabricius) Johannsen, Journ. New York Ent. Soc., vol. 54, p. 279, 280, 1946. Misidentification?

Holotype male: In USNM 65503, Mad River Beach, Humboldt Co., Aug. 12, 1948, Coll. No. 104, reared, W.

Head reddish-brown, mouthparts and antennae darkened. Eyes with thin dorsal extension. Antennal ratio 1.84.

Thorax yellowish to reddish-brown. Anterior portion of lateral vittae darkest reddish-brown; pollinose, especially on dorsomedial and dorsolateral bristle rows and on prescutellar area. Supra-alar bristles 2; prealar bristles 12; dorsomedial bristles in single staggered row, becoming 2 rows posterior to tubercle at anterior edge of prescutellar area. Dorsolateral bristles in single staggered row, becoming doubled at edge of prescutellar area and extending back to scutellum. Dorsomedial and dorsolateral bristles erect, divergent, yellow. Scutellar bristles numerous; anterior ones strewn; 4 posterior erect bristles. Halteres white.

Fore leg proportions 60:80:60:34:24:15:8. Fore leg ratio 0.75. Fore leg with beard 7 times as long as diameter of tarsus; legs uniformly stramineous. Seven spines in comb on hind tibia; spurs sinuate, ratio 58:24 (long spur subsequently broken off at tip); side bristles not clearly discernible for counting on short spur; on long spur, 3 on one side only. Middle leg ratio 0.72; hind leg ratio 0.63.

Wings very heavily haired;  $R_{2+3}$  scarcely discernible.  $R_{4+5}$  only slightly proximal to termination of M, very far distal to  $Cu_1$ .  $R_1$  distal to  $Cu_2$ ; anal lobe rounded. Wing length 2.89 mm.; venarum ratio 0.85. Ratio of arculus to m-cu:m-cu to wing tip 0.43.

Abdomen yellowish-brown with reddish-brown fascia on basal part of each segment, faint on segment I becoming progressively wider and heavier until segment VI is almost entirely dark.

Allotype: In USNM, reared with holotype.

Wing length 2.70 mm.; fore leg ratio 0.77; middle leg ratio 0.68; hind leg ratio 0.64; venarum ratio 0.90; ratio of arculus to m-cu:m-cu to wing tip 0.36.

Paratype: In USNM: 1 female, reared with the holotype and allotype.

Wing length 2.66 mm.; fore leg ratio 0.74; middle leg ratio 0.67; hind leg ratio 0.65; venarum ratio 0.85; ratio of arculus to m-cu:m-cu to wing tip 0.37.

This species belongs to Edwards' Group C of *Pentaneura*. It further belongs to that portion of the group that was not named when Fittkau (1957) erected *Thienemannimyia*.

In Johannsen (1946) *P. fluminalis*, new species, keys in Group C to *P. carnea* (Fabricius) and may well be the species that Johannsen



identified as *P. carnea* (Fabricius). However, the wings and genitalia of this species are distinctly different from those illustrated by Goetghebuer (1936a, pl. 2, fig. 18; 1936b, pl. 5, fig. 71) for *P. carnea* (Fabricius), and so I am considering it as new. I have not examined Johannsen's material identified as *P. carnea*.

Previous California records: ?Johannsen, 1946, p. 278.

***Pentaneura (Pentaneura) goniodes*, new species**

FIGURE 1c

Holotype male: USNM 65504, Berkeley, Oct. 3, 1947, W.

Head yellow; antennal pedicel and flagellum brown; mouthparts blackish. Eyes with long narrow dorsal extension. Antennal ratio 2.00.

Thorax stramineous, including legs; pollinose on prescutellar area and on dorsolateral bristle row. Vittae orange-yellow. Prealar bristles 14; dorsomedial bristles in staggered single row, which divides around tubercle, then extends laterally as row on each side of prescutellar area to join single dorsolateral row, thus forming cluster of bristles on either side of midline just in front of scutellum. Sternopleuron reddish-brown.

Fore leg proportions: 75:92:70:35:25:16:8. Fore leg ratio 0.76; middle leg ratio 0.50; hind leg ratio 0.65. Sparse hairs on fore tarsus 3 times as long as tarsal diameter.

Wings hyaline, weakly haired on basal half. Ratio of arculus to m-cu:m-cu to wing tip 0.46.  $R_1$  distal to  $Cu_2$ ;  $R_{2+3}$  proximal to  $Cu_1$ ;  $R_{4+5}$  distal to  $Cu_1$ . Squama well haired with small triangular spot on distal margin. Wing length 3.29 mm.; venarum ratio 0.91.

Abdomen with middorsal brown stripe. Segments II to V with basal brown fascia; remainder of segments yellow.

Female: Unknown.

Paratype: Collected with holotype. Wing length 3.03 mm.; fore leg ratio 0.71; middle leg ratio 0.54; hind leg ratio 0.65; antennal ratio 2.00; venarum ratio 0.87; ratio of arculus to m-cu:m-cu to wing tip 0.42. Both hind legs slide mounted. Both spurs sinuate; longer spur with 5 lateral spines; shorter spur with 6 lateral spines, ratio 42:70; comb of 7 long pale bristles.

This species falls in Edwards' Group D of *Pentaneura* and in the restricted group which Fittkau (1957) erected as genus *Conchapelopia*. It closely resembles *P. flavifrons* Johannsen, *P. alba* Roback, *P. rurika* Roback, and *P. vitellina* Johannsen, not Kieffer.<sup>2</sup>

<sup>2</sup> Fittkau (1957, p. 320) clarified the status of *vitellina* Kieffer and pointed out that Johannsen (1946) had misidentified the species. Fittkau then proceeded to propose a new name *americana* for *vitellina* Johannsen, not Kieffer, based on Johannsen's figure 13. The propriety of Fittkau's action is questionable since, according to my understanding of the rules of nomenclature, a new name is to be proposed only in the case of homonymy.



While these species differ in details of color, size, etc., they can be differentiated for certainty only by the structure of the male genitalia. The shape of the basal organ of the male genitalia is diagnostic for this species; the dististyle also appears to be more strongly angulate than in the related Nearctic species.

*Pentaneura (Pentaneura) chrysos*, new species

FIGURE 1d

Holotype male: USNM 65505, Pollock Pines, Eldorado Co., June 14, 1948, at light, W.

Entirely pale stramineous except antennal pedicels, vittae, and abdominal fascia pale yellowish-brown. Eyes with long narrow dorsal extension. Antennal ratio 2.26.

Prothorax broadly notched. Prealar bristles about 8; dorsomedial and dorsolateral bristles long and pale; dorsolateral bristles in single row; dorsomedial bristles in single row, elevated on slight elongated tubercle on prescutellar area, with about 3 bristles on each side of tubercle.

Fore leg proportions: 70:80:62:30:20:15:10. Fore leg ratio 0.77; middle leg ratio 0.60. Fore tarsal beard length 6 times tarsal diameter.

Wings entirely pale except darkened and thickened arculus.  $R_{4+5}$  distal to  $Cu_1$ . Ratio of arculus to m-cu:m-cu to wing tip 0.44. Wing length 2.96 mm.; venarum ratio 0.87.

Abdominal tergites with basal pale yellowish-brown fascia, indistinct on segment I, segments II to V on basal one-third, segments VI to VIII with most of tergite darkened.

Female: Unknown.

Paratype: In USNM: 1 male collected with type.

Wing length 2.74 mm.; fore leg ratio 0.75; antennal ratio 2.17; venarum ratio 0.83.

This species is placed in Edwards' Group D of *Pentaneura* and in the group which Fittkau (1957) established as genus *Thienemannimyia*. In Johannsen (1946, p. 297) the species runs to couplet 8 where it can be distinguished from *P. okoboji* (Walley) and *P. vitellina* (Kieffer) (cf. discussion under *P. goniodes*, new species) by the distinctive male genitalia.

*Pentaneura (Pentaneura) barberi* (Coquillett)

FIGURES 1e,f

*Tanypus barberi* Coquillett, Proc. U.S. Nat. Mus., vol. 25, p. 90, 1902.

The specimens before me agree well with Coquillett's original description and, although I have not studied the type material, I have no hesitation as to the specific placement. I am offering the following



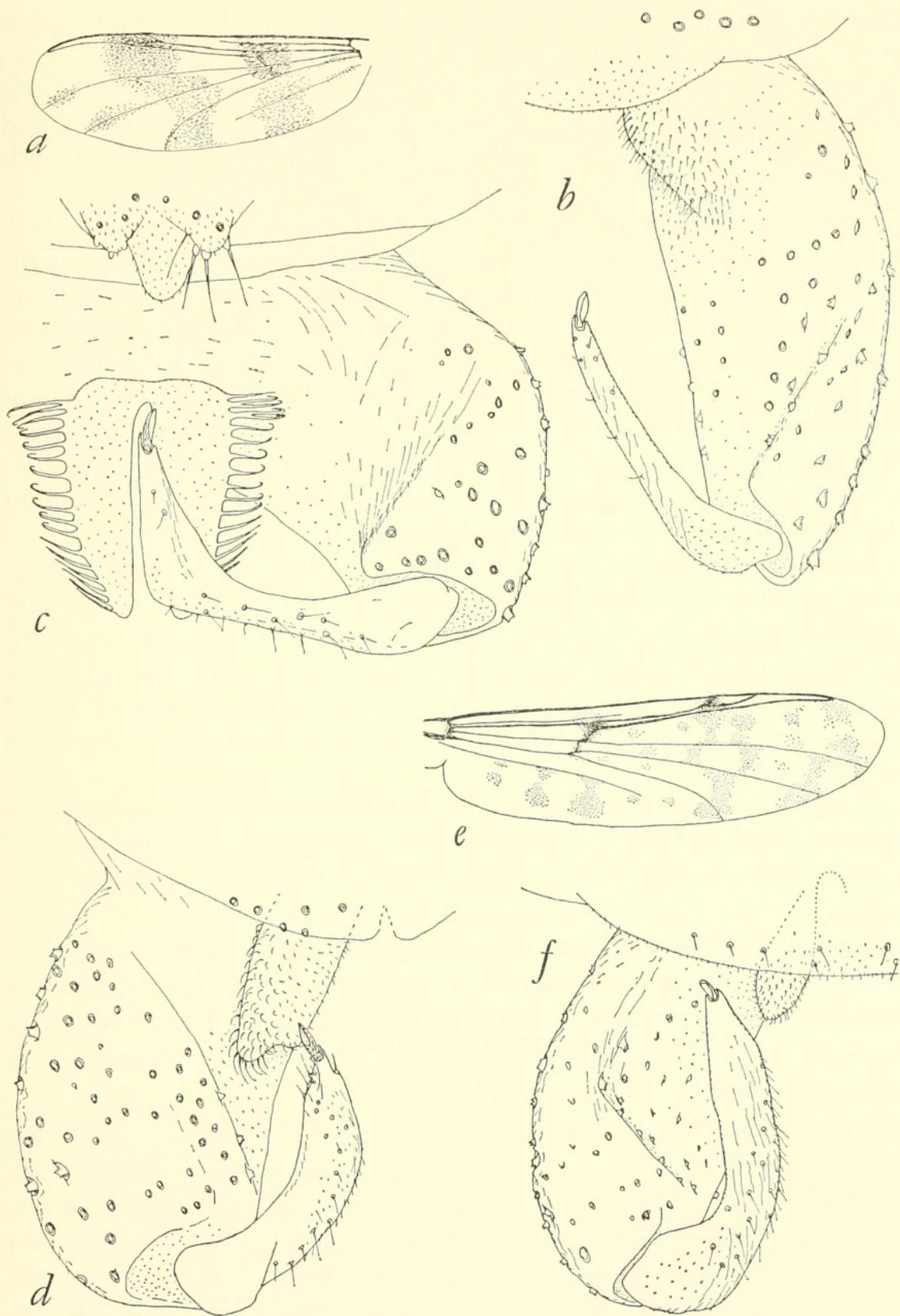


FIGURE 1.—*Pentaneura* (*P.*) *fluminalis*: *a*, wing; *b*, male genitalia. *Pentaneura* (*P.*) *goniodes*: *c*, male genitalia. *Pentaneura* (*P.*) *chrysos*: *d*, male genitalia. *Pentaneura* (*P.*) *barberi* (Coquillett): *e*, wing; *f*, male genitalia.



as a more complete description of the species, based on a male specimen in USNM: Mono Lake, Mono Co., June 6, 1948, W.

Head yellowish-brown, except antennal pedicels and mouthparts which are blackish-brown. Antenna yellowish with tip infusate and with fuscous band near middle. Antennal ratio 1.64. Eyes with conspicuous narrow dorsal extension.

Thorax, except for yellowish pronotum, humeri, and scutellum, dark brown; middle and lateral vittae separated by paler line along dorso-lateral bristle row; medial vittae separated by reddish-brown line along dorsomedial bristle row; dorsum heavily pollinose. Prothorax narrowed medially, evanescent, considerably inferior to mesonotum; with 6 to 8 very fine lateral bristles. Prealar bristles about 15; dorso-lateral and dorsomedial bristles in single rows with dorsomedial bristles doubled for about 6 hairs posteriorly, terminating before scutellum; anterolateral bristles about 15. Halteres stramineous. Scutellum rubbed. Sternopleuron dark reddish-brown.

Fore leg proportions: 68:87:58:32:23:14:9. Fore leg ratio 0.67. Legs stramineous; dark brown annulus at distal end of femur and proximal end of tibia, separated from joint by distance equal to width of bands; tips of tibiae and tarsal joints 1 to 3 dark brown; distal half of fourth and all of fifth dark brown. Fore tarsi with beard slightly less than 3 times tarsal diameter; middle and hind legs with long pale hairs.

Wings with numerous spots on hyaline background;  $R_{4+5}$  terminates slightly distal to  $Cu_1$ ;  $Cu_2$  sharply bent downward, terminating half way between  $R_1$  and  $R_{2+3}$ . Wing length 3.15 mm. Venarum ratio 0.90.

Each abdominal segment with basal dark brown, rather mottled, fascia, inconspicuous and narrow on segments I and II, progressively broadens until segment VII almost completely dark. Each abdominal segment with apical pollinose, mottled white fascia; prominent on segments I and II, decreasing apically.

Males: Wing length, range 2.32–3.18; mean 2.88 mm. (8); fore leg ratio, range 0.64–0.73; mean 0.69 (6); antennal ratio, range, 1.52–2.08; mean 1.81 (8); venarum ratio, range 0.80–0.92; mean 0.87 (8).

Females: Wing length, range 2.52–3.07; mean 2.73 mm. (3); fore leg ratio 0.58, 0.66 (2); venarum ratio, range 0.88–0.92; mean 0.90 (3).

Material examined: In USNM: 1 male, Mono Lake, June 7, 1948, W; 1 male, 1 female, Deer Creek Hot Springs, Tulare Co., Aug. 6, 1947, W; 2 males, 2 females, Wheeler's Springs, Ventura Co., June 16, 1948, W; 1 male, Grangeville, Kings Co., July 31, 1947, W; 1 male, Sanger, Fresno Co., Oct. 14, 1947; 1 male, Reedley, Fresno Co., Oct., 1947; 1 female, Visalia, June 30, 1947, W; 1 female, Shafter, Kern Co.,



June, 1946, B. Brookman. In UCD: 1 male, Bear-Cache Creek Junction, Yolo Co., Apr. 19, 1957, S.

The genus *Thienemannimyia* Fittkau, 1957, was established for Edwards' Group C, in part. Fittkau's generic diagnosis (freely translated) includes a "leg with a brown ring at the end of the femur and on the base of the tibia; the last 2 or 3 tarsal segments brownish. . . . Hypopygium of a very uniform structure" (Fittkau, 1957, figs. 3, 4).

Of the described North American species only *P. barberi* (Coquillett), *P. marmorata* Johannsen, *P. apicalis* (Walley), *P. ornata* (Meigen) Johannsen, and *P. pulchripennis* (Lundbeck) definitely belong to this restricted genus as indicated by characteristics described by Johannsen (1946).

Roback (1957) has described *Pentaneura norena*, a species obviously belonging to *Thienemannimyia*, as evidenced by the structure of the male genitalia and by the banded wings; however, the species lacks leg fasciae. *Thienemannimyia* must thus be emended to include both species with fasciate legs and those without fasciae. The remaining species treated by Johannsen (1946) as members of Group C—that is, those with unbanded legs—possibly may include also species that properly should be placed in *Thienemannimyia*; however, in the absence of hypopygial illustrations in the literature, none of these can be verified at this time. These species of uncertain position include *P. bifasciata* (Coquillett), *P. fragilis* (Walley), *P. futilis* (Wulp), *P. carnea* (Fabricius) Johannsen, and *P. sinuosa* (Coquillett). Because of lack of precise knowledge of many North American types of this group, I am not using *Thienemannimyia* at this time but am using a much more inclusive *Pentaneura* (*Pentaneura*) (=Groups B-F, sensu Edwards.)

*Pentaneura* (*Pentaneura*) *comosa*, new species

FIGURE 2a

Holotype male: USNM 65506, Alum Rock Park, Santa Clara Co., July 8, 1948, W.

Head pale yellowish-white; posteriorly infusate. Antennal pedicel and flagellum dark brown. Eyes with long narrow dorsal extensions. Palpi long, pale brown, ratio 35:43:45:70. Antennal ratio 1.52.

Thorax brown overlaid with strong white pruinescence; vittae dark brown, overlaid with conspicuous greenish pruinescence. Pronotum infusate yellowish-white with broad notch completely interrupted on midline; with 4 fine lateral bristles. Scutellum infusate yellow. Postnotum dark brown. Sternopleuron dark brown marked with infusate yellow on pleura. Halteres yellow. Supra-alar bristles 2, 1 long, 1 short; prealar bristles 11; dorsomedial bristles staggered in



single row, anteriorly with tuft of fine appressed bristles; dorsolateral bristles in 2 staggered rows, converging almost to midline just anterior to scutellum where the 2 rows are much broadened and staggered; anterolateral bristles 5, much finer and paler than dorsolateral bristles; scutellum with single posterior row of 12 long black bristles, anteriorly 16 scattered near midline.

Femora with apical faint brown band, remainder infusate stramineous. Fore tarsi with long beard 8 times as long as diameter of tarsus; middle leg and hind leg densely pilose. Fore tibia with single lyrate spur (similar to that illustrated for *P. lyra*, new species), composed of 6 spines; main spur spine only slightly heavier than lateral bristles; middle tibial spurs lyrate, each with 6 spines, main spur spine heavier than remainder of side bristles; spurs of approximately equal length. Hind tibial spurs very similar to those of middle leg, lyrate form not quite so pronounced; comb of 6 spines.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg</i> <i>Ratio</i>
Fore	57	65	56	29	22	15	7	0.86
Middle	65	78	57	27	21	18	12	0.73
Hind	57	96	55	33	23	14	8	0.57

Wings densely hairy;  $R_{4+5}$  terminates distal to  $Cu_1$ ; M terminates behind apex of wing; ratio of arculus to m-cu:m-cu to wing tip 0.41; cross veins not darkened. Length of first basal cell beyond end of second basal cell greater than length of m-cu cross vein. Wing length 2.85 mm.; venarum ratio 0.84.

Abdominal segments I to V with basal brown fascia, middorsal portion elongated posteriorly forming roughly shaped T; remainder of segment pruinose white; brown fascia progressively enlarged posteriorly with corresponding decrease in amount of white shown; segment VI to tip of abdomen almost entirely dark brown.

Female: Unknown.

Paratypes: In UCLA: 4 males, Resting Springs, Inyo Co., May 29, 30, 1955. In UCD: 1 male, Benton Station, Mono Co., July 20, 1950, H. A. Hunt.

Males: Wing length, range 2.15–2.74; mean 2.30 mm. (4); fore leg ratio, range 0.78–0.85; mean 0.81 (3); antennal ratio, range 1.25–1.54; mean 1.37 (4); venarum ratio, range 0.82–0.86; mean 0.84 (5); ratio of arculus to m-cu:m-cu to wing tip, range 0.37–0.43; mean 0.40 (4); prealar bristles 9 (1); anterolateral bristles 9 (1). Middle tibia with 2 equal, lyrate spurs, 4 side spines almost as long as main spur. Hind tibia with 2 subequal (24:21) lyrate spurs, each with 4 side spines about two-thirds as long as main spine; comb of 4 bristles.

This species is differentiated from related species in the key (p. 102).



*Pentaneura (Pentaneura) thryptica*, new species

FIGURE 2b

Holotype male: USNM 65507, 5 miles west of Gilroy, Santa Clara Co., Sept. 18, 1955 G.

Clypeus longer than wide, with 14 fine bristles. Dorsal extension of eyes much longer than wide. Palpi 4-segmented; ratio 38:47:58:108. Postocular bristles in single row median to eyes, becoming two rows behind eyes, one row lateral to eyes. Antennal ratio 1.80.

Head and thorax medium brown, scutellum yellowish-brown, stained with black on posterior surface; scutellar bristles about 22, 12 in posterior straight transverse row, and 10 anterior strewn ones. Prealar bristles 9; dorsomedial bristles staggered in 2 rows; dorsolateral bristles in single staggered row; scutellum with 11 large bristles in single posterior row; anterolateral bristles about 7.

Fore tarsal beard 4 times diameter of tarsus; legs stramineous. Fore tibia with single lyrate spur of 8 bristles (similar to that illustrated for *P. lyra*, new species), outer bristle on each side somewhat heavier. Middle tibia with one lyrate spur composed of 7 bristles and 1 ordinary somewhat sinuate spur with 6 side teeth. Length of lyrate to normal spur 20:38. Hind tibia with 2 spurs, shorter one sinuate with 5 side teeth almost as long as tip of spur; longer spur very slender with side teeth obscured; ratio of length of spurs 26:55; comb of 5 bristles.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg</i> <i>Ratio</i>
Fore	43	56	41	24	16	10	5	0.73
Middle	52	55	35	20	14	8	5	0.63
Hind	45	65	42	22	16	10	6	0.65

Wings well haired; ratio of arculus to m-cu:m-cu to wing tip 0.43. *R*<sub>1</sub> terminates above *Cu*<sub>2</sub>; *R*<sub>4+5</sub> ends distal to termination of *Cu*<sub>1</sub> and proximal to termination of *M*. Wing length 2.18 mm.; venarum ratio 0.89.

Abdominal segments blotched with black speckled brown; irregular whitish patch on each side of tergite.

Allotype: In USNM: Colored as male except abdomen, almost entirely brown. Dorsal extension of eye almost as wide as long. Clypeal bristles 21.

Prothorax with 3 fine lateral bristles. Prealar bristles 15; antero-lateral bristles about 18, both large and small bristles.

This species is distinguished from related North American species in the key (p. 102).



*Pentaneura (Pentaneura) lyra*, new species

FIGURES 2c,d

Holotype male: USNM 65508, Wheeler's Springs, Ventura Co., June 16, 1948, light trap, W.

Head infusate yellow; antennal pedicels dark reddish-brown; flagellum infusate. Palpi infusate; ratio 38:45:55:95. Clypeus slightly longer than broad, with 13 bristles. Postocular bristles reaching point medial to long narrow dorsal extensions of eyes; in single row.

Thorax reddish-brown; pleura, spaces between vittae, humeri and scutellum pale yellowish-white. Prothorax infusate yellow; completely divided by rather narrow notch; 2 lateral fine bristles. Postnotum reddish-brown. Halteres white. Prealar bristles 13; dorso-medial bristles in staggered single row; dorsolateral bristles in double staggered row, posterior rows dilated medially, almost reaching midline; scutellum with 12 long, pale bristles in posterior single row; anteriorly several fine pale strewn bristles near midline; anterolateral bristles 9.

Fore legs without beard; middle and hind legs heavily pilose. Single spur of fore tibia somewhat lyrate with 8 side teeth being almost as large as main spur continuation; both spurs of middle and hind tibiae lyrate, very similar to that of fore leg, about equal length, each with 7 to 9 side teeth; comb of hind tibia of 5 bristles.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	45	50	37	20	14	19	6	0.74
Middle	47	47	31	15	10	6	5	0.66
Hind	46	63	40	21	16	10	6	0.63

Ratio of arculus to m-cu:m-cu to wing tip 0.44.  $R_{4+5}$  terminates distal to  $Cu_1$ ; M terminates slightly below apex of wing; membrane rather heavily haired; cross veins not darkened; length of first basal cell beyond distal end of second basal cell greater than length of m-cu. Wing length 2.00 mm.; venarum ratio 0.91.

Abdominal segments I to V whitish with basal one-third to one-half covered by blotchy black fascia; segment VI and beyond largely blackish-brown.

Genitalia with pale bristles on ninth tergite.

Female: Unknown.

Paratypes: In USNM: 1 male, Springville, July 10, 1947, W. In UCLA: 1 male, China Ranch, Inyo Co., May 29, 1955; 4 males, Resting Springs, Inyo Co., May 29, 30, 1955. In UCD: 1 male, 4 miles west of Quincy, Plumas Co., July 16, 1949, W. E. Ehrhardt.

Males: Wing length, range 1.74–2.04; mean 1.87 mm. (6); fore leg ratio 0.66–0.71 (2); antennal ratio, range 1.40–1.54; mean 1.45 (3);



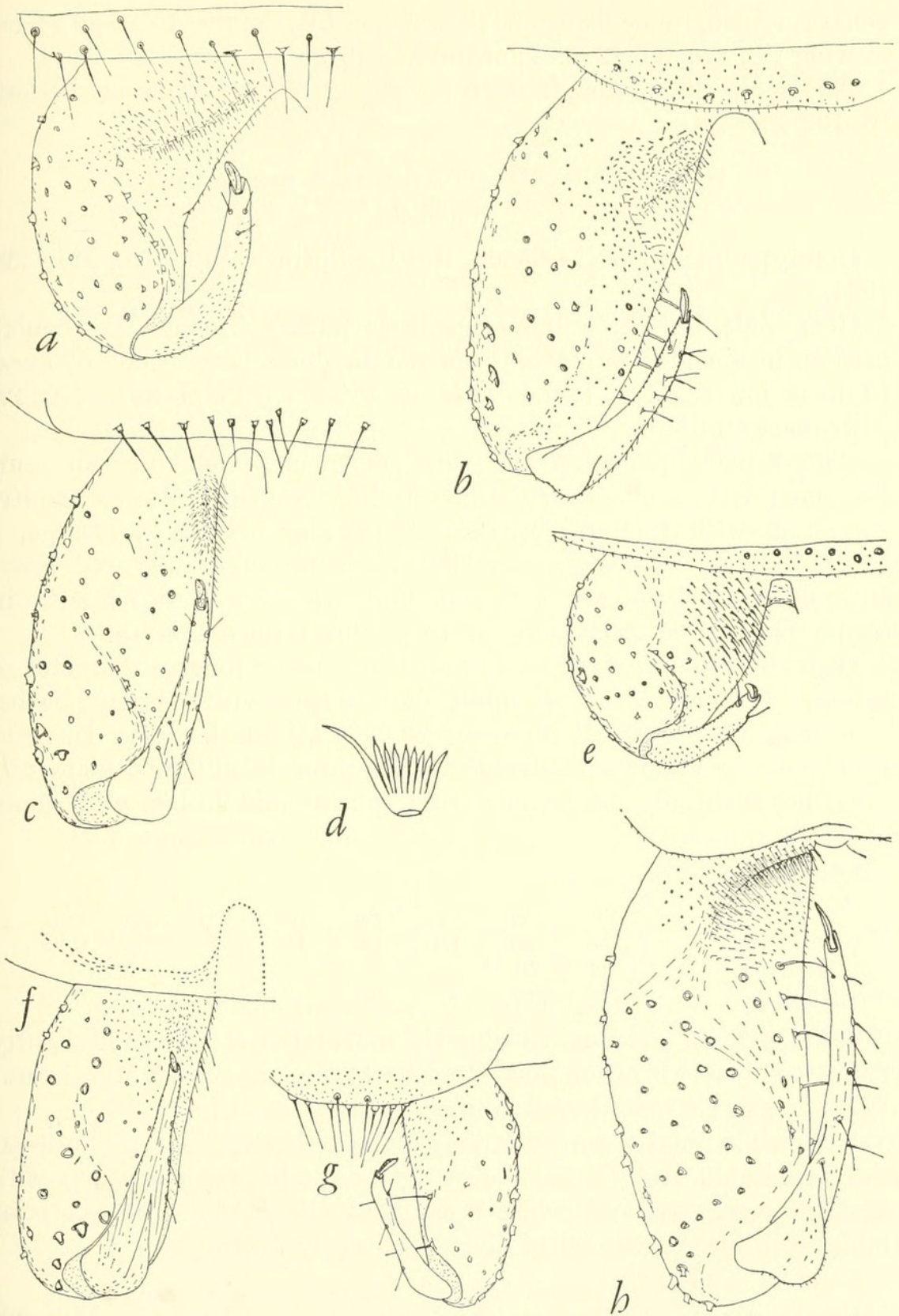


FIGURE 2.—*Pentaneura* (P.) *comosa*: a, male genitalia. *Pentaneura* (P.) *thryptica*: b, male genitalia. *Pentaneura* (P.) *lyra*: c, male genitalia; d, tibial spur of middle leg. *Pentaneura* (P.) *inyoensis*: e, male genitalia. *Pentaneura* (P.) *sequoiaensis*: f, male genitalia. *Pentaneura* (P.) *pilosella* (Loew): g, male genitalia. *Pentaneura* (P.) *smithae*: h, male genitalia.



venarum ratio, range 0.86–0.93; mean 0.88 (6); arcus to m-cu:m-cu to wing tip, range 0.42–0.45; mean 0.43 (6).

This species is distinguished from closely related forms in the key (p. 102).

*Pentaneura (Pentaneura) inyoensis*, new species

FIGURE 2e

Holotype male: USNM 65509, Resting Springs, Inyo Co., May 29, 1955.

Head pale brown; antennal pedicels darker brown. Postocular bristles in single row reaching medial to dorsal extensions of eyes. Clypeus longer than broad with 17 bristles. Palpi 35:50:70:62. Antennal ratio 1.70.

Thorax pale brown overlaid with conspicuous golden green pruinescence; vittae and postnotum darker brown. Halteres white. Pronotum with 4 lateral bristles. Supra-alar bristles 2, 1 large, 1 small; prealar bristles 8; dorsolateral bristles in 2 staggered rows; anterolateral bristles about 6; scutellum with 8 posterior bristles in transverse row, anteriorly about 10 smaller strewn bristles.

Legs stramineous; fore tarsal beard 3 times as long as diameter of tarsus. Fore leg with very short sinuate spur with 2 lateral barbs; spur length:tibial apical diameter 20:38. Middle leg with two unusual spurs of about equal length, each composed of 3 long filaments. Hind leg with only one visible trifid spur as middle leg; with comb of only 4 spines.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	35	40	39	18	15	9	5	0.98
Middle	42	51						
Hind	35	57	45	20				0.79

Arcus to m-cu:m-cu to wing tip 0.37.  $R_{4+5}$  terminates slightly distal to  $Cu_1$ ; M terminates almost at wing apex, slightly below. Wing length 1.89 mm.; venarum ratio 0.86.

First abdominal segment largely pale with slight lateral infuscation; segments II to V pale brown (to dark brown, paratype) with posterolateral pruinose white areas that almost meet on posterior middorsal line; remainder of abdomen largely brown.

Female: Unknown.

Paratypes: In UCLA: 2 males, Resting Springs, Inyo Co., May 30, 1955; 3 males, China Ranch, Inyo Co., May 30, 1955; 1 male, 1000 Palm Canyon, Riverside Co., March 20, 1954, B; 1 male, Saratoga Springs, May 28, 1955.

Males: Wing length, range 1.77–2.29; mean 1.95 mm. (6); fore leg ratio 0.89 (1); antennal ratio, range 1.60–1.76; mean 1.70 (3); venarum



ratio, range 0.86–0.93; mean 0.91 (3); arculus to m-cu:m-cu to wing tip, range 0.37–0.41; mean 0.39 (4); hind leg ratio 0.68 (1).

This species is distinguished from related forms in the key (p. 102).

*Pentaneura (Pentaneura) sequoiaensis*, new species

FIGURE 2f

Holotype male: USNM 65510, Stony Creek, Sequoia National Park, July 13, 1947, W.

Postocular bristles 15, in single row which begins at point medial to long dorsal extension of eyes. Eye extension with posteromedial border angulate; the anteromedial border rounded. About 12 clypeal bristles. Antennal ratio 2.00.

Thoracic vittae, postnotum, and sternopleuron pale brown; remainder of thorax whitish pollinose. Prothorax with 5 fine lateral bristles. Halteres white. One supra-alar bristle; prealar bristles 10; dorsolateral bristles in single staggered row; scutellum with 3 transverse rows of bristles, 12 in posterior row, 8 in median row, 3 in anterior row.

Fore tibial spur lyrate, closely resembling that of *P. lyra*, new species; lateral bristles spatulate, almost as long as spine of spur, giving appearance of comb. Middle leg with spurs short, subequal, each with apparently 3 lateral somewhat spatulate bristles. Hind leg with comb of 5 spines; spurs short, each with apparently 2 lateral bristles almost as long as spur.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	44	57	43	22	16	10	6	0.75
Middle	46	49	39	15	10	7	5	0.80
Hind	45	67	50	19	17	10	5	0.75

Ratio of arculus to m-cu:m-cu to wing tip 0.42.  $R_{4+5}$  terminates distal to  $Cu_1$ ; M terminates below wing tip. Wing membrane densely haired; cross veins colorless; length of first basal cell beyond distal end of second basal cell greater than length of m-cu.

Abdomen whitish; segments II to VI with basal one-third covered with pale brown fascia. The elongate dististyle and the absence of bristles on the posterior margin of the ninth tergite serve to distinguish this species. The key which follows serves to separate this species from closely related Nearctic forms.

Female: Unknown.

Paratype: Collected with holotype.

Wing length 2.22 mm.; fore leg ratio 0.76; antennal ratio 2.00; venarum ratio 0.89; prealar bristles 9; ratio of arculus to m-cu:m-cu to wing tip 0.42.



*Pentaneura (Pentaneura) pilosella* (Loew)

## FIGURE 2g

*Tanyus pilosellus* Loew, Berlin Ent. Zeitschr., vol. 10, p. 5, 1866.

The description that follows is given to supplement the original description and the one given by Johannsen (1946). It is based on a male specimen in UCLA: Lee's Lake, Chatsworth, Los Angeles Co., July 25, 1950, B.

Head yellowish-white except antennal pedicels reddish-brown and palpi and antennal flagella infusate. Postocular bristles in single row; reaching point medial to dorsal extension of eyes. Eye extension angulate posteriorly, rounded anteriorly. About 15 clypeal bristles. Antennal ratio 1.30.

Thorax yellowish-white except for vittae, postnotum, and sternopleuron which are reddish-brown. Mesothoracic vittae with greenish pruinosity. Halteres yellowish-white. Supra-alar bristles 2, prealar bristles 8; dorsomedial bristles in 2 rows, diverging posteriorly; dorsolateral bristles in 2 staggered rows, composed of large and small bristles, rows diverge posteriorly to join dorsomedial bristles; scutellum with 8 large bristles in transverse posterior row, anteriorly with many fine strewn bristles; anterolateral bristles about 8.

Legs infusate stramineous; beard 3.6 times fore tarsal diameter.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	25	30	19	12	8	5	4	0.63
Middle	32	27	33	15	4	5	5	1.22
Hind	29	38	30	14	11	6	4	0.79

Wing with ratio of arculus to m-cu:m-cu to wing tip 0.37. *R*<sub>1</sub> terminates proximal to *Cu*<sub>1</sub>; wing densely haired. Wing length 1.55 mm.; venarum ratio 0.75.

Abdomen with segments I, II, and IV yellowish-white with narrow basal brown band; segments III, V, and VI largely brown, with narrow apical white fascia; segments VII and VIII mounted with genitalia.

Males: Wing length, range 1.04–1.52; mean 1.26 mm. (7); fore leg ratio, range 0.56–0.72; mean 0.66 (5); antennal ratio, range 0.64–1.26; mean 0.91 (7); middle leg ratio, range 1.10–1.28; mean 1.18 (5); hind leg ratio, range 0.82–1.09; mean 0.89 (4).

Material studied: In USNM: 4 males, Orosi, Tulare Co., June 5, 1947, W. In UCLA: 9 males, Lee's Lake, Chatsworth, Los Angeles Co., July 25, 1950, B; 7 males, same locality, Aug. 10, 1950.

*Pentaneura (Pentaneura) smithae*, new species

## FIGURE 2h

Holotype male: USNM 65511, Saratoga Springs, March 20, 1955, B.

Head yellowish, occiput and mouthparts infusate; antennal pedicel, thoracic vittae, postnotum, and sternopleuron reddish-brown. Post-



ocular bristles in single row continuing medially to vertex between dorsal extensions of eyes. Palpi ratio 13:28:35:20. Antennal ratio 1.59.

Prothorax with 1 large, 2 small lateral bristles. Pronotum, humeri, small pleural area and scutellum yellowish. Halteres white. Prealar bristles 12; dorsolateral bristles mostly in double row, posteriorly expanded, becoming multiserial; 12 scutellar bristles in posterior transverse row, about 16 anterior strewn ones; anterolateral bristles about 12.

Fore legs with longest hairs 3.5 times diameter of tarsus, mostly with short hairs.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	45	53	38	22	15	10	6	0.71
Middle	55	46						
Hind	45	62	41	25	16	10	5	0.68

Wings with ratio of arculus to m-cu:m-cu to wing tip 0.38. Wing length 2.22 mm.; venarum ratio 0.83.

Abdomen with basal segment largely brown with only dorsal disc pale white; segments II to IV with basal half brown, apical half white; segment V with only narrow faint apical band; remainder of segments largely brown.

Allotype: In USNM: Whitmore Tub, Mono Co., Aug. 3, 1952, McDonald. Wing length 2.37 mm.; fore leg ratio 0.65; venarum ratio 0.82; ratio of arculus to m-cu:m-cu to wing tip 0.34.

Paratypes: In USNM: 3 males, Shafter, Kern Co., June, 1946, B. Brookman; 1 male, Independence, Inyo Co., Aug. 22, 1952, B. In KU: 1 male, Mono Lake, July 31, 1940, D. E. Hardy. In INHS: 1 male, Palo Alto, May 1, 1906. In UCLA: 4 males, Saratoga Springs, March 20, 1955, B; 3 males, Saratoga Springs, May 20, 1955; 1 male, Santa Monica Creek, Los Angeles Co., July 22, 1952; 7 males, collected with allotype. In UCD: 3 males, Benton Station, Mono Co., July 20, 1950, H. A. Hunt.

Males: Wing length, range 1.74–2.70; mean 2.33 mm. (17); fore leg ratio, range 0.66–0.73; mean 0.70 (12); antennal ratio, range 1.36–2.00; mean 1.66 (13); venarum ratio, range 0.77–0.93; mean 0.83 (17); arculus to m-cu:m-cu to wing tip, range 0.36–0.46; mean 0.39 (12); middle leg ratio 0.71, 0.75 (2).

This species is distinguished from the remainder of the North American species of this group in the key below.

I take pleasure in naming this species for my wife Mary Smith Sublette, an able zoologist whose patience, understanding, and assistance made this work possible.



Key to Species of *Pentaneura* (*Pentaneura*) Group E of Edwards

Based on key given by Johannsen (1946)

1. Small species; body length 1 mm.; wing length 1 mm.; body brownish with pale halteres and legs . . . . . **P. fimbriata** (Walker)  
Larger species; wing length 1.40 mm. or greater . . . . . 2
2. Thorax light brown with greenish pruinescence; abdomen yellow with brown fasciae; basistyle yellow; halteres yellow with black knob; tibiae yellow with narrow dark apices. Length 2.5 to 3 mm. . . . **P. brooksi** (Gerry)  
Thorax without greenish pruinescence, or otherwise differing . . . . . 3
3. Basitarsus of middle legs longer (1.1) than corresponding tibia; thorax yellow, vittae brown; abdomen yellow with brown basal fasciae.  
**P. pilosella** (Loew)  
Mesothoracic leg ratio less than 1.0 . . . . . 4
4. Antennal ratio about 0.5; fore leg ratio about 0.75; yellow species with buff-colored thoracic vittae. . . . . **P. flaveola** (Williston) Johannsen  
Antennal ratio 1.0 or greater. . . . . 5
5. Cross veins darkened; arculus to m-cu:m-cu to wing tip about 0.5;  $R_{4+5}$  terminates noticeably distal to  $Cu_1$ ; thorax pale with buff yellow vittae; abdomen yellow with brownish fasciae . . . . **P. planensis** Johannsen  
Cross veins not darker than adjacent veins; arculus to m-cu:m-cu to wing tip 0.45 or less . . . . . 6
6. Cross vein m-cu lies proximad of base of Rs by distance less than length of m-cu; thorax reddish-yellow with dark brown vittae; abdomen fasciate; antennal ratio 1.33; middle leg ratio 0.88; arculus to m-cu:m-cu to wing tip 0.43; wing length 1.7 mm. . . . . **P. indecisa** (Williston)  
Distance between m-cu and Rs greater than length of m-cu . . . . . 7
7. Fore tarsi with long beard (hairs 5 to 8 times diameter of tarsus); thoracic markings dark brown; fore leg ratio 0.78–0.86; middle leg ratio 0.55–0.60; antennal ratio 1.52 . . . . . **P. comosa**, new species  
Fore tarsi with short beard (about 4 times) or bare . . . . . 8
8. Basistyle of male genitalia subovate (fig. 2e) . . **P. inyoensis**, new species  
Basistyle of male genitalia subcylindrical, elongate . . . . . 9
9. Ninth tergite with conspicuous row of posteriorly directed bristles . . . 10  
Ninth tergite with only fine hairs . . . . . 11
10. Fore tarsi with short beard 4.4 times tarsal diameter; thorax marked with brown; each abdominal segment blotched with black speckled brown; irregular white patch on each side . . . . . **P. thryptica**, new species  
Fore tarsi with hairs only slightly longer than tarsal diameter; thorax marked with reddish-brown; basal one-third to one-half of each abdominal segment with blotchy black fascia, remainder of segment pale.  
**P. lyra**, new species
11. Thoracic markings reddish-brown; dorsolateral bristles mostly in 2 rows; some multiserial just anterior to scutellum; middle leg ratio 0.71–0.75; hind leg ratio 0.66; basistyle of male genitalia with prominent basal diagonal fold . . . . . **P. smithae**, new species  
Thoracic markings pale brown; dorsolateral bristles in single staggered row; middle leg ratio 0.80; hind leg ratio 0.75; basitarsus without prominent fold, only slightly wrinkled . . . . . **P. sequoiaensis**, new species

The groups of *Pentaneura* used by Edwards (1929) and followed by Johannsen (1946) appear to be at least subgenerically distinct. Freeman (1955) has split off Group A as *Pentaneura* subgenus



*Ablabesmyia* Johannsen, 1905, while retaining Edwards' Groups B to F as *Pentaneura* sensu stricto. Fittkau (1957) has named two new genera, *Thienemannimyia* and *Conchapelopia*, which include parts of Groups C and D of Edwards. There are other species groups within Edwards' Groups C and D that were not named. Group F appears to be the equivalent of *Nilotanytus* Kieffer, 1923. Group E contains the type-species, *Pentaneura grisea* Phillipi, sensu Edwards, and is thus *Pentaneura* in the strict sense. The remaining Group B is unnamed. Since the status of several types of North American *Pentaneura* are described inadequately as yet, I am refraining at this time from establishing or using subgeneric units for Edwards' Groups B to F.

*Anatopynia (Anatopynia) submarginella*, new species

FIGURE 3a

Holotype male: USNM 65512, Modoc Co., Fandango Pass, May 15, 1948, W.

Postocular bristles in double and triple rows reaching from below eyes up to point medial to dorsal extension of eyes. Clypeus wider than long, with about 16 bristles. Palpi ratio 15:25:20:30. Antennal ratio 1.64.

Head, thorax, and abdomen dark brown overlaid with greenish-white pollen; pronotum, pleural areas, and posterolateral area on each abdominal segment lighter brown; pollen on abdomen concentrated on posterior half of each segment, giving, in certain light, vittate appearance; incisures of abdomen somewhat lighter; pollen absent between vittae on thorax. Prothorax with 13 fine lateral bristles, covered all over with fine microtrichae. Sternopleuron with 3 fine lateral bristles above and 2 below anepisternal suture. Halteres yellowish, stalk basally infusate. Prealar bristles 26; dorsolateral bristles multiserial; scutellum with 26 large staggered bristles in posterior transverse row; anteriorly about 14 fine strewn bristles; antero-lateral bristles about 18.

Fore legs with few long hairs 3 times diameter of tarsus; legs paler brown than body. Fore tibia with almost straight spur with 9 side teeth; spur 0.8 as long as apical tibial diameter. Middle tibial spurs straight with 10 side teeth; spurs of equal length. Spurs of hind leg straight with 8 teeth on longer, 10 on shorter. Spur ratio 55:45. Comb of 9 bristles.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	75	85	53	28	20	11	6	0.62
Middle	77	84	41	22	17	10	7	0.49
Hind	70	100	63	33	24	15	10	0.63



Wings well haired only on distal half; anterior wing veins including m-cu cross vein brown; posterior veins pale; membrane not darkened. Wing length 3.37 mm.; venarum ratio 0.88.

The rather short, straight, parallel-sided dististyle of the genitalia is distinctive, separating this species from *A. marginella* (Malloch), in which the dististyle is longer and evenly tapered to the tip (Malloch, 1915, pl. 27, fig. 10).

Allotype: In USNM: Alturas, Modoc Co., July 14, 1948, W.

Colored as male except abdomen more solidly blackish-brown; antennal pedicel and first segment pale brown. Prealar bristles 28; anterolateral bristles about 30; dorsolateral bristles multiserial; dorso-medial bristles in two rows, dividing anterior to prescutellar area, extending laterally to join dorsolateral bristles.

Anterior wing veins dark brown; posterior paler; heavy hairs over entire wing; with oblique lighting macrotrichia produces irregular dark fascia on posterior basal half of wing and second fascia extending along distal part of M, Cu<sub>1</sub>, and Cu<sub>2</sub>; scutellum somewhat translucent and slightly paler brown.

Comb of hind tibia with 7 bristles; spurs subequal.

Paratypes: In CBPH: 1 female, 5.3 miles south of Manteca, San Joaquin Co., May 6, 1957. In UCLA: 1 male, Bradley, Aug. 28, 1949, B.

Male: Wing length 2.66 mm.; fore leg ratio 0.66; antennal ratio 1.78; venarum ratio 0.92; middle leg ratio 0.54; fore tarsal beard 4 times tarsal diameter.

Female: Wing length, 3.18 mm.; fore leg ratio 0.59; venarum ratio 0.82; middle leg ratio 0.49, hind leg ratio 0.58.

This species is differentiated from North American species in the key (p. 109).

***Anatopynia (Macropelopia) aclines*, new species**

FIGURE 3b

Holotype male: USNM 65513, Alturas, Modoc Co., July 14, 1948, W.

Dorsal surface of head yellowish-brown; mouthparts black. Antennal pedicel and flagellum black; postocular bristles in double row below eye, becoming single row for short distance behind eye, then 3 rows at base of dorsal extension of eye; rows extend almost to midline of vertex. About 30 clypeal bristles. Palpi ratio 15:32:38:57. Antennal ratio 2.25.

Thorax and basal four-fifths of abdominal segments marked with blackish-brown. Ground color of thorax and apices of abdominal segments yellowish-white, somewhat infuscate on thorax except for spot of clear yellow on humeri and pleura. Pronotum completely



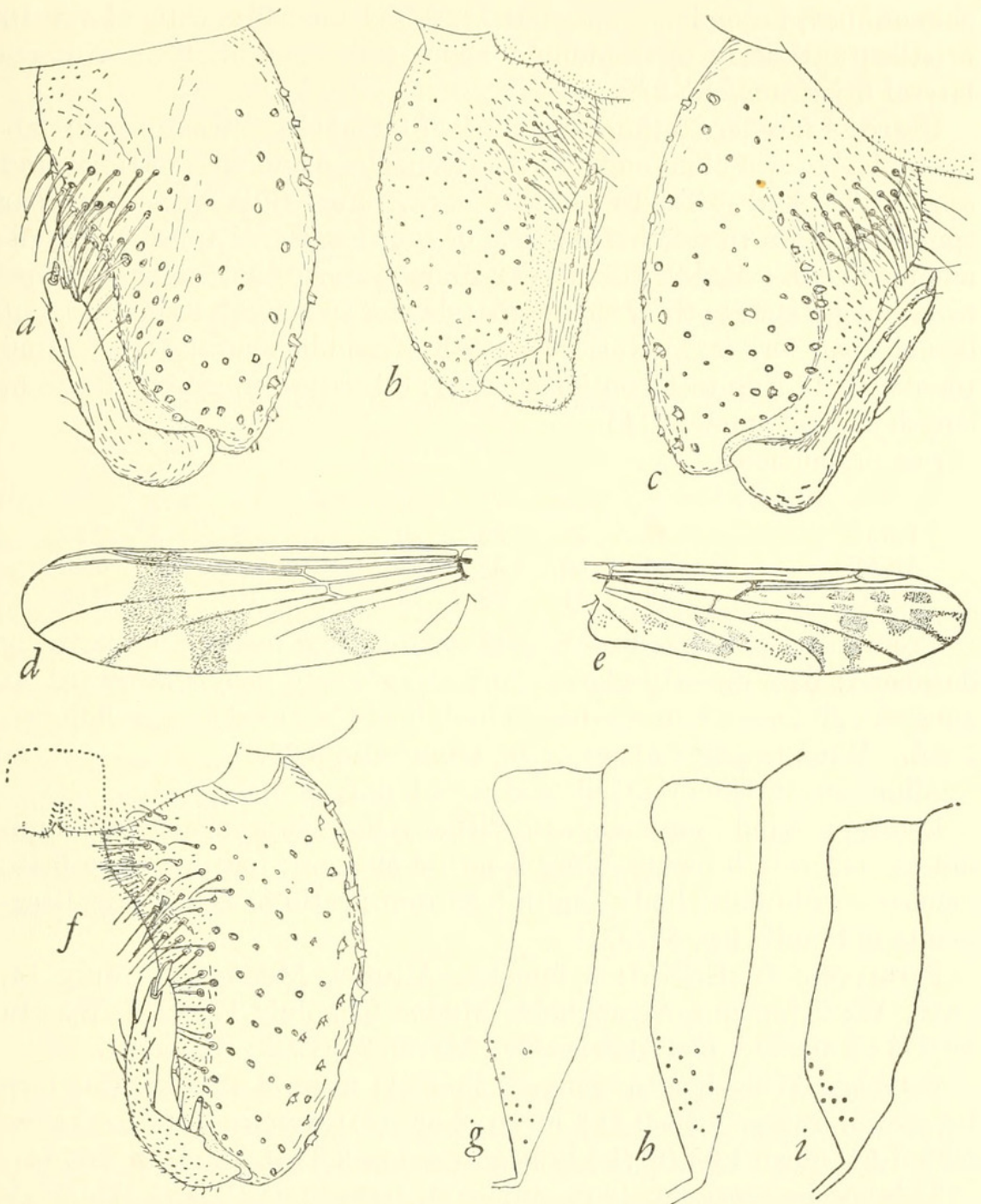


FIGURE 3.—*Anatopynia (A.) submarginella*: a, male genitalia. *Anatopynia (Macropelopia) aclines*: b, male genitalia. *Anatopynia (Psectrotanypus) eumorpha*: c, male genitalia: d, wing. *Tanypus carinatus*: e, wing; f, male genitalia; lateral view of pronotum: g, holotype, male; h, paratype from Michigan; i, paratype from Louisiana.

interrupted in middle, with 38 fine lateral bristles. Sternopleuron with 7 bristles above and 9 below anepisternal suture. Halteres yellowish-white. Prealar bristles 39; dorsomedial bristles in 2 rows becoming multiserial at anterior edge of prescutellar area where rows extend laterally to join dorsolateral bristle rows. Dorsolateral bristles in 3 staggered rows, becoming multiserial on prescutellar area. Scutellum with posterior row of about 38 bristles, 14 staggered on each



side of apex, becoming somewhat scattered medially with about 10 bristles; anteriorly on scutellum about 20 strewn bristles. Antero-lateral bristles about 27.

Beard of fore legs 6 times diameter of tarsus; legs stramineous; narrow apical brown band on femora, extreme base and apex of tibiae and apex of  $Ta_1$  and  $_2$ ;  $Ta_3$  to  $_5$  largely dark. Fore tibia with triangular spur that bears 16 side barbs; ratio of spur length to apical tibial diameter 43:40. Middle tibia with 2 spurs more linear than that of fore tibia; longer spur with 17 side barbs; shorter spur more triangular, but less so than fore leg. Ratio of length of middle spurs 34:45. Hind tibia with 15 side teeth on longer spur; 3 bristles in comb. Ratio of length of hind spurs 32:45.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta<sub>1</sub></i>	<i>Ta<sub>2</sub></i>	<i>Ta<sub>3</sub></i>	<i>Ta<sub>4</sub></i>	<i>Ta<sub>5</sub></i>	<i>Leg Ratio</i>
Fore	42	56	30	20	15	9	5	0.53
Middle	45	55	25	14	9	6	4	0.45
Hind	42	64	38	22	17	10	6	0.50

Cross veins of wings brown with surrounding membrane narrowly darkened;  $R_{2+3}$  directly above  $Cu_1$ ;  $Cu_2$  sharply bent downward at wing margin; anal vein reaches to middle of  $Cu_2$ ; anal lobe well developed. Wing length 4.51 mm.; venarum ratio 0.89.

Allotype: In USNM: Collected with holotype male.

Lighter colored than male with vittae yellowish-orange and abdominal fasciae pale brown. Wing length 4.59 mm.; fore leg ratio 0.46; venarum ratio 0.93; body length 3.89 mm.; ratio of last 3 tarsal segments of middle leg, 54:37:32.

Paratypes: In USNM: 3 females, Alturas, Modoc Co., July 14, 1948, W; 2 females, Stronghold, Modoc Co., July 17, 1948, W. In UCLA: 1 female, Los Angeles Co., March 22, 1933, W. Grisel.

Females: Wing length, range 3.33–4.81; mean 4.42 mm. (5); fore leg ratio, range 0.46–0.71; mean 0.56 (5); venarum ratio, range 0.90–1.54; mean 1.03 (5); body length, range 3.33–4.20; mean 3.63 (4).

This species most closely resembles *A. hirtipennis* (Loew), fide Malloch (1915), which is distinguished, however, by its short-haired fore legs and the curved dististyle of the male genitalia.

***Anatopynia (Psectrotanypus) dyari* (Coquillett)**

*Tanypus dyari* Coquillett, Ent. News, vol. 13, p. 85, 1902.

Males: Wing length, range 3.78–4.37; mean 4.14 mm. (5); fore leg ratio 0.63–0.67; mean 0.65 (5); antennal ratio, range 1.96–2.30; mean 2.13 (5); venarum ratio, range 0.90–0.97; mean 0.92 (5); prealar bristles about 36 (1).

Females: Wing length, range 3.70–3.85; mean 3.79 mm. (3); fore leg ratio 0.56, 0.56 (2); venarum ratio 0.90, 0.98 (2).



Material studied: In USNM: 2 males, 1 female, Jewel Lake, Contra Costa Co., May 11, 1948, W; 1 male, Prairie Creek, Humboldt Co., Aug. 10, 1948, W; 1 male, Berkeley, Jewel Lake, March 4, 1948, I. LaRivers; 2 males, Oceano Beach, San Luis Obispo Co., Aug. 19, 20, 1948, W; 1 female, Mad River Beach, Humboldt Co., Aug. 14, 1948, W. In CBPH: 4 males, Arcata, Humboldt Co., May 9, 1960, R. P. Maynard; 3 males, 2 females, Willits, Medocino Co., Feb. 20, 1958, R. P. Maynard; 1 male, 3 miles south of Woodside, San Mateo Co., Oct. 15, 1959, G. In UCLA: 1 female, Arcata, Humboldt Co., Sept. 9, 1950, B.

*Anatopynia (Psectrotanypus) eumorpha*, new species

FIGURES 3c,d

Holotype male: USNM 65514, Berkeley, Strawberry Canyon, June 3, 1948, light trap, W.

Palpi blackish-brown; antennal ratio 1.66.

Head and thorax yellowish-white; vittae, postnotum, and sternopleuron pale brown. Halteres white. Prealar bristles brown; dorsomedial bristles long and pale, in 2 erect rows; dorsolateral bristles pale and erect.

Fore tarsus beard length 6 times tarsal diameter (tarsi lost before measurements could be made). Legs stramineous; fore and middle femora darkened apically, tibiae basally; last two tarsal segments somewhat darker; hind leg almost completely pale.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	75	95						
Middle	85	93	56	26	20	13	7	0.60
Hind	80	102	77	40	29	17	18	0.75

Wings with large quadrate dark spot centered under m-cu, extending from anal vein to posterior wing margin; distinctly separate second irregular fascia extends completely across wing from R<sub>1</sub> to Cu<sub>2</sub>; posterior extension in cell Cu<sub>1</sub> and anterior extension lies along Cu<sub>1</sub>. Wing length 3.33 mm.; venarum ratio 0.91.

Abdomen white with pale yellowish-brown longitudinal, middorsal streak broadens posteriorly; segment VI and remainder of abdomen largely pale yellowish-brown.

Allotype: In USNM: Collected with holotype male.

Brown color on thorax somewhat darker than male, abdomen yellowish-brown. The anterior margin of the basal wing spot almost touches the basal extension of the distal wing fascia.

Wing length 3.63 mm.; fore leg ratio 0.69; venarum ratio 0.86.

Paratypes: In USNM: 1 male, 1 female, Berkeley, Strawberry Canyon, June 5, 13, 1948, W; 1 female, Point Reyes, Sonoma Co., March



16, 1948; 1 female, Strawberry Canyon, Alameda Co., May 24, 1948, W.

Males: Wing length 3.11 mm.; venarum ratio 0.90. Abdomen entirely white; beard length 6 times tarsal diameter.

Females: Wing length, range 3.55–3.70; mean 3.63 mm. (3); fore leg ratio, range 0.67–0.74; mean 0.70 (3); venarum ratio, range 0.84–0.91; mean 0.88 (3).

This species is distinguished from related North American species in the key (p. 109).

*Anatopynia (Psectrotanypus) venusta* (Coquillett)

*Tanypus venustus* Coquillett, Proc. U.S. Nat. Mus., vol. 25, p. 91, 1902.

Males: Wing length, range 3.33–4.67; mean 3.84 mm. (16); fore leg ratio, range 0.56–0.65; mean 0.60 (14); antennal ratio, range 1.57–1.93; mean 1.70 (14); venarum ratio, range 0.86–0.97; mean 0.91 (16); hind leg ratio, range 0.63–0.66; mean 0.64 (3).

Females: Wing length, range 3.51–4.63; mean 4.10 mm. (17); fore leg ratio, range 0.57–0.63; mean 0.59 (16); venarum ratio, range 0.92–0.98; mean 0.95 (16); hind leg ratio 0.64, 0.67 (2).

Material studied: In USNM: 2 males, 1 female, Deer Creek, Hot Springs, Tulare Co., Aug. 6, 1947, W; 1 male, Wheeler's Springs, Ventura Co., June 16, 1948, light trap, W; 1 male, Visalia, June 30, 1947, W; 1 male, Kern River Canyon, Kern Co., July 26, 1947, B. Brookman; 1 male, Alum Rock Park, Santa Clara Co., July 8, 1948, W; 1 male, Hume Lake, Aug. 20, 1947, W; 1 male, San Luis Obispo, Aug. 21, 1948, W; 1 male, 1 female, San Luis Obispo, Aug. 19, 1948, W; 1 female, Elderwood, July 18, 1947, bridge, W; 1 female, Buellton, Santa Barbara Co., June 23, 1948, W; 1 female, Santa Cruz, Santa Cruz Co., July 8, 1948, W. In CBPH: 1 male, Parks Air Force Base, Alameda Co., Oct. 13, 1959; 2 males, 2 females, 2 miles from Orcutt, Santa Barbara Co., Aug. 2, 1948, W; 1 female, 2.5 miles north of Manteca, San Joaquin Co., June 19, 1957, G; 1 female, Wrights, Santa Clara Co., Aug. 25, 1955; 1 male, 1 female, 3 miles west of Gilroy, Santa Clara Co., March 25, 1956, G; 1 female, Ft. Barry, Marin Co., March 18, 1954, G. In UCLA: 1 male, 9 females, Westwood Hills, Los Angeles Co., Apr. 6, 1950; 1 male, 1 female, Westwood Hills, Los Angeles Co., May 18, 1955, A. Fukushima; 1 male, Santa Monica Canyon, Los Angeles Co., July 22, 1952; 1 female, Sand Canyon, Orange Co., March 30, 1949; 2 females, Murphy Canyon, San Diego Co., May 8, 1949, B and Heid. In KU: 1 male, Kernville, July 24, 1940, D. E. Hardy. In UCD: 3 males, 1 female, Monticello, 1 mile south, Napa Co., Oct. 8, 1947, R. M. Bohart; 1 male, 2 females, Green Valley, Solano Co., Aug. 29, 1946, R. M. Bohart and H. E. Cott; 1 female, Green Valley, Solano Co., Apr. 3,



Key to North American Species of *Anatopynia* Johannsen

1.	Pulvilli present; wings banded or with coalesced spots (subgenus <i>Psectrotanypus</i> ) . . . . .	10
	Pulvilli absent; wings hyaline or with central dark cloud over cross veins or with isolated spots or dusky clouds . . . . .	2
2.	Wings hairy at tip or occasionally well haired; no wing markings except for occasionally infusate cross veins (subgenus <i>Anatopynia</i> ) . . . . .	3
	Wings always well haired; with spots or clouds (subgenus <i>Macropelopia</i> ) . . . . .	6
3.	Legs yellowish; with distinct dark preapical femoral band and sub-basal tibial band; tarsi infusate; cross veins slightly darkened.	

Legs yellowish or somewhat infusate, no distinct dark bands . . . . . 4

Thorax and abdomen marked with brown; leg ratio about 0.8; cross vein infusate . . . . . **A. decolorata** (Malloch)

**A. marginella** (Malloch)

Thorax and abdomen marked with dark brown; dististyle of male genitalia shorter and parallel-sided almost to tip (fig. 3*a*).

**A. submarginella**, new species

6. Thorax yellow, marked with somewhat polished, blackish-brown vittae; abdomen entirely yellow; wing with faint brown band across middle.

**A. algens** (Coquillett)

Thorax and abdomen fuscous, marked with paler brown . . . . .	7
---	---

7. Small species (body length female, 3.0 mm.); legs pale fuscous with only extreme tips of tibiae darkened . . . . . **A. fastuosa** (Johannsen)

Larger species (body length female, 3.5–4.0 mm.); legs darker, with both femora and tarsi darkened apically . . . . . 8

8. Fourth tarsal segment of middle legs two-thirds as long as third; fifth segment only slightly smaller than fourth . . . . . 9

Fourth tarsal segment only one-half as long as third; fifth tarsal segment very small. Fore tarsus not distinctly bearded. **A. miripes** (Coquillett)

9. Fore tarsus not bearded; dististyle of male genitalia slightly curved (Malloch, 1915, pl. 28, fig. 2) . . . . . **A. hirtipennis** (Loew) Malloch

Fore tarsus with long hairs, 6 times tarsal diameter; dististyle straight, almost parallel-sided (fig. 3b) . . . . . **A. aclines**, new species

10. Mesonotal ground color dark brown to opaque black . . . . . 11

Ground color yellowish-white to brown	12
---------------------------------------	----

11. Femora with only subapical brown band; fore tarsus bearded.

**A. guttularis** (Coquillett)

Femora with two brown bands; fore tarsus with only short hairs, 3 times diameter of tarsus. . . . . **A. venusta** (Coquillett)

12. Wing with only dark spot over cross vein . . . . . **A. brunnea** Roback

Wing with bands or spots or both . . . . . 13



13. Legs yellow except for slightly darkened tips of femora and tibiae; wing with two cross bands and brown apex containing several hyaline spots.  
**A. discolor** (Coquillett)  
 Legs with subapical femoral band and sub-basal tibial band . . . . . 14
14. Wing with irregular cross band near middle extending completely across wing. . . . . 15  
 Wing with central band only behind anal vein; second band near apical one-third extending across wing; tarsal beard 6 times tarsal diameter.  
**A. eumorpha**, new species
15. Apical one-third of wing brown, marked with several hyaline spots; fore tarsus sparsely bearded . . . . . **A. dyari** (Coquillett)  
 Apical one-third of wing brown, without hyaline spots; no beard.  
**A. johnsoni** (Coquillett)

*Tanypus carinatus*, new species

FIGURES 3e-i

*Protenthes punctipennis* (Meigen) Malloch (in part), Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 383, 1915, dark variety, misidentification.

Holotype male: USNM 65515, 3 miles south of Woodside, San Mateo Co., Apr. 20, 1960, G.

Postocular bristles in single row reaching point medial to dorsal eye extensions. Palpi normal, ratio 8:15:20:33. About 20 clypeal bristles. Antennal ratio 2.31.

Head, thorax, and abdomen blackish-brown, scutellum and pleura somewhat lighter. Pronotum produced anteriorly, considerably wider at apex than at middle; with 17 fine lateral bristles. Mesonotum with tubercle low, inconspicuous and concolorous with remainder of mesothorax; tubercle beset with numerous, rather coarse hairs. Haltere knob apex infusate yellow, most of knob blackish-brown. Supra-alar bristles 2, 1 long, 1 short; prealar bristles 9; dorsolateral bristles in single row to scutellum; anterolateral bristles 2; scutellar bristles about 20, 10 large ones in posterior transverse row, anteriorly about 10 fine ones in strewn pattern.

Tarsal hairs of fore legs 2 times diameter of tarsus. Femora largely dark with preapical pale annulus; tibia with broad basal and narrow apical black band, remainder of tibia infusate; tarsal segments 1, 2, and 3 infusate with black apices, segments 4 and 5 completely dark. Fore tibia with single spur with 2 side spines; spur shorter than diameter of tibial apex; ratio 45:55. Middle tibia with 2 spurs with ratio of 18:20; each with 2 side spines. Hind tibia with spurs 20:25; longer with 3 side spines; comb of 8 short heavy spines.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	57	73	61	30	21	15	10	0.83
Middle	62	70	58	29	20	13	9	0.83
Hind	61	86	75	40	30	18	11	0.87



Wing coloration very near *T. punctipennis* Meigen; anal margin with only two large spots, basal one extending across anal fold. Wing length 3.03 mm.; venarum ratio 1.13.

Allotype: In USNM: Collected with holotype male.

Wing length 3.00 mm.; fore leg ratio 0.78; venarum ratio 1.09. Wing spots larger and more distinct; those along anal margin coalesced with those above, along anal vein; costal cell somewhat darkened along entire length.

Paratypes from California: In USNM: 1 male, Tulare Co., Aug. 5, 1947, W; 4 males, 1 female, Visalia, Aug. 7, 1947, W; 1 male, 1 female, Shafter, Kern Co., June, 1946, B. Brookman. In UCLA: 1 female, Whitmore Tub, Mono Co., Aug. 3, 1952, McDonald. In CBPH: 1 male, 5.3 miles south of Manteca, San Joaquin Co., May 27, 1957, G.

Males: Wing length, range 2.29–2.96; mean 2.60 mm. (7); fore leg ratio, range 0.76–0.81; mean 0.80 (5); antennal ratio, range 2.05–2.43; mean 2.28 (5); venarum ratio, range 1.09–1.20; mean 1.11 (7); hind leg ratio, range 0.81–0.93; mean 0.85 (6).

Females: Wing length 2.32, 2.44 mm. (2); fore leg ratio 0.78, 0.82 (2); venarum ratio 1.08–1.19 (2); hind leg ratio 0.83, 0.84 (2).

Paratypes from Michigan: In INHS: 3 males, 4 females, Grand Junction, Little Bear Lake, Aug. 15, 1914; 1 female, INHS no. 18811.

Head and thorax reddish-brown. Mesothoracic tubercle not too prominent, slightly lighter at apex, not strongly contrasting. Scutellum infusate yellow. Postnotum dark reddish-brown, sternopleuron concolorous. Haltere knob black, yellow at base of stalk.

Fore legs with beard 5 times tarsal diameter; legs as holotype. Fore leg ratio of males 0.86, 0.93; middle leg 0.90, 0.91; hind tarsi missing. Female: fore leg ratio 0.91; middle and hind tarsi missing.

Abdomen dark brown, pruinose; incisures faintly paler.

Ninth tergite with 16 bristles; carina of dististyle not quite as broad as in California specimens.

Paratype from Louisiana: In JES: 1 male, Natchitoches, U.S. Fish Hatchery, March 21, 1960, reared, JES.

Antennal ratio 2.44. Halteres dark; prealar bristles 10; scutellum with 12 bristles in posterior single row.

Tarsal beard 4 times diameter of fore tarsus; femora dark, each with preapical yellow annulus.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	46	60	50	29	19	12	8	0.83
Middle	52	58	55	28	19	11	7	0.95
Hind	50	67	64	41	28	18	11	0.95

Carina of dististyle of male genitalia as well developed as California specimens; only 7 bristles on ninth tergite.



Of all the Nearctic species of *Tanypus* this one most closely resembles *T. punctipennis* Meigen (Edwards).<sup>3</sup>

It differs most noticeably by having a smaller and darker tubercle on the mesonotum and by having a more strongly produced mesial carina on the dististyle of the male genitalia. It is distinguished from other Nearctic species in the key (p. 120).

*Tanypus imperialis*, new species

FIGURES 4a-c

Holotype male: USNM 65516, Laguna Lake, Imperial Co., June 9, 11, 1950.

Head with about 12 clypeal bristles; palpi 3-segmented, ratio (length times width) 20 x 16:23 x 12:25 x 10. Antennal ratio 2.04 (in paratype collected with holotype; antennae missing on holotype).

Head and thorax largely yellow; mouthparts, antennal pedicel, vittae, and postnotum shining cinnamon brown. Pronotum strongly produced; mesonotal tubercle yellow. Halteres white. Wing spots small and pale. Wing length 2.32 mm.; venarum ratio 1.03. Prealar bristles 3; dorsolateral bristles in single row; scutellar bristles 6 in posterior transverse row; anterolateral bristles absent. Fore tarsal beard 6 times tarsal diameter; legs yellow, fore femur, extreme tip of tibia, and tips of tarsal segments 1 to 4 with preapicle brown band; tarsal segment 5 largely brown; mid and hind femora with distinct preapical brown band, second indistinct brown band below that, two separated by clear yellow band; remainder of legs as fore leg. Fore tibia with simple spur, no side barbs; spur length:diameter of tibial apex 37:48. Middle tibial spurs slightly curved, with 2 side barbs long and filiform; spur length ratio 30:30. Hind tibial spurs as middle leg, ratio 32:40; no comb.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg</i> <i>Ratio</i>
Fore	45	53	51	23	21	15	10	0.96
Middle	46	52	49	22	17	11	8	0.94
Hind	48	62	66	35	27	18	10	1.06

Abdomen yellowish brown, with middorsal, longitudinal brownish streak near base of each segment. Ninth tergite with 15 bristles; medially directed bristles of basistyle almost uniform in size; dististyle with unique, incurved, lamella-like tip bearing small, subapical spur.

<sup>3</sup> The status of *Tanypus punctipennis* Meigen of American authors was somewhat uncertain due to the brevity of published descriptions. In lieu of type examination, I have examined a series of specimens kindly loaned to me by Dr. Paul Freeman from the collections of the British Museum (Natural History). The specimens were determined by F. W. Edwards, who had examined the Meigen types in Paris. *T. punctipennis* Meigen (Edwards) has proven to be different from the specimens described under this name in American literature. To clarify the status of this species I have given a more complete description of Edwards' material in an appendix to this paper.



Allotype: In USNM: Fish Springs, Salton Sea, Imperial Co., Oct. 18, 19, 1954, Whitney.

Wing pattern and coloration as holotype male. Differs by dorsolateral bristles forming group of 4 bristles just anterior to scutellum and by having 11 prealar and 12 anterolateral bristles. Pronotum produced as in holotype, bearing 5 fine, lateral bristles.

Wing length 2.29 mm.; fore and hind tarsi missing; venarum ratio 1.07.

Paratypes: In UCD: 1 female, 12 miles east of Heber, Imperial Co., May 12, 1956, T. R. Haig. In UCLA: 1 male, collected with holotype; 1 female, Lee's Ranch, Chatsworth, Los Angeles Co., July 25, 1950.

Male: Wing length 2.59 mm.; fore leg missing; antennal ratio 2.04; venarum ratio 1.05; hind leg missing.

Females: Wing length 2.59, 2.70 mm. (2); fore leg ratio 0.69 (1); venarum ratio 1.02, 1.02 (2); hind leg ratio 1.00, 0.80 (2). In female collected 12 miles east of Heber, Imperial Co., dorsolateral bristles in three rows just anterior to scutellum with about 7 bristles in clump; pronotum produced with 5 lateral bristles; prealar bristles 10; anterolateral bristles 10.

In the female from Lee's Ranch, Los Angeles Co., the high leg ratio and the produced pronotum seem to place it in this species; however, the prealar bristles are 9, the anterolateral bristles 4, and the dorsolateral bristles become staggered in 2 rows turning medially just before the scutellum.

This species is quite similar to *T. neopunctipennis* new species but differs in being smaller and by having a strongly produced pronotum and having a distinctly different male genitalia. It is separated from the other Nearctic species in the key (p. 120).

*Tanypus parastellatus*, new species

FIGURES 4d,e

Holotype male: USNM 65517, Laguna Lake, Imperial Co., June 9, 11, 1950.

Head dark; antennal ratio 2.00.

Pronotum parallel-sided; dark brown, infusate yellow apically. Mesonotum blackish-brown, overlaid with strong greyish-green pruinescence; tubercle very small and dark. Scutellum dark yellowish-brown. Postnotum shining blackish-brown. Halteres yellow. Prealar bristles 10; dorsolateral bristles in single row; anterolateral bristles about 6.

Legs yellowish; black ring above and below knee and at apex of tibiae and at apex of tarsal joints 1 to 3; 4 and 5 largely dark; base



of femora somewhat infusate, with clear yellow fascia between basal infuscation and apical dark band.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg</i> <i>Ratio</i>
Fore	40	53	32	18	13	9	6	0.60
Middle	45	45	33	18	11	8	6	0.73
Hind	40	57	45	23	17	10	7	0.79

Wing spots smaller and more distinct than in *T. stellatus* Coquillett (cf. Malloch, 1915, pl. 27, fig. 5); spot over r-m extending only narrowly onto surrounding membrane. Wing length 2.00 mm.; venarum ratio 1.14.

Abdomen dark brown, apical one-fourth of each segment yellow.

Genitalia with dististyle slightly curved, broadened near middle; proximomesial border of basistyle not strongly projecting as in *T. stellatus* Coquillett.

Allotype: In USNM: Lee's Ranch, Chatsworth, Los Angeles Co., July 25, 1960.

Wing length 2.11 mm.; fore tarsi missing; hind leg ratio 0.74; venarum ratio 1.20. Wing spots darker and larger with spot over r-m approaching size of that found in *T. stellatus*.

Paratype: In UCLA: 1 female collected with the allotype. Wing length 2.22 mm.; fore and hind tarsi missing; venarum ratio 1.14.

The species most closely resembles *T. stellatus* Coquillett, from which it can be distinguished by the dististyle of the male genitalia, which is slightly bent and broadened before the apex, and by the wing spots, which are smaller and do not coalesce. The spot over r-m is distinctly smaller in this species.

#### *Tanypus stellatus* Coquillett

##### FIGURE 4f

*Tanypus stellatus* Coquillett, Proc. U.S. Nat. Mus., vol. 25, p. 89, 1902 (1903).

I have not examined the type specimen. My interpretation of the species is that of Malloch and is based on material in the Illinois Natural History Survey Collection. A specimen from Cedar Lake, Indiana, July 17, 1914, was used in the following description, which supplements Malloch's earlier one.

Postocular bristles about 12 to 14 on vertex, 6 to 7 on each side of midline in single row. Eyes long, parallel-sided, dorsally extended. Antennal ratio 2.29. Palpi ratio 25:38:50:75. About 20 clypeal bristles.

Pronotum with 21-32 fine lateral bristles. Mesonotum with only faint indication of tubercle characteristic of genus; tubercle dark, concolorous with mesonotum.



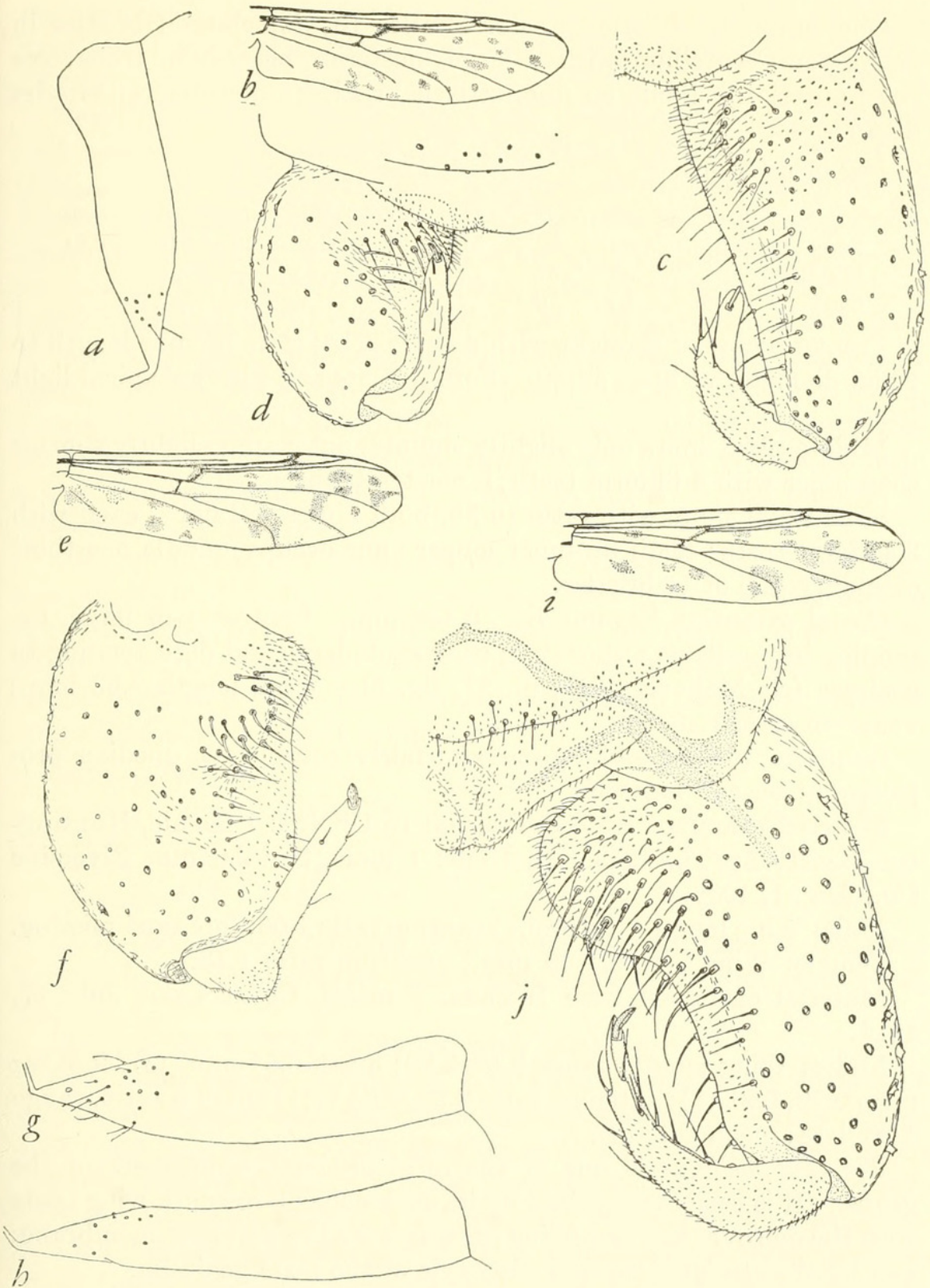


FIGURE 4.—*Tanypus imperialis*: a, lateral view of pronotum; b, wing; c, male genitalia. *Tanypus parastellatus*: d, male genitalia; e, wing. *Tanypus stellatus* Coquillett: f, male genitalia. *Tanypus grodhausi*: g, paratype, lateral view of pronotum; h, allotype, lateral view of pronotum; i, wing; j, male genitalia.



One supra-alar bristle; prealar bristles 10; dorsolateral bristles in single row; scutellum with 8 large, posterior bristles in transverse row; anteriorly about 40 fine, strewn bristles; anterolateral bristles 6 to 7.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg</i> <i>Ratio</i>
Fore	50	63	51	27	20	12	10	0.81
Middle	55	57						
Hind	50	70						

Front tibial spur straight with 2 side barbs; ratio of spur length to tibial diameter at apex 42:50. Fore femur dark with subapical light band.

Middle tibial spurs only slightly sinuate; outer spur slightly shorter than inner with 4 filiform teeth; inner teeth obscured.

Hind tibial spurs with ratio 16:30, both almost straight; each with 3 filiform teeth; teeth on inner longer spur occupy middle one-third of spur; comb of 11 bristles.

Costal extension beyond  $R_{4+5}$  0.144 mm. Spot on r-m large, extending into cells on either side; wing spots large and dark tending to coalesce (cf. Malloch, 1915, pl. 27, fig. 5). Wing length 2.63 mm.; venarum ratio 1.10.

Genitalia with straight dististyle; fairly conspicuous median projection at base of basistyle.

Material examined from California: In USNM: 1 female, Huntington Beach, Apr. 6, 1949. In UCR: 1 male, San Jacinto, Riverside Co., Aug. 1, 1958, S.

Male: Wing length 1.96 mm.; venarum ratio 1.06; fore tarsi missing.

Female: Wing length 2.00 mm.; venarum ratio 1.13.

Material examined from Indiana: 3 males, Cedar Lake, July 17, 1914.

Males: Wing length, range 2.59–2.70; mean 2.64 mm. (3); fore leg ratio 0.78, 0.81 (2); antennal ratio 2.29, 2.64 (2); venarum ratio, range 1.06–1.13; mean 1.09 (3).

*Tanypus stellatus* is one of the most distinctive members of the genus. It is easily recognized by its dark color; large dark wing spots with the one over r-m extending broadly onto the adjacent membrane; and by the straight, tapered dististyle of the male genitalia.

*Tanypus grodhausi*, new species

FIGURES 4g–j

Holotype male: USNM 65518, Parks Air Force Base, Alameda Co., May 28, 1959, G.

Antennal flagellum with terminal segment darker and clearly separated by articulation; antennal ratio 2.31. Postocular bristles



very sparse, in single row of 5 bristles behind eye. About 8 clypeal bristles. Palpi 3-segmented, ratio (length times width)  $14 \times 9:16 \times 6:15 \times 5$ .

Head behind eyes, small pleural area, lateral margins of pronotum and scutellum yellowish, latter somewhat infusate; mesonotum greyish-black, heavily overlaid with greyish pollen; postnotum shining black. Tubercle of mesonotum yellow, prominent, and strongly contrasting. Pronotum parallel-sided to apex (or very slightly produced in paratypes); 13 fine lateral bristles; covered completely by microtrichia. Haltere knob white, stalk black. Wing spotted with dark brown on hyaline membrane in distinctive pattern. Wing length 3.51 mm.; venarum ratio 1.01. Supra-alar bristles 2, 1 large, 1 small; prealar bristles 5; dorsolateral bristles in single row becoming multi-serial just anterior to scutellum where about 10 to 12 bristles form clump; anterolateral bristles 4; scutellum with 12 large bristles in posterior transverse row.

Fore tarsal beard 7 times diameter of tarsus. Fore tarsal spur smooth, slightly curved spine, one minute side barb; spur length:tibia apex diameter 55:65; middle tibia with two slender spurs, each slightly curved, with two basal slender filiform side teeth; ratio of length of spurs 38:40. Hind tarsal spur same as middle leg; ratio of spurs 50:50; no apparent comb.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta<sub>1</sub></i>	<i>Ta<sub>2</sub></i>	<i>Ta<sub>3</sub></i>	<i>Ta<sub>4</sub></i>	<i>Ta<sub>5</sub></i>	<i>Leg Ratio</i>
Fore	60	78	56	28	25	18	13	0.72
Middle	74	80	56	27	23	15	11	0.70
Hind	68	97	73	39	32	20	14	0.75

Each segment of abdomen with apical narrow band of infusate yellow; basal fascia greyish-black; about 160 bristles on segment II tergite.

Allotype: In USNM: Collected with holotype.

Except for sexual differences, like male. Wing spots somewhat larger and darker and pronotum slightly produced. Wing length 3.66 mm.; fore leg ratio 0.68; hind leg ratio 0.80; venarum ratio 1.05.

Paratypes: In USNM: 1 male, Saratoga Springs, Death Valley, May 30, 1953, W; 1 male, 1 female, Palo Verde, Imperial Co., Apr. 8, 1949, lake margin, W. In UCD: 1 female, Davis, Aug. 1, 1955, D. C. Green; 1 female, Davis, May 14, 1952, S. In UCLA: 54 males, 24 females, Saratoga Springs, Death Valley, March 19, 20, 1955; 33 males, 2 females, Saratoga Springs, Death Valley, May 27, 29, 1955, B et al.; 12 males, Saratoga Springs, Death Valley, Apr. 23, 24, 1955; 1 male, 2 females, Salt Springs, Death Valley, San Bernardino Co., March 24, 1957; 1 female, Lancaster, Los Angeles Co., May 13, 1953; 2 males, 2 females, Huntington Beach, Feb. 21, 1950; 1 male, Resting



Springs, Inyo Co., May 29, 1955. In CBPH: 12 males, 16 females, Parks Air Force Base, Alameda Co., May 28, 1959; 2 males, Lake Elsinore, Riverside Co., May 13, 1949, E. Meyers. In KU: 3 males, Little Lake, D. E. Hardy, July 25, 1940.

Males: Wing length, range 2.18–3.33; mean 2.68 mm. (23); fore leg ratio, range 0.70–0.90; mean 0.80 (23); hind leg ratio, range 0.74–0.85; mean 0.79 (15); antennal ratio, range 1.83–2.25; mean 2.01 (16); venarum ratio, range 1.02–1.15; mean 1.06 (17).

Females: Wing length, 2.37–3.85; mean 3.11 mm. (21); fore leg ratio, range 0.65–0.73; mean 0.68 (19); hind leg ratio, range 0.73–0.85; mean 0.79 (17); venarum ratio, range 1.04–1.13; mean 1.07 (20).

This species can be distinguished from the other North American members of this genus by the clump of 8 to 12 bristles at the posterior end of the dorsolateral bristle row and by having only 3 spots just posterior to  $R_{4+5}$ .

*Tanypus neopunctipennis*, new species

FIGURES 5a–d

*Protenthes punctipennis* (Meigen) Malloch (in part), Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 383, 1915, misidentification of *Tanypus punctipennis* Meigen.

Malloch gave what he considered to be a more complete description of *Tanypus punctipennis* Meigen. After examining a series of *T. punctipennis* determined by F. W. Edwards of the British Museum (see appendix), I have concluded that Malloch's identification was erroneous.

Holotype male: In INHS: East St. Louis, Ill., July 18, 1906.

Postocular bristles in single row behind eye, very fine, 16 vertex bristles. Eyes with parallel-sided dorsal extensions. Palpi 3-segmented, ratio 23:25:26. Antennal ratio 2.72.

Pronotum with 14 fine lateral bristles. Mesonotum with prominent tubercle light colored, strongly contrasting with surrounding vittae. Supra-alar bristles 2, 1 large and 1 fine; prealar bristles 7; dorsolateral bristles in single row; scutellar bristles 8 in large posterior single row; 16 anterior fine bristles strewn; anterolateral bristles 3 to 5.

Wings with dark spot over r-m very small, scarcely extending into cells on either side. Costal extension 0.96 mm. beyond  $R_{4+5}$ . Wing length 2.77 mm.; venarum ratio 1.00.

Femora somewhat infusate, each with preapical yellow annulus. Length of fore tibial spur:apical tibia diameter 55:56; ratio of length of spurs of middle tibia 45:44; hind tibia 65:45. Spur of fore tibia with 2 slight barbs; middle, each with 3 longer filiform barbs; hind, each with 2 rather inconspicuous filiform teeth; comb of 8 spines.

Genitalia with curved dististyle; no median carina.



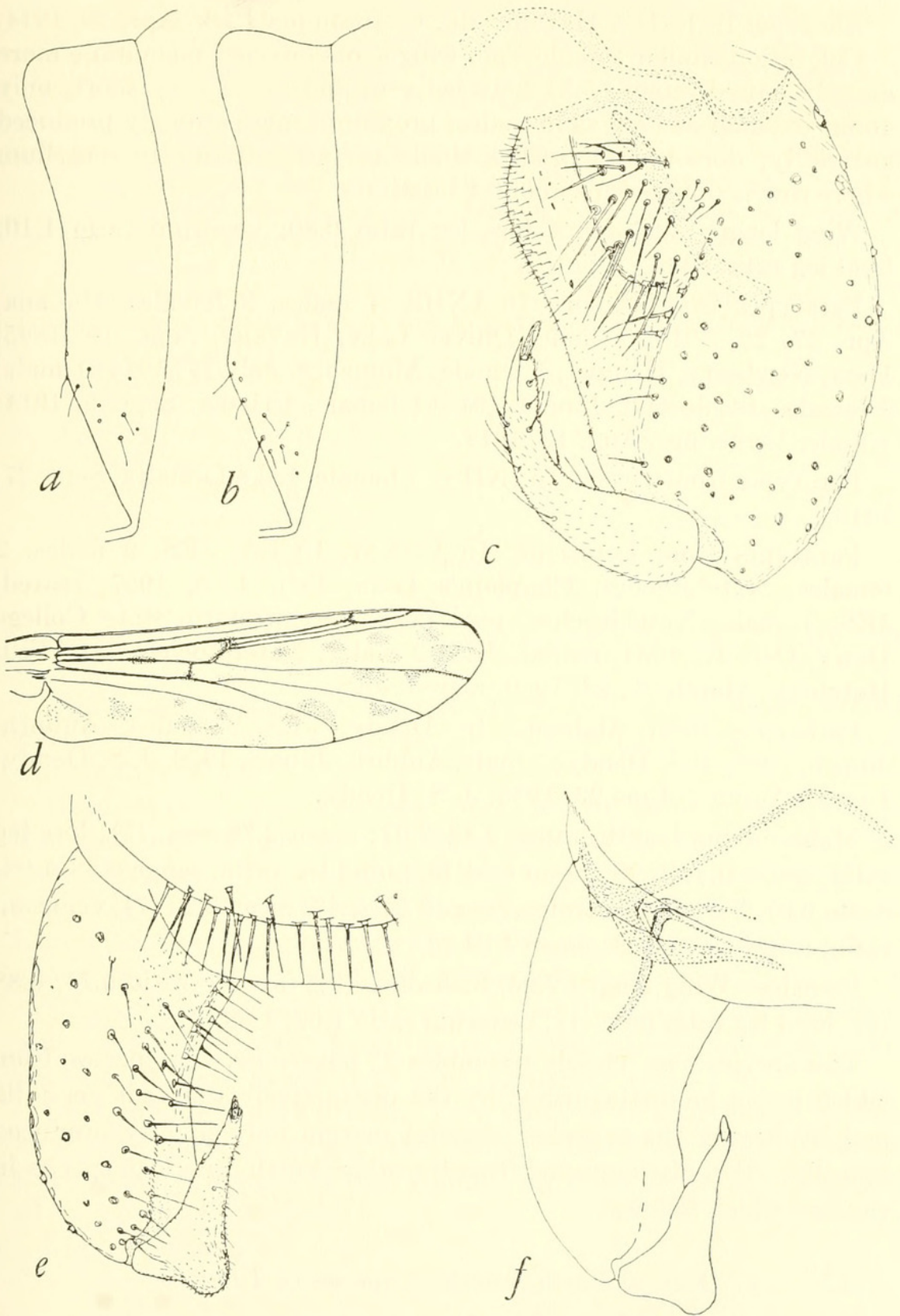


FIGURE 5.—*Tanypus neopunctipennis*: *a*, holotype, lateral view of pronotum; *b*, allotype, lateral view of pronotum; *c*, male genitalia; *d*, wing. *Procladius barbatulus*: *e*, male genitalia; *f*, internal "struts" of male genitalia.



Allotype: In INHS: Havana, Ill., Chautauqua Park, Apr. 29, 1914.

Coloration similar to holotype; wing spots heavier, membrane more densely haired; stem of M between r-m and m-cu very short, only about one-half as long as in males; pronotum more strongly produced anteriorly; dorsolateral bristles single to just anterior to scutellum where row is doubled for about 4 bristles.

Wing length 3.28 mm.; fore leg ratio 0.80; venarum ratio 1.10; hind leg ratio 0.96.

Paratypes from Illinois: In INHS: 4 males, 3 females, Havana, Apr. 27, 29, 1914; 1 male, Quiver Lake, Havana, Sept. 19, 1895, Hart, Newberry, Hempel; 1 female, Momence, July 17, 1914; 1 male, 2 females, St. Joseph, June 9, 1915; 1 female, Urbana, Sept. 5, 1914; 1 male, Vergennes, Aug. 12, 1914.

Paratypes from Texas: In INHS: 1 female, Lake Lomalta, Sept. 27, 1910.

Paratypes from Louisiana: In USNM, UCLA, JES: 9 males, 2 females, Natchitoches, Chaplain's Lake, Feb. 4, 5, 1957, reared, JES; 1 male, Natchitoches, pool near Northwestern State College Dairy, Oct. 22, 1954, reared, JES; 2 males, Natchitoches, U.S. Fish Hatchery, March 21, 22, 1960, reared, JES.

Paratypes from Alabama: In Dendy, JES: 9 males, Auburn, June 6, 1956, J. S. Dendy; 1 male, Auburn, June 8, 1956, J. S. Dendy; 1 male, Auburn, June 23, 1955, J. S. Dendy.

Males: Wing length, range 2.44–3.07; mean 2.78 mm. (7); fore leg ratio, range 0.84–0.98; mean 0.91 (8); hind leg ratio, range 0.88–1.08; mean 0.97 (7); antennal ratio, range 2.01–2.43; mean 2.22 (7); venarum ratio, range 1.00–1.08; mean 1.04 (3).

Females: Wing length 2.96, 3.33 mm. (2); fore leg ratio 0.74, 0.88 (2); hind leg ratio 0.90 (1); venarum ratio 1.02, 1.08 (2).

This species most closely resembles *T. imperialis*, new species, from which it can be distinguished by the distinctively different genitalia and by having the superior pronotal margin only slightly produced apically. It is distinguished from the other North American species in the key which follows.

#### Key to North American Species of *Tanypus*

1. Tubercle of mesonotum very small and inconspicuous, concolorous with remainder of mesonotum or only slightly lighter in color; general body color dark; palpi 4-segmented . . . . . 2
- Tubercle conspicuous, yellow or yellowish-white, strongly contrasting with remainder of brown to dark brown mesonotum; occasionally tubercle infusate yellow; body with yellowish ground color; palpi 3-segmented . . . . . 4



2. Anterior and posterior margins of pronotum nearly parallel; dististyle of male genitalia straight or slightly curved . . . . . 3  
Anterior margin of pronotum strongly produced at apex; dististyle of male genitalia with distinctively produced mesial carina (in cleared genitalia mounts difficult to see) . . . . . **T. carinata**, new species
3. Spot over r-m cross vein large extending broadly into cells on either side; wing spots dark and tend to coalesce (cf. Malloch, 1915, pl. 27, fig. 5); dististyle of male genitalia straight; tapering to tip . **T. stellatus** (Coquillett)  
Spot over r-m smaller extending into adjacent cells only narrowly; wing spots smaller and more distinct, isolated; dististyle slightly bent, broadened before apex . . . . . **T. parastellatus**, new species
4. Dorsolateral bristles in single row to scutellum; with 4 spots in cell behind  $R_{4+5}$  . . . . . 5  
Dorsolateral bristles in single row to just anterior to scutellum where row expands to form clump of 8-12 bristles . . . . . **T. grodhausi**, new species
5. Pronotum only slightly produced towards apex; dististyle simple, no carina, evenly curved . . . . . **T. neopunctipennis**, new species  
Pronotum strongly produced at apex; dististyle with unique apical carina bearing subterminal spine . . . . . **T. imperialis**, new species

***Procladius barbatulus*, new species**

FIGURES 5e,f

Holotype male: USNM 65519, Hume Lake, Fresno Co., Sept. 24, 1957, G.

Postocular bristles in 2 staggered rows. Eyes with usual parallel-sided dorsal extensions. Clypeal bristles 9; palpi ratio 8:13:18:30. Antennal ratio 1.70.

Head, thorax, and abdomen dark brown, somewhat lighter at shoulders and on pleura. Halteres dark. Pronotum with 18 fine lateral bristles. One supra-alar bristle; prealar bristles 13; dorso-medial bristles 3 on either side of midline on prescutellar area; dorso-lateral bristles in single row; anterolateral bristles 6; scutellar bristles about 28, somewhat scattered, posteriorly forming transverse row.

Wings darkened only over r-m and, faintly, over m-cu; membrane well haired with black hairs; anterior veins somewhat darker than posterior. Wing length 2.22 mm.; venarum ratio 1.50.

Legs uniformly dark brown. Fore tarsus with short beard, 4 times tarsal diameter. Fore leg with single tibial spur, slightly shorter than diameter of apex of tibia; middle leg spurs 40:30; hind leg spurs 53:32, comb of 11 spines.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	45	59	44	20	15	10	5	0.74
Middle	51	56	37					0.66
Hind	45	61	43	20	16	9	7	0.70

Abdomen almost uniformly darkened with only faint suggestion of lighter color apically on segments; with about 60 bristles on tergite II.



Female: Unknown.

This species keys to *P. choreus* (Meigen) in Johannsen (1952). There is much confusion as to the identity of *P. choreus* and *P. culiciformis* (Linnaeus). Edwards (1929) lists them as separate species although he points out there may be only a varietal difference between the two. Edwards says the male genitalia of the two species are identical.

Through the kindness of Dr. Paul Freeman of the British Museum (Natural History) I have examined examples of *P. culiciformis* and *P. choreus* determined by Edwards. While there is a slight color and size difference, the genitalia of the two appear to be identical. I must therefore conclude that *P. choreus* is only a variety of *P. culiciformis* and herewith list it as a new synonymy. *P. culiciformis* is redescribed from Edwards' material in the appendix to this paper.

*P. barbatulus*, new species, may be separated from the rest of the Nearctic species by the distinctive dististyle of the male genitalia. The genitalia resembles those figured by Freeman (1955) for *P. albitalus* Kieffer and *P. polytomus* (Kieffer). These species, however, have distinctively different wing patterns (cf. Freeman, 1955, pl. 1, figs. h and j). *P. sagittalis* (Kieffer) is described by Edwards (1929) as having a dististyle that resembles *P. barbatulus*, new species; however, *P. sagittalis* lacks a fore tarsal beard and can thus be distinguished.

***Procladius freemani*, new species**

FIGURES 6a-e

Holotype male: USNM 65520, San Bruno, San Mateo Co., Aug. 23, 1957, R. P. Maynard.

Postocular bristles in 2 staggered rows; reaching medially to dorsal extension of eye. Clypeal bristles 23. Palpi ratio 15:20:39:40. Antennal ratio 2.22.

Head and thorax almost entirely black, heavily dusted with white pollen; heavily infusate yellow on shoulders, pleura and apex and lateral margin of prothorax. Prothorax with 13-17 lateral bristles. Haltere knob white, stalk infusate. Supra-alar bristles 2, 1 large, 1 small; prealar bristles about 19; dorsomedial bristle row divides just behind inconspicuous mesonotal tubercle and extends laterally as two rows, 1 on each side, almost to dorsolateral bristle row. Dorsolateral bristles in single row; immediately anterior to scutellum is a transverse row of 5 bristles on each side, lying at right angles to dorsolateral row. Scutellar bristles about 40; anterolateral bristles 6.

Wings with preapical shadow as well as one in posterior margin. Wing length 2.59 mm.

Legs infusate yellow, apex of tibia and basitarsus black; tarsal segments 2 to 5 largely black; longest hairs of fore leg 3 times diameter



of tarsus. Tibial spurs on middle leg subequal, ratio 21:23, slightly shorter than single spur on fore leg; 5 lateral teeth on each spur; hind leg spur ratio 21:25; comb of 12 bristles.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta<sub>1</sub></i>	<i>Ta<sub>2</sub></i>	<i>Ta<sub>3</sub></i>	<i>Ta<sub>4</sub></i>	<i>Ta<sub>5</sub></i>	<i>Leg Ratio</i>
Fore	57	67	50	23	17	11	8	0.75
Middle	62	65	42	19	15	9	8	0.65
Hind	58	73	50	25	18	10	8	0.68

Abdomen with about 60 to 65 bristles on each side of segment II; apical one-half to one-third of each segment yellowish-white; each with basal black fascia.

Genitalia with medially projecting "strut" without denticles; distally projecting "strut" almost straight, of moderate length. Dististyle apex almost straight; angle moderately produced.

I cannot distinguish the female with certainty from that of *P. denticulatus*, new species.

Paratypes: In USNM: 2 males, Shafter, Kern Co., June, 1946, B. Brookman; 1 male, Rockwell Pond, Selma, Aug. 4, 1947, W; 1 male, Stratford, July 8, 1947, W; 1 male, Huntington Beach, Feb. 21, 1950. In UCD: 1 male, Quincy, 4 miles west, Plumas Co., July 16, 1949, W. F. Ehrhardt. In UCLA: 3 males, Whitmore Tub, Mono Co., Aug. 3, 1952, McDonald; 1 male, Berkeley, May 1, 1948, W. In CBPH: 1 male, Lake Merced, San Francis Co., Feb. 10, 1959, G; 7 males, collected with the holotype; 1 male, Bridgeport, Mono Co., May 15, 1959; 2 males, Puddingstone Reservoir, Los Angeles Co., June 22, 1952, G; 6 males, Lake Isabella, Kern Co., June 23, 1959, G.

Males: Wing length, range 2.29–3.11; mean 2.58 (19); fore leg ratio, range 0.66–0.77; mean 0.72 (19); antennal ratio, range 1.57–2.59; mean 2.09 (13); venarum ratio, range 1.40–1.60; mean 1.49 (15); middle leg ratio 0.63 (1); hind leg ratio, range 0.64–0.70; mean 0.66 (7); tarsal beard length, range 2.50–4.40; mean 3.48 times diameter of tarsus (10). The shape of the angle of the dististyle shows some variation which I have interpreted as differences in mounting techniques.

This species can be distinguished from other members of the *culiciformis* group only by the features of the diagnostic male genitalia.

The species is named for Dr. Paul Freeman of the British Museum (Natural History), whose willing answers to vexing points of nomenclature and courteous assistance in obtaining named specimens have encouraged me in my study of the group.



*Procladius denticulatus*, new species

FIGURES 6f-h

*Procladius culiciformis*, of authors, not Linnaeus.

Holotype male: USNM 65521, Fortuna, Humboldt Co., May 12, 1960, light trap.

Head largely black but some infusate yellow in front of and behind eyes. Antennal flagellum black. Postocular bristles in 2 staggered rows; reaching almost to midline. Eyes with parallel-sided dorsal extensions. Palpi black, ratio 15:22:36:50. Clypeus somewhat swollen, with about 20 bristles. Antennal ratio 1.74.

Pronotum with wide notch; yellow apically, black laterally; 15 fine lateral bristles. Mesonotum largely shining black; humeri and pleural areas infusate yellow; greyish pollinose when viewed obliquely; thoracic bristles shining black. Scutellum, postnotum, and sternopleuron black. Halteres yellow, infusate basally. One supra-alar bristle; prealar bristles 23; dorsomedial bristles staggered in two rows, dividing in front of prescutellar area and extending laterally to reach almost to dorsolateral bristles; dorsolateral bristles in single row, extending medially just in front of scutellum to midline; scutellum with about 48 strewn bristles; anterolateral bristles 6.

Wings with broad triangular black fascia with base extending from point proximal to the termination of  $R_1$  to near the tip of  $R_{4+5}$ ; apex at termination of  $Cu_2$ . Cross veins with dark spot; large dark spot in anal margin. Wing length 3.00 mm.; venarum ratio 1.44.

Legs largely blackish; base of fore femur and, to lesser extent, middle and hind legs infusate yellow. Fore tibia with single long straight spur, bearing 5 side spines. Middle leg with spurs of almost equal length, each with 5 or 6 spines. Hind leg with outer spur slightly shorter than inner; ratio 48:60; comb of 13 spines.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	$\frac{Len}{Ratio}$
Fore	60	72	59	27	20	13	9	0.82
Middle	65	68	47	23	17	10	8	0.69
Hind	65	84	60	30	20	12	9	0.71

Abdomen black; apical one-third of each segment heavily infusate yellow; basal dark portion pilose, about 65 bristles on each side of segment II.

I cannot distinguish the female of this species with certainty from that of *P. freemani*, new species.

Paratypes: In USNM: 3 males, Shafter, Kern Co., June 1946, B. Brookman; 1 male, Wheeler's Springs, Ventura Co., June 16, 1948, W; 2 males, Independence, Inyo Co., Aug. 22, 1952, B; 1 male, Hume Lake, July 20, 1947, W; 1 male, Clear Lake, Lake Co., Oct. 11, 1947, W. In UCLA: 2 males, Huntington Beach,



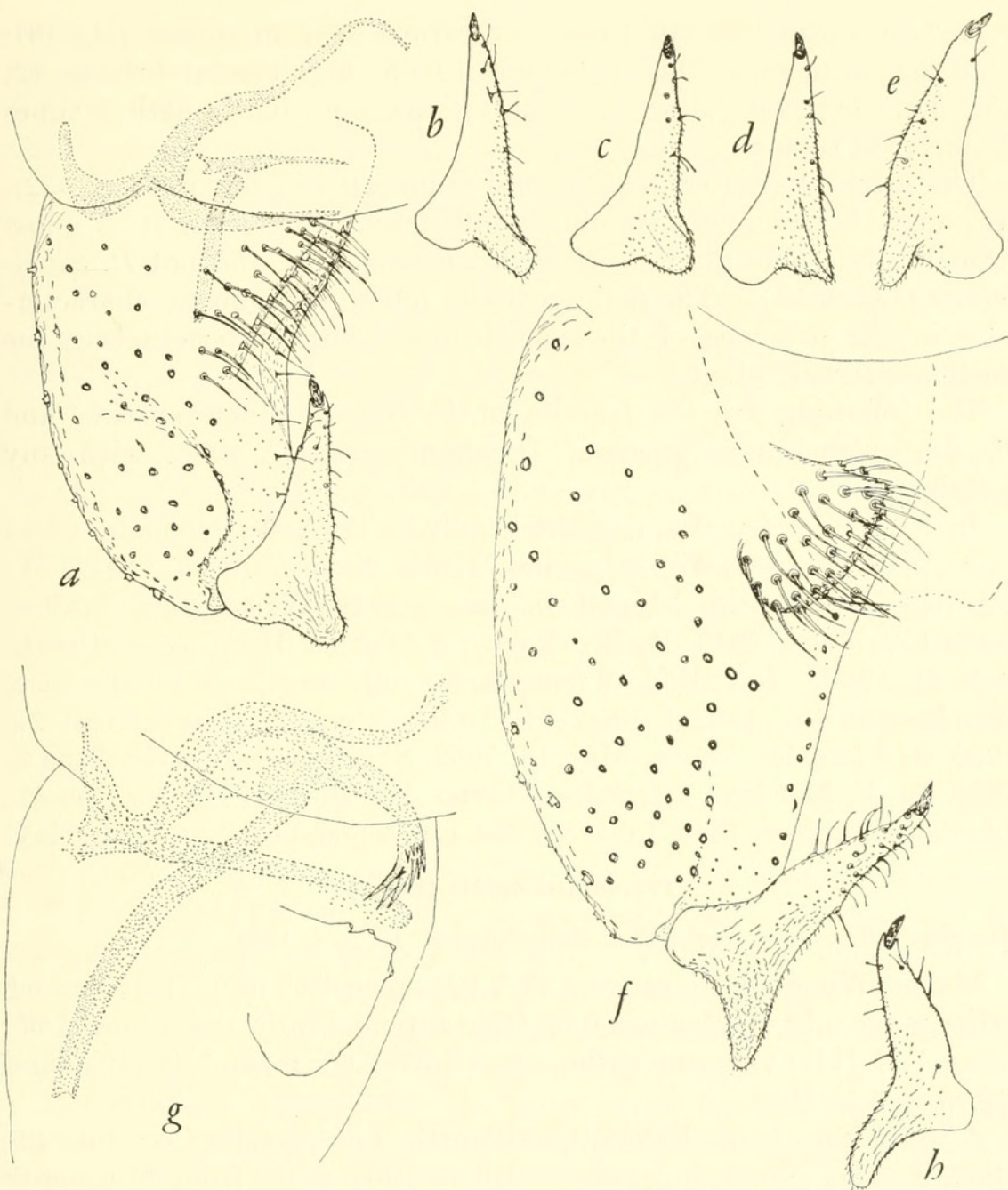


FIGURE 6.—*Procladius freemani*: a, male genitalia; b-e, variations in dististyle of male genitalia. *Procladius denticulatus*: f, male genitalia; g, internal "struts" of male genitalia; h, dististyle of paratype.

Feb. 21, 1950. In Bay: 7 males, Whittier, Feb. 16, 18, 1960. In CBPH: 1 male, 3 miles south of Woodside, San Mateo Co., Apr. 20, 1960, G; 1 male, 3.5 miles north of Sierra City, Sierra Co., July 11, 1957, G. In KU: 1 male, Mono Lake, July 31, 1940, E. E. Kenaga. In UCD: 1 male, Woodland, June 20, 1949, Jack Fowler; 1 male, Davis, Feb. 13, 1958, G. G. Moore; 1 male, Davis, May 20, 1959, F. E. Strong; 5 males, Davis, May 10, 11, 18, 1959.

Males: Wing length, range 2.04–3.00; mean 2.47 mm. (15); fore leg ratio, range 0.67–0.82; mean 0.74 (12); antennal ratio, range



1.74–2.30; mean 2.01 (10); venarum ratio 1.38–1.50; mean 1.45 (9); hind leg ratio, range 0.65–0.71; mean 0.68 (6). Prealar bristles 12, 15. Fore legs with short hairs only; maximum hair length 3 times diameter of tarsus.

The species keys to *P. culiciformis* (Linneaus) in Johannsen (1952). Although I have not examined Johannsen's material, it is most probably referable to *P. denticulatus*, new species, and not *P. culiciformis* (Linneaus). The male genitalia offers a diagnostic characteristic in the presence of the conspicuous denticles terminating the median internal "strut."

The following are the females of *P. freemani*, new species, and *P. denticulatus*, new species. I cannot separate them with any certainty.

In USNM: 4 females, Stratford, July 8, 1947, W; 1 female, Clear Lake, Oct. 4, 1947, W; 2 females, Hume Lake, July 20, 1947, W; 1 female, Topaz Lake, Mono Co., June 5, 1948, W; 1 female, Shafter, Kern Co., June, 1946, B. Brookman; 2 females, Huntington Beach, Feb. 21, 1950. In CBPH: 2 females, 3.8 miles northeast of Manteca, San Joaquin Co., Oct. 8, 1956. In UCD: 5 females, Davis, Nov. 21, 1950, S; 6 females, Davis, May 16, 1952, S; 2 females, Davis, June 3, 1955, A. T. McClay; 2 females, Davis, Apr. 1, 1941, G. E. Bohart; 1 female, Tambark Flat, July 18, 1950, Los Angeles Co., A. T. McClay.

*Procladius bellus* (Loew)

*Tanypus bellus* Loew, Berlin Ent. Zeitschr., vol. 10, p. 4, 1866.

Males: Wing length, range 1.37–2.22; mean 1.69 mm. (16); fore leg ratio, range 0.58–0.68; mean 0.62 (13); antennal ratio, range 1.51–1.95; mean 1.74 (11); venarum ratio, range 1.37–1.60; mean 1.43 (10); hind leg ratio 0.57 (1).

A male from Lee's Ranch, Chatsworth, Los Angeles Co., July 25, 1950, is very small and pale. Still another male from Mammoth Lakes, July 29, 1940, D. E. Hardy, has the head, thorax, and abdomen blackish but with no discernible morphological differences from the yellowish to brownish typical forms.

Females: Wing length, range 1.33–1.77; mean 1.56 (6); fore leg ratio, range 0.53–0.61; mean 0.57 (5); venarum ratio 1.32, 1.46 (2); hind leg ratio 0.52, 0.56 (2).

Material studied: In USNM: 7 males, Woodlake, July 28, 1947, W; 3 males, 1 female, Selma, July 10, 1947, W; 1 male, Clear Lake, Lake Co., Oct. 11, 1947, W; 1 male, Stratford, Apr. 8, 1947, W; 2 males, Palo Verde, Imperial Co., Apr. 8, 1949, W, lake margin. In KU: 1 male, Mammoth Lakes, July 29, 1940, D. E. Hardy. In UCLA: 1 male, 2 females, Lee's Ranch, Chatsworth, Los Angeles Co., July 25, 1950. In CBPH: 1 male, Lakeport, Lake Co., July 21,



1955, H. Brydon. In UCR: 1 male, 3 females, San Jacinto, Riverside Co., Sept. 26, 1958, S; 2 males, 2 females, San Jacinto, Riverside Co., July 7, 1958; 1 male, San Jacinto, Riverside Co., Aug. 1, 1958; 1 male, Lancaster, Aug. 18, 1958; 1 female, Lancaster, July 28, 1958, S.

### Subfamily Podonominae

#### *Boreochlus persimilis* (Johannsen)

##### FIGURE 7a

*Trichotanypus persimilis* Johannsen, Canadian Ent., vol. 58, p. 99, 1926.

*Boreochlus persimilis* (Johannsen), Edwards, in Edwards and Thienemann, Zool. Anz., vol. 122, p. 153, 1938.

Antennal pedicel dark cinnamon brown; flagellum pale brown; tip slightly enlarged, bent to one side with cluster of short terminal hairs. Eyes reniform. Antennal ratio 0.31.

Thorax dark cinnamon brown, somewhat pollinose. Pronotum details obscured by pointing glue. Haltere stalk pale brown, knob dark brown. One long, pale prealar bristle; dorsomedial bristles long, pale, and appressed; dorsolateral bristles long, pale, suberect, divergent, in single staggered row; scutellar bristles apparently rubbed, at least 4.

Fore leg proportions, 55:60:32:18:15:9:6; fore leg ratio 0.53. Hind tibia with single slender spur beset with prickles on basal half; spur length less than apical diameter of tibia; comb of 6 spines.

Wings densely haired, cuneiform, no anal angle. Squama with 10 hairs; costa greatly elongate (0.088 mm.). Venation as illustrated by Johannsen (1952). Wing length 1.41 mm.; venarum ratio 1.13.

Abdomen pale brown, somewhat darker on dorsal median line (first segment only, others broken off in genitalia mount).

The genitalia differs from the figure given by Edwards only by having the dististyle somewhat excavated on the distal end instead of being slightly enlarged. Such a difference could be attributed to variations in mounting technique, and so I do not consider it significant.

Material examined: 1 male, Fallen Leaf, Lake Tahoe, June 17, 1916, H. G. Dyar.

#### *Podonomus* species

Material examined: 4 females, Nevada Co., Northwest of Cisco, May 16, 1948, W.

This is apparently a new species closely related to *Podonomus kiefferi* (Garrett) and *P. arietinus* (Coquillett) but in the absence of the male I prefer not to describe it.

The species appears to differ from the aforementioned species by having the halteres entirely black instead of with a whitish pedicel and by having the abdomen yellowish-brown instead of black.



In addition to the specimens listed above, I have studied an additional female that differs in some particulars and possibly represents a distinct species. In USNM: 1 female, Topaz Lake, Mono Co., July 25, 1948, light trap, R. Coleman.

### Subfamily Diamesinae

#### *Pseudodiamesa (Pseudodiamesa) branicki* (Nowicki)

Although this species was not represented by males in the collection at hand, the characteristics given by Oliver (1959) for the female are considered diagnostic. In the two specimens that I have seen, the thorax is blackish-brown with only the pronotum and scutellum a lighter brown. The halteres are yellowish-white with the stalk infusate. Wing length 5.73, 5.92 (2); fore tarsi missing; venarum ratio 0.72, 0.76 (2).

Material examined: 2 females, Blanco's Corral, White Mt., Mono Co., July 7, 1953, elevation 10,000 feet, W. D. McLellan.

#### *Pseudodiamesa (Pseudodiamesa) diastena*, new species

FIGURES 7b,c

Holotype male: USNM 65522, Mill Valley, Marin Co., Apr. 12, 1953, H. L. Mathis.

Antennal flagellum heavily haired. Postocular bristles in single row below eyes, expanding to form staggered double row behind eyes, then becoming staggered single row toward dorsal part of head; each row terminates even with narrow dorsal eye extension. Eyes bare. About 10 clypeal bristles. Palpi with first and second segments fused, indicated by constriction, ratio  $41(13+28):30:35$ . Antennal ratio 2.75.

Head, thorax, and abdomen black. Prothorax with only 14 lateral bristles; no dorsal bristles; somewhat narrowed dorsally; two halves contiguous. Halteres dark. Prealar bristles 15; dorsolateral bristles partially in double row, forming cluster of 7 bristles just anterior to scutellum; scutellum with about 48 strewn bristles; anterolateral bristles absent.

Fourth tarsal segment on hind leg cylindrical. Fore leg with single long straight tibial spur, ratio of spur length: diameter of tibial apex 70:50. Tibial spurs of middle leg with many encircling fine hairlike denticles, ratio of length of spurs 50:60. Hind tibial spurs as middle leg, ratio 55:75. Comb of 10 bristles at apex with 3 rows of equal-sized bristles just basally, each row decreasing in number.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	60	74						
Middle		67	78					
Hind	75	91	52	27	19	8		0.57



The specimen apparently got wet; the wings were crumpled, with the result that, when a slide preparation was made, the membrane was rubbed as it was flattened under the cover slip; however, there appear to be the alveoli of sparse macrotrichia near the wing tips. Cross vein m-cu narrowly separated from r-m.

This species may be recognized by its genitalia, which is similar to *Pseudodiamesa pertinax* (Garrett) and *P. branicki* (Nowicki), but which has an anal point more slender than either of the two, and in which the basal lobe of the basistyle extends more distally. The dististyle with its spine hidden from a dorsal view appears also to be distinctive; however, this may be the result of a slide-mounting variation.

Allotype: In USNM: Topotypic, Apr. 12, 1953, H. L. Mathis.

Similar to male in coloration and most body features except that second palpus segment longer than first, to which fused; second segment with distinct swelling. Genital plates lamellate with virtually no ventral elongation. Fourth tarsal segments shortened but not distinctly obcordate.

#### *Prodiamesa (Monodiamesa) species*

There is only one North American record of the subgenus, namely, *Prodiamesa (Monodiamesa) bathyphilia* Kieffer, an identification based on a larva. Brundin (1951) questions the identity of this North American material. The female at hand will not resolve the question raised by him as only males can be specifically identified with certainty. I believe this specimen to represent a new species but have not so named it because of lack of definitive characteristics in the female. To my knowledge this is the first North American record of the subgenus based on adults.

Material examined: In UCLA: 1 female, Whitmore Tub, Mono Co., Aug. 3, 1952, McDonald.

#### *Diamesa fulva* Johannsen?

*Diamesa fulva* Johannsen, Ent. News, vol. 32, p. 229, 1921.

Head yellowish; antennal pedicel yellow, flagellum black. Eyes without dorsal extension, glabrous. Palpi black; second segment without swelling; subcylindrical.

Prothorax infusate yellow. Mesonotum and scutellum pale cinnamon brown; vittae not distinct; overlaid with white pollen. Scutellum rounded above; apex not pointed; postnotum blackish-brown; sternopleuron yellowish, somewhat darker on sternum; halteres white.

Fore coxa, trochanter, and extreme base of femur yellow; remainder of leg black. Middle and hind femora and tibiae infusate yellow; narrow black above and below knee and at apex of tibiae;



basitarsi infusate yellow basally, apically black as in remainder of tarsus. Fourth tarsal joint obcordate. Fore leg ratio 0.81; middle leg ratio 0.51; hind leg ratio 0.62.

Wings yellowish-brown by transmitted light; C extended; m-cu intersects  $Cu_1$  near base; anal vein reaches far beyond f-Cu. Wing length 2.41 mm.; venarum ratio 0.91.

Abdomen black, with apex of each segment somewhat lighter; venter yellow becoming black at segment VII.

This identification is queried in absence of the male with its diagnostic genitalia.

Material studied: 1 female, 4 miles west of Quincy, Plumas Co., July 16, 1949, W. F. Ehrhardt.

*Diamesa nivorunda* (Fitch)?

*Chironomus nivorundus* Fitch, Amer. Journ. Agric. Sci., vol. 5, p. 282, 1847.

*Diamesa waltli* Johannsen, New York State Mus. Bull., no. 86, p. 174, 1905, not Meigen, Syst. Besch., vol. 7, p. 13, 1838.

Head, thorax, and abdomen entirely black except halteres, venter of abdomen, and genitalia. Antennal flagellum 7-segmented; first segment slightly less than two times length of segments 2 to 6; length of segment 7 four times 6. Postoculars in single row behind eyes, extending to ventral surface of head. Eyes rounded above, hairy. Palpi ratio 40:55:60:90; second segment dilated distally, then narrowly constricted just before joint.

Prothorax with 13 small lateral bristles; lobes completely divided but with posterior margins in contact. Mesonotum strong greyish pruinosity. Halteres yellowish-white. Body length 3.80 mm. Supra-alar bristles absent; prealar bristles 8, small; dorsomedial bristles absent; dorsolateral bristles in single row; scutellum with 30 to 35 bristles, scattered; dorsolateral bristles continuous onto shoulder with only 1 bristle lateral to main line of bristles.

Fourth tarsal segment cordiform; empodium long, with many lateral branches; claws with 4 basal teeth that are long and attenuate; comb of 17 spines; inner tibial spur long and sinuate, with heavy lateral prickles one half length; outer spur slightly bent with long prickles half length, ratio 44:70.

Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta</i> <sub>1</sub>	<i>Ta</i> <sub>2</sub>	<i>Ta</i> <sub>3</sub>	<i>Ta</i> <sub>4</sub>	<i>Ta</i> <sub>5</sub>	<i>Leg Ratio</i>
Fore	70	96	65	30	20	6	9	0.68
Middle	86	90	41	21	15	8	9	0.45
Hind	98	105	65	35	20	7	9	0.62

Wings large, anal lobe strongly right angled; C produced (0.12 mm.);  $R_1$  dilated distally, clavate;  $R_{2+3}$  distinctly only on basal one-third;



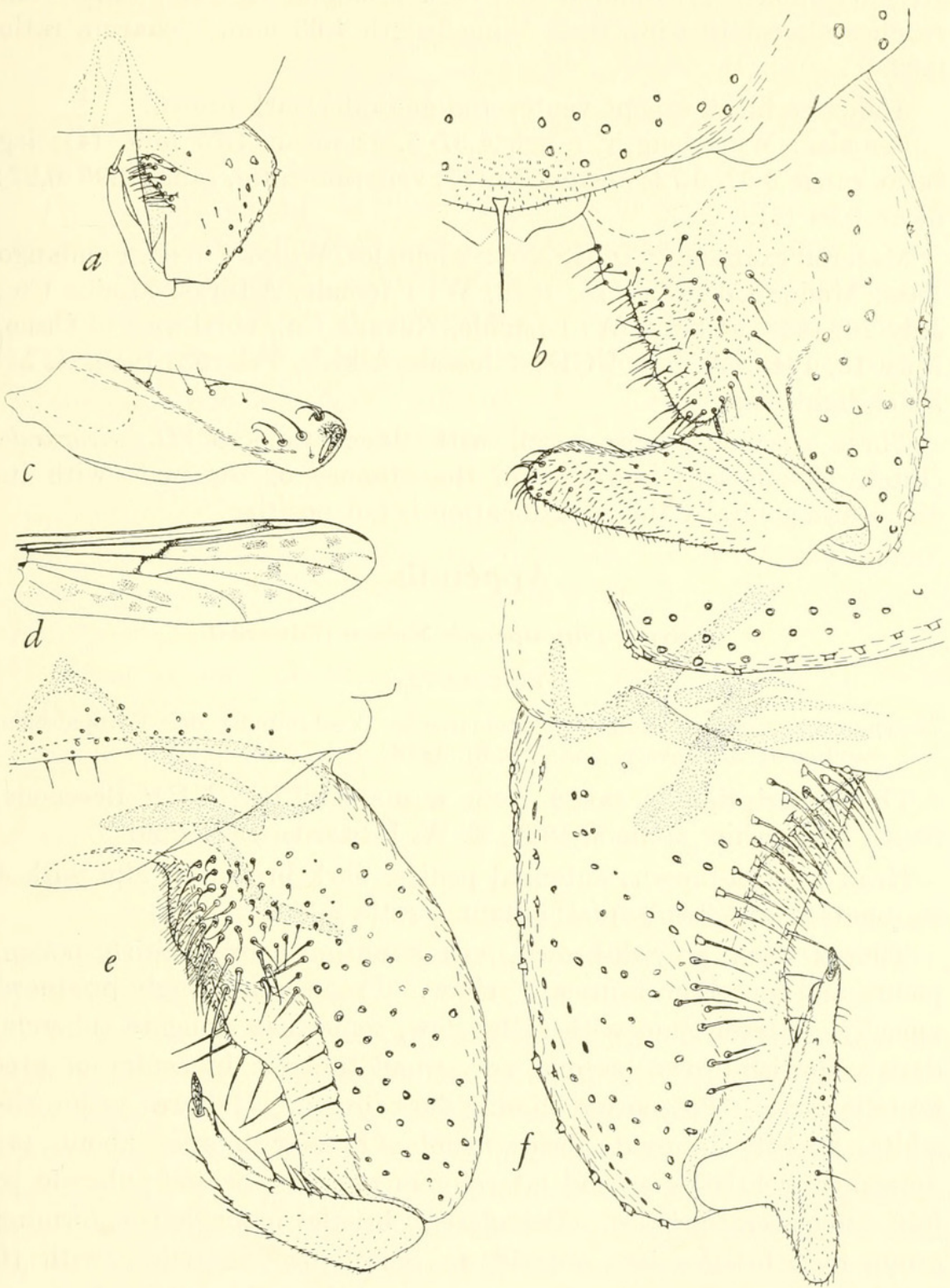


FIGURE 7.—*Boreochlus persimilis* (Johannsen): *a*, male genitalia. *Pseudodiamesa (P.) diastena*: *b*, male genitalia; *c*, dististyle of male genitalia, ventral view. *Tanypus punctipennis* Meigen: *d*, wing; *e*, male genitalia. *Procladius culiciformis* (Linnaeus): *f*, male genitalia.



R<sub>4+5</sub> terminates proximal to M; f-Cu proximal to r-m. Anal vein reaches almost to wing tip. Wing length 4.63 mm.; venarum ratio 0.92.

Abdomen black except venter and genitalia dark brown.

Females: Wing length, range 4.37–5.11; mean 4.75 mm. (4); leg ratio, range 0.67–0.72; mean 0.70 (4); venarum ratio, range 0.90–0.97; mean 0.94 (4).

Material examined: In USNM: 2 females, Willow Creek, Fandango Pass, Modoc Co., May 15, 1948, W; 1 female, Alturas, Modoc Co., July 16, 1948, at light, W; 1 female, Nevada Co., northwest of Cisco, May 16, 1948, W. In UCD: 1 female, Ukiah, Feb. 23, 1959, S. M. Fidel, light trap.

These specimens agree well with descriptions of *D. nivorunda* (Fitch) Johannsen; however, in the absence of the male with its diagnostic genitalia this identification is not positive.

## Appendix

### *Tanypus punctipennis* Meigen (Edwards)

FIGURES 7*d,e*

*Tanypus punctipennis* Meigen, Systematische Beschreibung der Europäischen zweiflügeligen Insekten, vol. 1, p. 61, 1818.

This description is taken from a male in BM(NH): Beesands, South Devonshire, June 8, 1920, F. W. Edwards, 1920–229.

Head greyish-brown; antennal pedicel dark brown. Palpi with 4 segments, 1 and 2 subequal; antennal ratio 2.14.

Thorax dark greyish-brown, vittae outlined by whitish pollen, pleura and scutellum infusate yellow. Pronotum strongly produced apically. Mesonotum with rather low, somewhat elongate tubercle, dark yellowish-brown; second very small tubercle in center of pre-scutellar area. Postnotum shining dark brown. Halteres yellowish-white, slightly infusate below knob. Prealar bristles about 14; dorsomedial bristles extend laterally in one row behind tubercle to join dorsolateral bristles. Dorsolateral bristles in single row forming group of 3 bristles just anterior to scutellum. Scutellum with 16 bristles in posterior transverse row. Anterolateral bristles 3 to 5.

Fore tarsi with beard 6 times tarsal diameter; femora infusate with clear yellow subapical fascia, space between yellow fascia and joint darker than remainder; thus in certain lights femora appears dusky with dark brown apical band. Tibiae infusate yellow, with distinct, rather broad sub-basal brown band, apex narrowly darkened as are apices of tarsal segments 1 to 3; 4 and 5 largely dark.



## Leg proportions:

	<i>F</i>	<i>Ti</i>	<i>Ta<sub>1</sub></i>	<i>Ta<sub>2</sub></i>	<i>Ta<sub>3</sub></i>	<i>Ta<sub>4</sub></i>	<i>Ta<sub>5</sub></i>	<i>Leg Ratio</i>
Fore	70	85	72	34	25	17	10	0.85
Middle	73	82	71	32	22	14	10	0.86
Hind	67	105	95	52	37	22	14	0.90

Wing length 3.40 mm.; venarum ratio 1.08.

Goetghebuer's figure in "Die Fliegen" is in error; the spots in cell  $R_5$  are progressively larger distally with the most basal one so small as to be scarcely distinguishable; there is no distinct spot in the base of cell M, only a faint shadow; cell  $Cu_1$  has a distal dark spot and, near the center, a larger less distinct one; above and beyond the tip of the anal vein is a dark spot and, along its anterior margin, two more, one below f-Cu and the other below m-cu; on the anal margin of the wing are 4 spots, the distal 2 being more or less doubled; r-m cross vein with a large dark blotch, the m-cu cross vein darkened, faintly darkened along M proximal to cross vein. Costal margin clear except for distinct spot at  $R_1$  and faint cloud above large dark r-m spot.

Abdomen dark brown, each segment with narrow apical dusky yellow fascia.

Setae of basal lobe of basistyle heavier than distal ones.

Male: Wing length 3.92 mm.; fore leg ratio 0.80; antennal ratio 2.44; venarum ratio 1.04; anterolateral bristles 4; prealar bristles about 15.

Females: Wing length, 3.51 3.89 mm. (2); fore leg ratio, 0.73, 0.83 (2); venarum ratio 1.01, 1.08 (2); anterolateral bristles 10 (1); prealar bristles about 16 (1).

In one female the pronotum was exceedingly produced, the dorsolateral bristles in a single row becoming about tripled anterior to the scutellum. In the second female the pronotum was moderately produced, the dorsolateral bristles in a single staggered row becoming tripled. In a second male the pronotum was moderately produced, the dorsolateral bristles, as the second female above, forming a group of 10 bristles at the posterior end of the the dorsolateral bristles; the mesonotum was ash grey. Legs infusate yellow with dark band above and below knee.

Material examined: In BM(NH): 1 male, 2 females, London, Putney, June 10, 1929, F. W. Edwards, B. M. 1929-297; Ormsby, June 22, 1888, G. H. Verall, 93.-36; Radwell, Hertfordshire, June 15, 1917, F. W. Edwards.



*Procladius culiciformis* (Linnaeus)

## FIGURE 7f

*Tipula culiciformis* Linnaeus, Systema naturae, ed. 12, p. 978, 1767.

*Tanypus choreus* Meigen, Klassifikation und Beschreibung der Europäischen zweiflügeligen Insekten, vol. 1, p. 23, 1804, new synonymy.

I have examined a series of specimens from the British Museum (Natural History) identified by F. W. Edwards as *P. culiciformis* (Linnaeus) and *P. choreus* (Meigen). Although slight differences in size and color exist between the series I have seen, the chaetox, ratios, and genitalia are not significantly different. Essential features are compared below from Edward's material.

	P. culiciformis		P. choreus	
	male (1)	female (1)	males (2)	females (2)
wing length	3.07	2.92	3.15-3.51	3.15-3.29
fore leg ratio	0.69	0.69	0.73-0.74	0.67-0.69
middle leg ratio	0.66	0.62	0.60-0.64	0.58-0.64
hind leg ratio	0.68	0.65	0.64-0.68	0.64-0.65
antennal ratio	2.08		2.00-2.41	
venarum ratio	1.40	1.46	1.37-1.53	1.43-1.55
prealar bristles	19		20	
dorsolateral bristles	mostly 1 row		mostly 1 row	
dorsomedial bristles	2 rows		2 rows	
anterolateral bristles	8		8	

The males identified by Edwards as *P. choreus* had a short, sparse beard about 4 times as long as the diameter of the tarsus while the specimen of *P. culiciformis* had hairs no longer than 3 times the diameter of the tarsus. In the absence of genitalia differences this beard difference could be construed as only varietal.

Material examined: In BM(NH): 2 males, Radwell, Hertfordshire, May, 1918, F. W. Edwards; 1 female, Slapton, South Devonshire, June 9, 1920, F. W. Edwards; 1 female, Ruislip, Middlesex, Sept. 7, 1914, F. W. Edwards [determined as *P. choreus* (Meigen)]; 1 male, 1 female, Radwell, Hertfordshire, June, 1918, F. W. Edwards [determined as *P. culiciformis* (Linnaeus)].



## References

### BRUNDIN, LARS

1951. Zur Kenntnis der Taxonomie und Metamorphose der Chironomidengattungen: *Protanypus* Kieff., *Prodiamesa* Kieff. und *Mono-diamesa* Kieff. Inst. Freshwater Res., Drottningholm, no. 33, pp. 39-53.

### EDWARDS, F. W.

1929. British non-biting midges (Diptera, Chironomidae). Trans. Ent. Soc. London, vol. 77, no. 2, pp. 279-430.

### FITTKAU, ERNST JOSEF

1957. *Thienemannimyia* und *Conchapelopia*, zwei neue Gattungen innerhalb der *Ablabesmyia-Costalis*-Gruppe (Diptera, Chironomidae), VII: Chironomidenstudien. Arch. Hydrobiol., vol. 53, no. 3, pp. 313-322.

### FREEMAN, PAUL

1955. A study of African Chironomidae, Part I. Bull. British Mus. (Nat. Hist.) Ent., vol. 4, no. 1, pp. 1-67.

### GOETGHEBUER, MAURICE

- 1936a. Tendipedidae (Chironomidae). In Lindner, Die Fliegen der Palaearktischen Region, Lief. 97, pp. 1-48.  
1936b. Tendipedidae (Chironomidae). In Lindner, Die Fliegen der Palaearktischen Region, Lief. 100, pp. 49-81.

### JOHANNSEN, O. A.

1946. Revision of North American species of the genus *Pentaneura* (Tendipedidae: Chironomidae, Diptera). Journ. New York Ent. Soc., vol. 54, pp. 267-289.  
1952. Family Tendipedidae (= *Chironomidae*) except Tendipedini. In Guide to the insects of Connecticut, Part VI: The Diptera or true flies of Connecticut, Fasc. 5: Midges and gnats, pp. 3-26. State Geol. Nat. Hist. Surv. Bull., Connecticut, no. 80, 255 pp.

### MALLOCH, JOHN R.

1915. The Chironomidae, or midges, of Illinois, with particular reference to the species occurring in the Illinois River. Bull. Illinois State Lab. Nat. Hist., vol. 10, pp. 275-543.

### OLIVER, D. R.

1959. Some Diamesini (Chironomidae) from the Nearctic and Palearctic. Ent. Tidsk., vol. 80, pp. 48-64.

### ROBACK, SELWYN S.

1957. The immature tendipedids of the Philadelphia area. Monogr. Acad. Nat. Sci. Philadelphia, no. 9, 152 pp.  
1959. The subgenus *Ablabesmyia* of *Pentaneura* (Diptera; Tendipedidae; Pelopiinae). Trans. Amer. Ent. Soc., vol. 85, pp. 113-135.









1964. "Chironomid midges of California. II. Tanypodinae, Podonominae, and Diamesinae." *Proceedings of the United States National Museum* 115, 85–136.

**View This Item Online:** <https://www.biodiversitylibrary.org/item/53489>

**Permalink:** <https://www.biodiversitylibrary.org/partpdf/52431>

**Holding Institution**

Smithsonian Libraries and Archives

**Sponsored by**

Smithsonian

**Copyright & Reuse**

Copyright Status: Public domain. The BHL considers that this work is no longer under copyright protection.

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.