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## The *Pusio* Group of the Genus *Fannia* Robineau-Desvoidy, with Descriptions of New Species (Diptera, Muscidae)

BY JOHN M. SEAGO<sup>1</sup>

Studies of flies collected during fly-control programs of the Communicable Disease Center and of flies from the collections of various institutions and individuals have revealed three new species of *Fannia* allied to *pusio* (Wiedemann) and have added numerous distribution records. A study was made of the male genitalia, and drawings of the important structures used in identification are presented.

The holotypes of all new species described are deposited in the American Museum of Natural History.

The *pusio* group may be characterized as small species, 2.5 to 3.5 mm. in length, in which the males have the intermediate segments of the abdomen trimaculate dorsally and with legs and thoraces black. In the Americas there are five described species: *Fannia pusio* (Wiedemann), *femoralis* (Stein), *howardi* Malloch, *leucosticta* (Meigen), and *trimaculata* (Stein). *Punctiventris* Malloch, though not typically a member of the *pusio* group, is included because it was compared to *trimaculata* in the original description.

The males may be separated by the following key:

### KEY TO MALES

1. Hind femur with a distinct pre-apical swelling or prominence ventrally which is visible in direct anterior aspect (figs. 2 to 7) . . . . . 2  
Hind femur of rather uniform thickness to the apical one-fourth; at most

<sup>1</sup> Entomologist, Communicable Disease Center, Public Health Service, United States Department of Health, Education, and Welfare, Atlanta, Georgia.

- with a slight posteroventral pre-apical callosity which is not visible in direct anterior aspect (figs. 8 to 12) . . . . . 6
2. Hind tibia with long, soft, hair-like bristles ventrally (figs. 1 and 2) . . . . . *pusio* (Wiedemann)  
Hind tibia without long, soft, hair-like bristles ventrally, at most with a few short bristles present . . . . . 3
3. Hind femur with only one strong, pre-apical anteroventral bristle, ventral surface densely haired, especially on basal half (figs. 3 and 4) . . . . . *dodgei*, new species  
Hind femur with more than one strong pre-apical anteroventral bristle, ventral surface with scattered hairs (figs. 5 to 7) . . . . . 4
4. Hind femur with a rather evenly rounded, knob-like, and densely bristled pre-apical prominence on ventral surface; anteroventral and posteroventral surfaces otherwise essentially bare (fig. 5) . . . . . *snyderi*, new species  
Hind femur with pre-apical swelling neither strong nor heavily bristled, the anteroventral and posteroventral surfaces with outstanding bristles, at least on the apical half (figs. 6 and 7) . . . . . 5
5. Hind femur with the three or four strong pre-apical anteroventral bristles curled and hair-like at apices and distinctly longer than the corresponding pre-apical posteroventral bristles (fig. 6) . . . . . *femoralis* (Stein)  
Hind femur with the three or four strong pre-apical anteroventral bristles not curled or hair-like at apices and distinctly shorter than the corresponding pre-apical posteroventral bristles (fig. 7) . . . . . *sabroskyi*, new species
6. Hind femur with only one strong anteroventral bristle on apical third (figs. 8 and 9) . . . . . 7  
Hind femur with two or more strong anteroventral bristles on apical third (figs. 10 and 11) . . . . . 8
7. Hind femur with a row of 10 to 12 evenly spaced anteroventral bristles extending to base of femur; posteroventrally with a series of progressively longer bristles beginning at base and terminating near apex (fig. 8) . . . . . *howardi* Malloch  
Hind femur with a series of seven or eight straight, closely placed, hair-like bristles on the middle third of anteroventral surface; posteroventrally with a row of progressively longer bristles beginning near middle and terminating at apical one-fifth (fig. 9) . . . . . *trimaculata* (Stein)
8. Hind femur with a complete row of rather strong anteroventral bristles; posteroventrally without callosity, but with a row of seven or eight progressively longer bristles which begin near base and terminate one-third before apex (fig. 10) . . . . . *leucosticta* (Meigen)  
Hind femur with two strong pre-apical anteroventral bristles, and almost directly opposite them on a slight callosity on the posteroventral surface a group of five or six long, hair-like bristles which are slightly curled at their apices (figs. 11 and 12) . . . . . *punctiventris* Malloch

*Fannia snyderi*, new species

#### Figures 5, 18-20

Small blackish species with male abdomen trimaculate dorsally on the intermediate segments; antennae, palpi, and legs black.

MALE: Eyes bare, closely approximated, separated by less than the distance across posterior ocelli, orbits silvery; 10 to 11 frontal bristles;

antennae blackish gray, arista short pubescent; parafacial at about middle of its length approximately one-fifth of the width of the third antennal segment at its greatest width, frontal setae extending beyond middle of third antennal segment; palpi black, slightly clavate.

Thorax black, non-vittate, grayish pruinescence visible in some views. Dorsocentrals 2:3, acrostical setulae in three rows and with the usual pair of strong prescutellar acrosticals; pre-alar bristle small, duplicated. Abdomen blackish brown. In posterodorsal aspect the markings of tergite two are broadly coalesced, tergites three and four exhibit an elongate dorsal and a pair of lateral dark brown spots, tergite five with only the single dorsal vitta. The abdominal markings are made more conspicuous in this view by the silver-gray pruinescence of the remainder of the tergites. As the abdomen is tilted so that it is viewed from a more dorsal position, the whole dorsum darkens until the spots are hardly visible. Fifth sternite transverse posteriorly (fig. 20). Hypopygium small, not protruding (fig. 18). The inferior forceps as figured (fig. 19).

Legs black. Fore tibia with one pre-apical dorsal bristle. Middle coxa without spines; mid-femur anteroventrally with a row of 11 to 12 rather strong bristles which become more closely set and somewhat stouter at apical one-third and end with four to six short setae on apical one-fifth; posteroventrally a row of bristles, the row becomes double at middle, then more dense and spinose shortly before apex. Middle tibia gradually thickened apically, the ventral pubescence sparse, but long, at least half as long as the diameter of the tibia at its greatest thickness; with one pre-apical dorsal bristle, one anterodorsal bristle at apical one-fourth, and one posterior bristle at apical two-fifths. Posterior coxa with one or two hair-like bristles behind. Posterior femur with a distinct, knob-like, densely bristled prominence on ventral surface shortly before apex; except for a few setulose hairs basally, the anteroventral and posteroventral surfaces are essentially bare (fig. 5). Posterior tibia with one pre-apical and one submedian dorsal bristle, a row of five or six anterodorsal bristles, and one submedian anteroventral bristle. All tarsi simple.

Wings clear. Squamae whitish, lower lobe distinctly protruding. Halteres whitish yellow.

**FEMALE:** Similar to the male in color with the exception of the abdomen which is shining black. Frontal setae extending well beyond base of third antennal segment, frontal triangle extending to middle of frons, parafrontals shining black, with a trace of silvery pruinescence laterally; parafacials silvery pruinulent and at about middle of their length, approximately one-fifth of the width of the third antennal segment at its greatest width.

Legs black. Fore tibia with only the pre-apical dorsal bristle; middle



trally with a somewhat irregular row of progressively longer bristles beginning on basal one-fourth and ending pre-apically with bristles which are slightly curled at their apices (fig. 4). Hind tibia with one pre-apical and one submedian dorsal bristle; a row of seven or eight anterodorsal bristles; and a single anteroventral bristle at apical one-third. All tarsi simple.

Female unknown.

Length, 2.5 to 3 mm.

TYPE MATERIAL: Holotype, male, David, Republic of Panama, June 8, 1943 (F. M. Snyder collector); paratypes: one male, Turbo, Colombia, June 2, 1943 (F. M. Snyder collector), returned to Snyder; one male, Pinar del Rio, Cuba, May 16, 1953 (F. de Zayas), in Communicable Disease Center collection.

Named in honor of Dr. Harold R. Dodge.

*Fannia sabroskyi*, new species

Figures 7, 16

Similar to *snyderi* in size and color. Differs in chaetotaxy of hind femur.

MALE: Structurally similar to that of *snyderi*. Hind femur with a distinct pre-apical swelling on ventral surface which is similar to that of *femoralis*; a row of 11 or 12 anteroventral bristles beginning on basal one-fourth and terminating on the pre-apical swelling (fig. 7). These bristles are of rather uniform length, with the exception of the basal two or three which are shorter. Posteroventrally a row of 10 to 11 bristles which begin on basal one-fourth, become progressively longer, and end pre-apically. The apical three or four posteroventral bristles are slightly curled at their apices and are distinctly longer than the corresponding anteroventral bristles. Inferior forceps as in figure 16.

*Sabroskyi* is easily separated from its closest ally, *femoralis*, by the characters outlined in the above key.

FEMALE: Very similar to that of *snyderi*, differing chiefly in the extent of the pollinosity on the parafrontals. In *sabroskyi* the parafrontals are entirely shining black.

Length, 2.5 to 3.5 mm.

TYPE MATERIAL: Holotype, male, and allotype, female, Kaieteur, British Guiana, August 6, 1911; paratypes: three males and four females, same data as holotype; four males and five females, Tukeit, British Guiana, July 17 and 18, 1911; two females, Bartica District, British Guiana, March 30 and April 26, 1924. Paratype distribution: Communicable Disease Center Museum, United States National Museum, the American Museum of Natural History, and F. M. Snyder collection.

Named in honor of Mr. Curtis W. Sabrosky.

In the material from the American Museum of Natural History is a single male which is identical to *sabroskyi* in every respect except for a pair of modified bristles on the fifth tergite. These sublateral, marginal bristles have their apices abruptly recurved and slightly flattened. In the absence of other material which exhibits this character, the writer is inclined to believe that this specimen is an aberration. This specimen, labeled "Shudihar R., British Guiana, W. G. Hassler," is not included in the type series of *sabroskyi*.

*Fannia femoralis* (Stein)

Figure 6

*Homalomyia femoralis* STEIN, 1897, Berliner Ent. Zeitschr., vol. 42, p. 282.

*Fannia femoralis* was described from Opelousas, Louisiana, from material in the Hough collection. In the original description, Stein points out that *femoralis* is very similar to *pusio* Wiedemann, differing mainly in the bristling of the hind tibiae. One of the specimens on which the description was based has been examined by the writer.

The parafrontals of the females are uniformly pollinose. Stein in 1911 stated that the females of *femoralis* have the parafrontals shining black. This statement was based on a female from Umahaunkiali, Peru, which is probably another species.

DISTRIBUTION OF MATERIAL EXAMINED: Charleston, West Virginia; Wilmington, North Carolina; Athens, Tennessee; De Kalb County, Georgia; Auburn, Alabama; Opelousas, Louisiana; Plainview, Illinois; Marathon, Menard, and Uvalde, Texas; Phoenix, Arizona; Sonoma County, California; Socorro, New Mexico; "Atzcapico" (possibly Atzcapotzaltongo near Mexico City), Mexico; and Pinar del Rio, Cuba (F. de Zayas).

*Fannia howardi* Malloch

Figures 8, 17

*Fannia howardi* MALLOCH, 1911, Proc. U. S. Natl. Mus., vol. 44, no. 1972, p. 626.

This is a common and widespread species described from Washington, D. C. It is easily confused with *trimaculata* Stein but may be distinguished quite readily by the bristling of the hind femur as outlined in the above key. Records published by Stein and Malloch of *trimaculata* occurring in the continental United States have been based on misidentification of this species. Stein reported *trimaculata* from Louisiana; however, four males bearing his determination label, which were presumably the basis of his

report, were reexamined and found to be *howardi*. Malloch's omission of *howardi* in his key to species published in 1924 has undoubtedly led to many misidentifications by persons not familiar with the previous literature.

The female has very slightly pollinose parafrontals, the pollinosity only slightly stronger along the margins of the eyes.

DISTRIBUTION OF MATERIAL EXAMINED: Flushing, New York; Muskegon, Michigan; Washington, D.C.; Charleston, West Virginia; Athens, Tennessee; Montgomery, Alabama; Tifton, Thomasville, De Kalb, and Rabun counties, Georgia; Robeline, New Iberia, and Opelousas, Louisiana; Lafayette, Indiana.

*Fannia leucosticta* (Meigen)

Figure 10

*Anthomyia leucosticta* MEIGEN, 1826, Systematische Beschreibung der bekannten Europäischen zweiflügeligen Insecten, vol. 7, p. 328.

*Homalomyia brevis* RONDANI, 1866, Atti Soc. Italiana Sci. Nat. Mus. Civ. Stor. Nat. Milano, vol. 9, p. 132.

This species is the only European representative in the group. Malloch (1924a) expressed the opinion that *leucosticta* did not occur in the United States; however, it has been identified in numerous fly-trap collections of the United States Public Health Service. One specimen in the Hough collection from Tifton, Georgia, determined by Stein as *brevis* Rondani, was reexamined and found to be *howardi*.

The female of *leucosticta* can be separated from *punctiventris* by the absence of the two submedian ventral bristles on the mid tibia. These bristles are present in *punctiventris*. Both species have pollinose abdominal markings, in contrast to the shining black abdomens of females of the other known species of the group.

DISTRIBUTION OF MATERIAL EXAMINED: Baltimore, Maryland; Troy, New York; Clintonville, Wisconsin; Muskegon, Michigan; Charleston, West Virginia; De Kalb County, Georgia; Topeka, Kansas; Portland, Oregon; Dizagmehr (near Shafar Khaneh), Iran; and Kamba via Sokoto, British Nigeria.

*Fannia punctiventris* Malloch

Figures 11-13

*Fannia punctiventris* MALLOCH, 1934, Diptera of Patagonia and South Chile, pt. 7, fasc. 2, p. 207.

The writer has not seen material of this species. The holotype in the British Museum (Natural History) was examined by Dr. van Emden

at the request of the writer. Mr. Sabrosky examined the paratype at the United States National Museum. The brief description that follows is based on the comments and sketches of Mr. Sabrosky and Dr. van Emden, and on the original description.

The hind femur of *punctiventris* has two equally strong pre-apical anteroventral bristles, and on the posteroventral surface, almost directly across from the proximal anteroventral bristle, is a hardly perceptible callosity which bears five or six long, hair-like bristles which are slightly curled at their apices. This callosity is strictly posteroventral and is not visible in strict anterior aspect.

Malloch states in the original description that *punctiventris* has three series of black spots on the abdomen in both sexes and compares the coloration to that of *trimaculata*. However, the type male has a series of elongated dark median spots on each tergite and no indication of lateral spots in most views. In nearly posterior view, in addition to the median series of spots, each segment appears uniformly brown except for narrow apical and lateral areas which are grayish, giving the appearance of large lateral brown spots.

The female has the thorax densely gray dusted, with three brown vittae and the abdomen with three series of dark spots as in the male. With the exception of the mid-tibia, which has two submedian ventral bristles, the chaetotaxy of the legs is similar to that of other females in the group (after Malloch).

The holotype male and allotype female are from Santiago, and the single paratype is from Perales, Santiago, Chile.

DISTRIBUTION: This species is apparently known only from the type specimens.

*Fannia pusio* (Wiedemann)

Figures 1, 2, 15

*Anthomyia pusio* WIEDEMANN, 1830, Aussereuropäische Zweiflügelige Insekten, vol. 2, p. 437.

*Homalomyia femorata* LOEW, 1870, Wiener Ent. Monatschr., vol. 5, p. 43.

*Fannia trimaculata* Stein, ALBUQUERQUE, 1945, Bol. Mus. Nac., Rio de Janeiro, zool. ser., no. 34, p. 1.

*Fannia pusio* was originally described from South America by Wiedemann and redescribed from Cuba as *femorata* by Loew. This species is very closely allied to *femoralis*, from which it is easily separated by the presence of long, hair-like bristles on the ventral surface of the hind tibia. The hind tibia of *femoralis* is bare ventrally or with at most a few short bristles present. *Pusio* is also very distinct in genitalic characters, as noted in figure 15.



The females have the entire parafrontals pollinose, with the pollinosity stronger along the margins of the eyes.

DISTRIBUTION OF MATERIAL EXAMINED: Baltimore and Chesapeake, Maryland; Washington, D.C.; Chatham, Thomas, and De Kalb counties, Georgia; Gainesville, Bradenton, and Panama City, Florida; Opelousas, Louisiana; Galveston, Texas; Salta, Arizona; Lake Tortuguero, Puerto Rico; Santiago de Cuba; Nassau, Bahamas; Tampico, Mexico; Amatitlan, Guatemala; Trinidad, West Indies; Guadalupe; Honolulu, Hawaii; and Port Oca, Guam.

*Fannia trimaculata* (Stein)

Figure 9

*Homalomyia trimaculata* STEIN, 1897, Berliner Ent. Zeitschr., vol. 42, p. 176.

This species was described from Jamaica. It was reported by Stein (1897) from Louisiana, but these specimens proved to be *howardi*. Malloch (1934) records *trimaculata* as occurring from Montevideo, Uruguay, to as far north as Washington, D.C. However, the writer has never seen an authentic specimen of *trimaculata* from the United States. Specimens now in the United States National Museum from Washington, D.C., determined by Malloch and Aldrich and presumably the basis for Malloch's statement of occurrence there, are *howardi*.

*Trimaculata* is easily confused with *howardi* but can be readily distinguished by the characters outlined in the above key. The row of seven or eight hair-like bristles on the middle third of the anteroventral surface of the hind femur is easily recognized, and the basal and apical third of this surface is essentially bare except for the one strong bristle near the apex.

The parafrontals of the females are uniformly pollinose.

DISTRIBUTION OF MATERIAL EXAMINED: Jamaica; David, Republic of Panama; Rio de Janeiro, Brazil; Mayaguez, Puerto Rico; Sanchez, Dominican Republic; Aux Cayes, Haiti; Tegucigalpa, Honduras; Santo Domingo, West Indies; Guayaquil, Ecuador; Cabezas, Venezuela, and Gatun, Canal Zone, Panama.

MALE GENITALIA

To examine the male genitalia it is necessary to cut off the terminal abdominal segments with a pair of fine scissors. These segments must be cleared in a 10 per cent solution of sodium or potassium hydroxide, then washed in distilled water. The genitalia thus prepared are easily examined in a glycerin mount. A very satisfactory permanent mount can be prepared by running the genitalia through an alcohol series into cellosolve, clove oil, and finally into Canada balsam.

The terminology used (fig. 18) is based on Johannsen (1916). The superior forceps correspond to the cerci of Hockett (1924) and the mesolobe of Collin (1939). The inferior forceps of Johannsen are equivalent to the dististylus of Hockett and the parolobe of Collin. In the description of *Fannia americana*, Malloch referred to the superior forceps as the dorsal plate and the inferior forceps as the superior forceps. In figure 18 the aedeagus and accessory structures have been omitted for the sake of clarity.

Four of the nine species exhibit genitalic differences which are of taxonomic value. *Fannia punctiventris* (fig. 13) is the most distinct with the inferior forceps (fig. 13C) elongate and articulated basally and the fifth sternite (fig. 13B) deeply emarginate and densely bristled. The fifth sternite of *snyderi* (fig. 20) is typical for the remainder of the group, though there may be some variation in the arrangement of the bristles. *Leucosticta* (fig. 14) can be recognized by the absence of a basilateral process. *Howardi* (fig. 17) is distinct in having no apical anterior projection of the basilateral process. The inferior forceps of *pusio* (fig. 15) each form a rough triangle, especially in direct ventral view. The remaining four species are very similar to *snyderi* (fig. 19) in genitalic characters, differing only slightly in the conformation of the inferior forceps and the basilateral process. Owing to slight variation within a species, it is believed that these differences are not of taxonomic value.

#### KEY TO MALES BASED ON GENITALIA

1. Fifth sternite deeply emarginate posteriorly and densely bristled, forceps freely articulated basally (fig. 13) . . . . . *punctiventris* Malloch  
Fifth sternite nearly transverse posteriorly, forceps not articulated basally. 2
2. Inferior forceps with basilateral process extending parallel to its length (fig. 19) . . . . . 3  
Inferior forceps with basilateral process absent or projecting laterad (figs. 14, 15, 17) . . . . . 4
3. Width (greatest lateral extension) of basilateral process less than median thickness of inferior forceps (fig. 16) . . . . . *sabroskyi*, new species  
Width of the basi-lateral process greater than median thickness of inferior forceps (fig. 19) . . . . . *dodgei*, new species; *femoralis* (Stein); *snyderi*, new species; and *trimaculata* (Stein)
4. Inferior forceps in ventral view rather widened, not elongate nor acutely tapered apically, each forming a rough triangle (fig. 15) . . . . . *pusio* (Wiedemann)  
Inferior forceps in ventral view elongate and acutely tapered apically (figs. 14, 17) . . . . . 5
5. Inferior forceps with basilateral process distinct in ventral view (fig. 17) . . . . . *howardi* Malloch  
Inferior forceps with basilateral process absent, or at least not abruptly produced (fig. 14) . . . . . *leucosticta* (Meigen)

## ACKNOWLEDGEMENTS

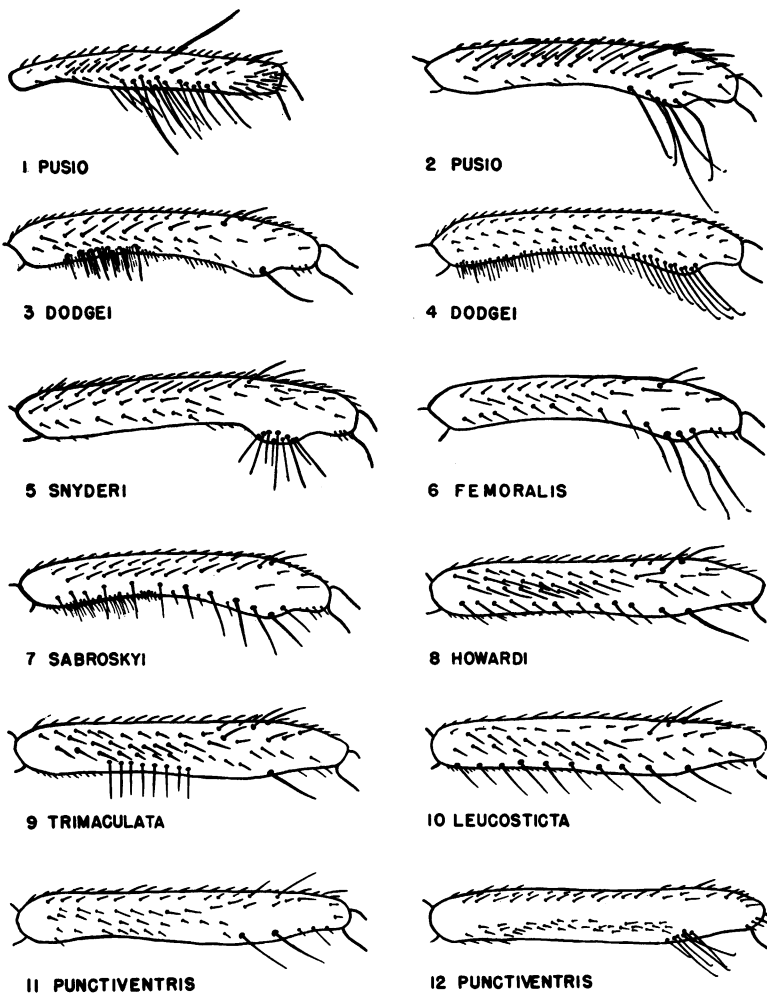
The writer is indebted to Mr. F. M. Snyder, Dr. H. R. Dodge, and Mr. C. W. Sabrosky for the loan of material and technical assistance, and to Dr. C. H. Curran and Dr. R. L. Wenzel for the loan of material. Thanks are also due Dr. van Emden for his kindness in reexamining the holotype of *punctiventris* Malloch.

## SUMMARY

The *Fannia pusio* group is discussed and a new key is presented to adult males. The key includes nine species: *Fannia pusio* (Wiedemann), *femoralis* (Stein), *howardi* Malloch, *trimaculata* (Stein), *leucosticta* (Meigen), and *punctiventris* Malloch, and three new species, *dodgei*, *sabroskyi*, and *snyderi*. In addition there are presented new distribution data on the previously described species, new characters for separating *howardi* and *trimaculata*, a key to males based on male genitalia, and 20 figures showing characters of the legs or male genitalia used in identification.

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FIGS. 1, 2. *Fannia pusio*. 1. Anterior view of hind tibia. 2. Anterior view of hind femur.

FIGS. 3, 4. *Fannia dodgei*, holotype, hind femur. 3. Anterior view. 4. Posterior view.

FIG. 5. *Fannia snyderi*, holotype, anterior view of hind femur.

FIG. 6. *Fannia femoralis*, cotype, anterior view of hind femur.

FIG. 7. *Fannia sabroskyi*, holotype, anterior view of hind femur.

FIG. 8. *Fannia howardi*, anterior view of hind femur.

FIG. 9. *Fannia trimaculata*, anterior view of hind femur.

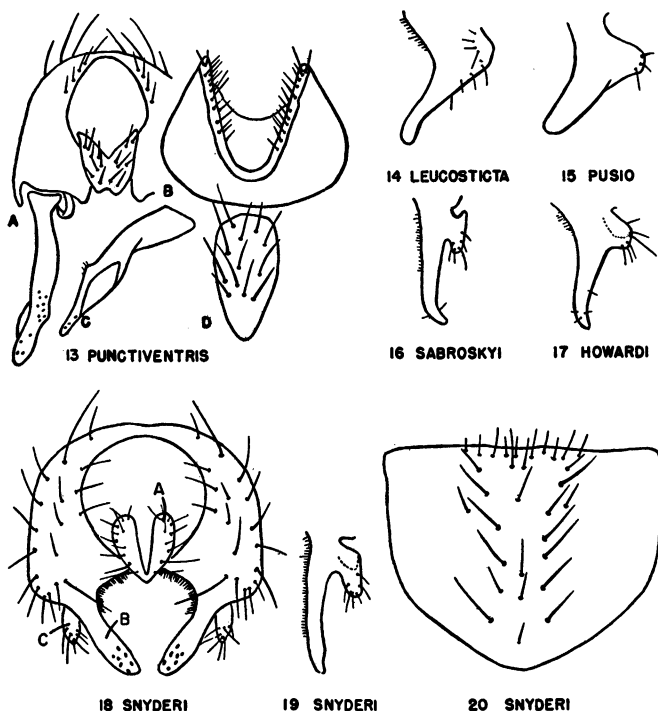
FIG. 10. *Fannia leucosticta*, anterior view of hind femur.

FIGS. 11, 12. *Fannia punctiventris*, paratype, hind femur. 11. Anterior view. 12. Posterior view.

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- FIG. 13. *Fannia punctiventris*, paratype. A. Ventral view of genitalia. B. Fifth sternite. C. Lateral view of interior forceps. D. Fourth sternite.  
 FIG. 14. *Fannia leucosticta*, ventrolateral view of inferior forceps.  
 FIG. 15. *Fannia pusio*, ventral view of inferior forceps.  
 FIG. 16. *Fannia sabroskyi*, ventrolateral view of inferior forceps.  
 FIG. 17. *Fannia howardi*, ventral view of inferior forceps.  
 FIGS. 18-20. *Fannia snyderi*, paratype. 18. Ventral view of genitalia. A. Superior forceps. B. Inferior forceps. C. Basilateral process. 19. Ventrolateral view of inferior forceps. 20. Fifth sternite.

