

# THE SARCOPHAGINAE OF PANAMA (DIPTERA: CALLIPHORIDAE)

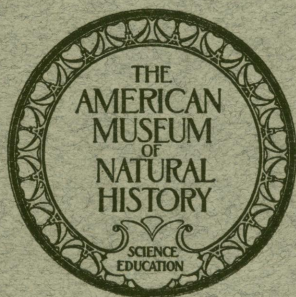
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BY DAVID G. HALL

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## Article II.—THE SARCOPHAGINAE OF PANAMA (DIPTERA: CALLIPHORIDAE)

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FIGURES 1 TO 26

The forty-two species listed in a key and reported herein comprise all of the Sarcophaginae known to occur in Panama. Twenty-four of them are described as new, and figures of the male genitalia of these are given. They are most interesting in the diversity of the male genitalia. All the species except nine belong in the genus *Sarcophaga*, *sensu lato*. The key and descriptions are based upon specimens of Sarcophaginae in The American Museum of Natural History, in the U. S. National Museum, and in the author's collection. With valuable collections made by Mr. C. H. Curran during the winter of 1928–1929, it seems advantageous to report on all of the Panama species at this time.

The old families Sarcophagidae and Calliphoridae are united in the family Calliphoridae, this name having precedence. They are alike in lacking a prominent postscutellum (Malloch, 1925, Ann. Mag. Nat. Hist., (9) XVI, p. 94). The family Calliphoridae is separated into the subfamilies Sarcophaginae and Calliphorinae, the Sarcophaginae being distinguished by the presence of four notopleural bristles and by the posthumeral bristle being mesad of the postsutural bristle (Girschner, 1893, Berl. Ent. Ztschr., XXXIII, p. 312). These characters are sufficient to separate the two subfamilies in Panama. There are no published characters to separate the two subfamilies of the world fauna into these two well-defined groups. In such a study it would not be surprising to find them considered as one family.

Several attempts have been made during the last few years to limit the size of the unwieldy genus *Sarcophaga*. These proposed systems are not satisfactory. Only a few of these genera show a natural relationship of the species included. The worker who divides a genus into a series of smaller genera should be well acquainted with all of the described species. In the genus *Sarcophaga*, only a few characters are known that will enable one to separate them into a series of well-defined smaller genera so that each of these will be large enough to be usable. The system of restricted genera in the Sarcophaginae results in almost as many genera

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as species, thus creating a confusion of names. This system does, however, result in giving a true natural relationship of the species which fall under the same generic name.

The student desiring the correct identification of a sarcophagid fly should not have man-made obstacles to confuse him. The identification of these flies should be made simple so that he can find the name of any species. In the present paper, therefore, all of the species in the several genera are included in one key and most of them are placed in the genus *Sarcophaga*.

Since female specimens show but a few specific characters, all identifications are made upon male specimens. The female sarcophagid exhibits some characters that are of generic value, but it would be unfortunate indeed to set up generic names on characters of female specimens and specific names on male characters.

#### KEY TO GENERA

- 1.—Propleurae with hair.....2.
- Propleurae without hair.....3.
- 2.—Three posterior dorsocentral bristles.....NOTOCHAETOPHYTO Hall.
- Two posterior dorsocentral bristles.....NOTOCHAETA Aldrich.
- 3.—Fifth vein with setulae.....JOHNSONIA Coquillett.
- Fifth vein without setulae.....4.
- 4.—Orbital bristles present in male.....5.
- Orbital bristles absent.....6.
- 5.—Head elongate, metacephalon produced behind.....SAROTHROMYIA Aldrich.
- Head-length normal.....SARCOPHAGULA Van der Wulp.
- 6.—First genital segment of male enlarged; abdomen with truncated appearance..7.
- Male abdomen of normal shape.....8.
- 7.—Vibrissae high above oral margin; epistoma produced..PACHYGRAPHOMYIA Hall.
- Vibrissae normal; epistoma not produced.....ARGORAVINIA Townsend.
- 8.—Lower lobe of squamae on upper surface with long dark hair.
- ADISCOCHAETA Enderlein.
- Lower lobe of squamae without hair on upper surface.....9.
- 9.—Fifth sternite divided.....SARCOPHAGA Meigen.
- Fifth sternite not divided.....SARCOFAERTIOPSIS Hall.

#### KEY TO SPECIES

- 1.—Three posterior dorsocentral bristles.....2.
- Four posterior dorsocentral bristles.....12.
- 2.—Hypopygium of male black.....3.
- Both or second segment of male hypopygium of male red.....9.
- 3.—Hind tibia of male with long hair. (Fig. 4).....*Sarcophaga declinata*, n. sp.
- Hind tibia of male without long hair.....4.
- 4.—Orbital bristles present in male.....5.
- Orbital bristles absent in male.....7.



- 5.—Metacephalon produced behind, giving an elongated head-shape.  
*Sarothromyia femoralis* Schiner.
- Head-shape normal.....6.
- 6.—First vein without setulae.....*Sarcophagula occidua* Fabricius.
- First vein with small bristles.....*Sarcophahrtiopsis capitata* Curran.
- 7.—First hypopygial segment of male thickset and heavy; anterior clasper cleft at tip. (Fig. 5).....*Sarcophaga rudicompages*, n. sp.
- First hypopygial segment of male normal; anterior clasper simple.....8.
- 8.—Propleurae hairy.....*Notochaeta angusta* Aldrich.
- Propleurae without hair (Fig. 6).....*Sarcophaga accurata*, n. sp.
- 9.—Hind tibia of male with long hair. (Fig. 7).....*Sarcophaga pyrrhopyga*, n. sp.
- Hind tibia of male without long hair.....10.
- 10.—Fifth vein with bristles on the upper surface. (Fig. 1).  
*Johnsonia lagunicula*, n. sp.
- Fifth vein always bare.....11.
- 11.—Parafrontals and parafacials golden pollinose. (Fig. 2).  
*Notochaetophyto resinata*, n. sp.
- Parafrontals and parafacials silvery.....*Sarcophaga rapax* Walker.
- 12.—Both or second segment of male hypopygium red.....13.
- Both segments of male hypopygium black.....24.
- 13.—Male with villosity on hind tibia.....14.
- Male without villosity on hind tibia.....26.
- 14.—Upper surface of lower lobe or squamae with long dark hair.  
*Adiscochaeta abnormis* Enderlein.
- Upper surface of lower lobe of squamae without long dark hair.....15.
- 15.—Scutellum with three pair of marginal bristles. (Fig. 8).  
*Sarcophaga chirotheca*, n. sp.
- Scutellum with two pair of marginal bristles.....16.
- 16.—First segment of male hypopygium black on basal half.....17.
- Both segments of hypopygium red.....19.
- 17.—Palpi red.....18.
- Palpi black. (Fig. 9).....*Sarcophaga chrysostomata*, n. sp.
- 18.—Third abdominal segment with median marginal bristles.  
*Sarcophaga gulo* Fabricius.
- Third abdominal segment without median marginal bristles. (Fig. 10).  
*Sarcophaga hirsuta*, n. sp.
- 19.—Penis with a long stalk curved in a semicircle bearing a large divided disc on the apical end.....*Sarcophaga occipitalis* Thomson.
- Penis not as described.....20.
- 20.—Median marginal bristles on the third abdominal segment weak and depressed. (Fig. 11).....*Sarcophaga uncinata*, n. sp.
- Median marginals on third abdominal segment large and distinct.....21.
- 21.—Bucca with only black hair. (Fig. 12).....*Sarcophaga cassidifera* Engel.
- Bucca with both black and pale hair.....22.
- 22.—Head with one row of postocular ciliae.....*Sarcophaga capitata* Aldrich.
- Head with two rows of postocular ciliae.....23.
- 23.—Fourth abdominal segment reddish in ground color. (Fig. 13).  
*Sarcophaga urceola*, n. sp.

- Fourth abdominal segment solid black. (Fig. 14).  
*Sarcophaga chrysostoma* Wiedemann.
- 24.—Back of head with abundant whitish hair. . . . . 25.  
 Back of head almost devoid of white hair. (Fig. 15).  
*Sarcophaga scelestus* var. *aduncta*, n. var.
- 25.—Second abdominal segment with median marginal bristles. (Fig. 16).  
*Sarcophaga postuncinata*, n. sp.  
 Second abdominal segment without median marginal bristles. (Fig. 17).  
*Sarcophaga egregia*, n. sp.
- 26.—First vein with setulae. . . . . 41.  
 First vein without hair. . . . . 27.
- 27.—Frontal bristles but slightly divergent below.  
*Sarcophaga aurigena* Townsend.  
 Frontal bristles diverging to about the middle of the second antennal joint. . . 28.
- 28.—Back of head with one row of postocular ciliae. . . . . 29.  
 Back of head with more than one row of postocular ciliae. . . . . 30.
- 29.—Second abdominal segment without median marginal bristles. (Fig. 18).  
*Sarcophaga megista*, n. sp.  
 Second abdominal segment with median marginal bristles. (Fig. 19).  
*Sarcophaga calx*, n. sp.
- 30.—Back of head with three rows of postocular ciliae. . . . . 31.  
 Back of head with two rows of postocular ciliae. . . . . 32.
- 31.—First genital segment of male black. . . . . *Sarcophaga lambens* Wiedemann.  
 First genital segment of male red. . . . . *Sarcophaga xanthosoma* Aldrich.
- 32.—Scutellum with a tuft of whitish hairs on vertical borders.  
*Sarcophaga placida* Aldrich.  
 Scutellum without such tufts. . . . . 33.
- 33.—Minute hairs below near eye in several rows. (Fig. 20).  
*Sarcophaga retrocila*, n. sp.  
 Minute hairs below near eye in a single row. . . . . 34.
- 34.—Scutellum with apical bristles. . . . . 35.  
 Scutellum without apical bristles. . . . . 36.
- 35.—Middle tibia with one anterodorsal bristle. (Fig. 21).  
*Sarcophaga elaborata*, n. sp.  
 Middle tibia with two anterodorsal bristles. (Fig. 22).  
*Sarcophaga retusa*, n. sp.
- 36.—Fourth abdominal segment solid black. (Fig. 23).  
*Sarcophaga cyaniforceps*, n. sp.  
 Fourth abdominal segment reddish. . . . . 37.
- 37.—Median marginal bristles present on the third abdominal segment. . . . . 38.  
 No median marginal bristles on the third abdominal segment. . . . . 39.
- 38.—Anterior transverse plate of penis with a pair of long anterodorsally curved extensions. (Fig. 24). . . . . *Sarcophaga sanguisuga*, n. sp.  
 Anterior transverse plate of penis short. (Fig. 25).  
*Sarcophaga afficta* Van der Wulp.
- 39.—Penis with a transparent bladder-like protuberance at tip. (Fig. 26).  
*Sarcophaga vesica*, n. sp.  
 Penis without such a process. . . . . 40.



- 40.—Abdomen mostly reddish in ground color, with overlaying of golden pollinosity; forceps divided to top. . . . . *Sarcophaga ochripyga* Van der Wulp.  
 Abdomen without the golden pollinosity but slightly reddish in ground color.  
*Sarcophaga articulata*, n. sp.
- 41.—Vibrissae, above the oral margin; head at antennae produced. (Fig. 3).  
*Pachygraphomyia spinosa*, n. sp.
- Vibrissae normal; head-shape normal. . . . . *Argoravinia modesta* Wiedemann.

#### **ADISCOCHAETA** Enderlein

ENDERLEIN, 1928, 'Klassifikation der Sarcophagiden,' Arch. f. Klass. u. Phyl. Ent., Band 1, Heft 1, pp. 44-45 (*Adiscochaeta abnormis* Enderlein). CURRAN, 1928, 'Diptera of Porto Rico,' Sci. Surv. Porto Rico and the Virgin Islands, XI, part 1, p. 94 (*Squamata* in key only). ENGEL, 1931, Konowia, X, p. 154, Fig. 11 (*Adiscochaeta abnormis* Enderlein).

This genus is substantiated only because it clearly exhibits a character that seems worthy of generic importance. The lower lobe of the squamae has long dark hair upon its upper surface. Several species show this character, only one of which occurs on the insular range.

Curran had the species in his key to the genera of Sarcophaginae of Porto Rico, under the generic name *Squamata*. His specific description was never published and it seems best to use Enderlein's name.

#### **Adiscochaeta abnormis** Enderlein

ENDERLEIN, 1928, Arch. f. Klass. u. Phyl. Ent., Band 1, Heft 1. ENGEL, 1931, Konowia, X, p. 143, Fig. 11.

Specimens are on hand from Panama, Porto Rico, West Indies, Colombia, Venezuela, and the Guianas. Enderlein's material was from Colombia and Paraguay.

The species has been well figured by Engel.

#### **ARGORAVINIA** Townsend

TOWNSEND, 1917, Proc. Biol. Soc. Wash., XXX, p. 190 (*Argoravinia*).

This genus was based upon the peculiar head-shape and the outer structure of the male hypopygium. It appears greatly like the genus *Metoposarcophaga* proposed by Townsend. The parafrontals and para-facials are wide, the front protuberant, and the hypopygium is large, giving a truncated appearance to the abdomen.

#### **Argoravinia modesta** Wiedemann

WIEDEMANN, 1830, 'Aus. Zweifl.,' II, p. 363. TOWNSEND, 1912, Proc. U. S. Nat. Mus., XLIV, p. 358 (*argentea*). ALDRICH, 1916, 'Sarcophaga and Allies,' p. 290, Fig. 140 (*Sarcophaga fissa*). TOWNSEND, 1918, Proc. Ent. Soc. Wash., XX, p. 20 (*Argoravinia argentea*). ALDRICH, 1930, Proc. U. S. Nat. Mus., LXXVIII, Art. 12, p. 7 (syn.).

Originally described from Honduras. Specimens are on hand from Panama, Guatemala, and Porto Rico. Aldrich placed it in his group "H." It has the first vein setulose.

### JOHNSONIA Coquillett

COQUILLETT, 1895, Proc. Acad. Nat. Sci., XLVII, p. 316 (*J. elegans*). ALDRICH, 1916, 'Sarcophaga and Allies,' p. 30 (*J. setosa*). TOWNSEND, 1926, Rev. Mus. Paul., XV, p. 215. ENDERLEIN, 1928, Arch. f. Klass. u. Phyl. Ent., Band 1, Heft 1, p. 45. CURRAN, 1928, N. Y. Acad. Sci., XI, p. 96 (*J. bivittata*). ALDRICH, 1929, Proc. U. S. Nat. Mus., LXXXVI, (15), p. 1 (*J. frontalis*).

This genus is quite homogeneous as it now stands. The setulose fifth vein and the long bristles on the cheeks form good diagnostic characters.

The following key separates the known species.

- 1.—Fourth abdominal segment entirely black.....*lagunicula* Hall.  
Fourth abdominal segment partially or entirely reddish.....2.
- 2.—Pulvilli enlongate.....*frontalis* Aldrich.  
Pulvilli normal.....3.
- 3.—Fourth abdominal segment black on apical third or slightly more.  
*bivittata* Curran.  
Fourth abdominal segment red on apical half or more.....4.
- 4.—Legs red or reddish.....*elegans* Coquillett.  
Legs black.....*setosa* Aldrich.

### Johnsonia lagunicula, new species

#### Figure 1

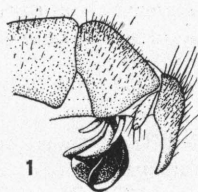
MALE.—Head: front 0.287 of head-width (average of two specimens that measured, respectively, 0.274 and 0.300); parafrontals and parafacials gray pollinose with a slight yellowish tinge, the former with a few minute hairs in a row below near eye; frontal bristles about six, diverging below to about the middle of the second antennal joint; antennae black, arista with long plumosity for three-fifths of its length, third joint twice the second and reaching almost to the vibrissae, which are normal and at the oral margin; palpi and proboscis black, ordinary; bucca very short, less than one-fourth the eye-height; postocular ciliae in two well-defined rows; back of head with numerous pale hairs around the middle and below, none pale before the metacephalic suture; two uppermost pairs of frontal bristles extremely strong.

Thorax with three to five black stripes tinged with yellow; no anterior acrosticals; dorsocentrals two to three; sternopleurals three; scutellum with two pairs of marginal, one of subapical, and one of apical bristles.

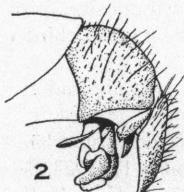
Abdomen gray tessellated; first and second segments with laterals only, third with strong median marginal pair, fourth with marginal row of about ten. Fifth sternite not divided, yellow, with a strong U-shaped indentation in the posterior margin.

Hypopygium red; first segment dark basally with a posterior marginal row of several bristles; second segment bright reddish with numerous long hairs. Genital features as figured.

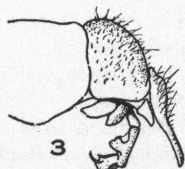




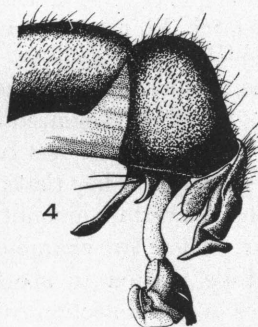
*Johnsonia lagunicula* H.



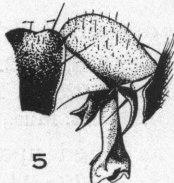
*Notochaetophyto resinata* H.



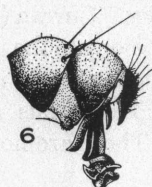
*Pachygraphomyia spinosa* H.



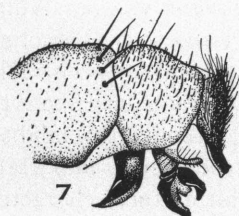
*Sarc. declinata* H.



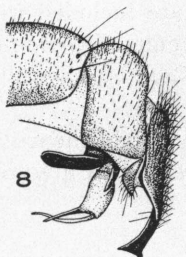
*Sarc. rudicompages* H.



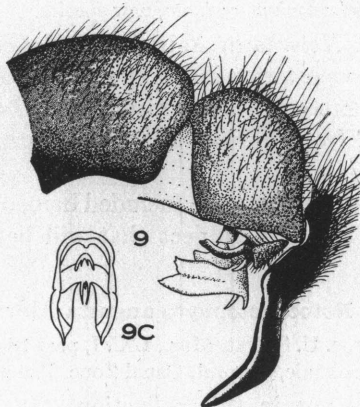
*Sarc. accurata* H.



*Sarc. pyrrhopyga* H.



*Sarc. chirotheca* H.



*Sarc. chrysostomata* H.



Unless otherwise noted, all figures show the left lateral view of the composite hypopygium. A, enlarged left lateral view of penis; B, rear view of forceps; C, tip of penis; D, rear of penis. Each separate figure has its own scale.

Wings hyaline; costal spine of medium size, third costal segment about equal to fifth in length, first vein with numerous setae, third with setae almost to cross-vein, fifth with several.

Legs black; middle tibia with two anterodorsal bristles, hind tibia without villosity.

Described from two male specimens, June 30, 1924, Red Tank, Canal Zone, Panama (Nathan Banks), and November 17, 1923, Sabanas, Panama.

HOLOTYPE.—Canal Zone specimen in U. S. National Museum (Cat. No. 49757).

PARATYPE.—In The American Museum of Natural History.

This species differs from others in the genus by the lack of red or reddish on the fourth segment of the abdomen, and in genital peculiarities.

#### **NOTOCHAETA** Aldrich

ALDRICH, 1916, '*Sarcophaga* and Allies,' p. 52. ALDRICH, 1925, Proc. U. S. Nat. Mus., XLVI, part 18, p. 21. CURRAN, 1928, N. Y. Acad. Sci., XI, part 1, p. 94 (in key only). ALDRICH, 1930, Proc. U. S. Nat. Mus., LXXVIII, part 12, p. 31.

The genus *Notochaeta* as based upon the genotype, *Notochaeta fuscianalis* Van der Wulp (*N. subpolita* Aldrich), is easily recognized by two important characters. As Aldrich (1916) pointed out, it has two postsutural dorsocentral bristles. Curran (1928) shows in his key that the propleurae of specimens that belong to the genus have a certain amount of hair, although this might be short or light in color. These two characters are considered important. The genus should be limited to species exhibiting these characters. There are no species in the collection from Panama included here.

#### **NOTOCHAETOPHYTO**, new genus

GENOTYPE.—*Notochaetophyto resinata*, new species.

The species of *Notochaeta* Aldrich (1916, '*Sarcophaga* and Allies,' p. 52) having three posterior dorsocentral bristles are included within this genus. They are easily recognized from the genus *Notochaeta* by this character, and from the main genus of *Sarcophaga* by having hair on the propleurae.

There are a number of species included here, only two of them occurring in Panama. This is a subject that will be treated in a separate paper.

#### **Notochaetophyto angusta** Aldrich

ALDRICH, 1925, Proc. U. S. Nat. Mus., LXVI, part 18, p. 23.

Described from one male, Corozal, Canal Zone, Panama, June, 1911 (Busck).

This species is not in this collection. It has two sternopleural bristles, no median marginal bristles on the first and second abdominal segments, the genitalia of the male are black, and the middle tibia has one bristle.



**Notochaetophyto resinata**, new species

## Figure 2

**MALE.**—Head: front 0.223 of head-width (average of two specimens that measured, respectively, 0.220 and 0.226); parafrontals and parafacials golden pollinose, the former with the usual row of minute hairs below near eye; frontal bristles about nine, diverging below to about the middle of the second antennal joint; antennae black, arista with long plumosity for four-fifths of its length, third joint two and one-half times the second, reaching almost to the vibrissae, which are normal and at the oral margin, palpi and proboscis black, ordinary; bucca one-fourth the eye-height; back of head with three rows of postocular ciliae around the middle and below with numerous pale hairs; none before the metacephalic suture.

Thorax with three to five black stripes tinged with golden; anterior acrostical absent, prescutellar one, dorsocentrals two to three; sternopleurals three. Scutellum with two pairs of marginal, one of subapical, and one of apical bristles.

Abdomen tessellated, first and second segments with lateral bristles only, third with median marginal pair, fourth with a marginal row of about twelve. Fifth sternite reddish, divided, the arms divergent, V-shaped, the anterior inside edges with a strong comb of short black setae.

Hypopygium red; first segment black with golden pollen and a posterior marginal row of about seven bristles, second segment with numerous long, bristle-simulating hairs, two on the anterodorsal surface very strong and up-curved. Genital features as shown in the accompanying figures.

Wings hyaline, costal spine short, third costal segment about equal to fifth in length, first and third veins hairy.

Legs black, middle tibia with two anterodorsal bristles, middle femur without comb, hind tibia without villosity.

**FEMALE.**—Front 0.321 of head-width in single specimen. General appearance and chaetotaxy as in male, except for lack of scutellar apicals and one anterodorsal bristle on the middle tibia. Genitalia black, the opening triangular and slitlike, the margins with five long setae.

Described from a male selected from a series of two collected December 30, 1928, and January 4, 1929, and one female, February 14, 1929, on Barro Colorado Island, Canal Zone, Panama (C. H. Curran).

**HOLOTYPE MALE AND ALLOTYPE FEMALE.**—In The American Museum of Natural History.

**PARATYPE.**—Male in the U. S. National Museum (Cat. No. 49758).

**PACHYGRAPHOMYIA**, new genus

Front broad in both sexes; orbital bristles absent in male, two pairs in female; frontal bristles descending to a point just below the base of the antennae and diverging but slightly; vibrissae high above the oral margin, narrowing the bucca, the facial ridges rounded, outside of and descending to below the vibrissae; parafacials with a few minute pale hairs; head-length at antennal base long, protuberant; bucca produced; head rounded behind; outer verticals present in both sexes.

Thorax with two anterior dorsocentral bristles, four posterior dorsocentral bristles, the posterior two only being large; without anterior acrostical bristles; with three sternopleural bristles; two humeral bristles; one posthumeral bristle; pre-

sutural bristles one; supra-alar bristles one; inter-alar bristles one. Scutellum with two pairs of marginal, one of subapical, and one of very minute apical bristles.

Abdomen reddish, the tessellation weak; the first and second segments without median marginal bristles, but with strong laterals and with long dense pilosity below. The large size of the hypopygium gives a definitely truncated appearance.

Wings and legs as specifically described below.

GENOTYPE.—*Pachygraphomyia spinosa*, new species.

The genus *Pachygraphia* differs from *Pachygraphomyia* in having the head-shape more angularly protuberant, not rounded at the antennal base, and in having the oral margin produced.

### ***Pachygraphomyia spinosa*, new species**

#### Figure 3

MALE.—Head: front 0.268 of head-width (average of two specimens measuring 0.275 and 0.262); parafrontals and parafacials silvery gray pollinose, the latter with several minute hairs below near the eye; frontal bristles about eleven, but slightly diverging; antennae black; third joint about one and a half times the length of the second and reaching three-fourths the distance to the oral margin; vibrissae above the oral margin a distance equal in length to the length of the second antennal joint; arista with long plumosity for its full length; palpi and proboscis black, both ordinary; bucca golden pollinose, and about one-fourth the eye-height with yellow hairs; back of head with one row of postocular ciliae and silvery white hairs around the middle and below.

Thorax yellowish white pollinose with the usual three to five black stripes; pleurae with yellowish pollen; no anterior acrostical bristles; three sternopleural bristles and one pair of prescutellar bristles. Scutellum with two pairs of marginal, one of preapical, and one of minute apical bristles.

Abdomen reddish, with silvery yellow pollen; tessellated, and with the usual three shifting black stripes; one pair of median marginal bristles on the third segment; fourth segment with a marginal row of about ten.

Hypopygium red; first segment enlarged, giving the abdomen a truncated appearance; with golden pollen and no marginal row of bristles; second segment short; both with short black hair.

Wings hyaline; costal spine absent; third costal segment as long as fifth; first vein with a number of setulae, third hairy almost to the cross-vein.

Legs black; middle femur without comb; middle tibia with one anterodorsal bristle; hind tibia without villosity.

FEMALE.—The fourth segment not red; otherwise like the male except for the usual sexual differences.

Described from a male specimen selected from a series of two males and two females collected February 2, 1929, at Patilla Point, Barro Colorado Island, Canal Zone, Panama (C. H. Curran).

HOLOTYPE AND ALLOTYPE.—In The American Museum of Natural History.



**SARCOFAHRTIOPSIS**, new genus

The accessory plate in the male of all species of *Sarcofahrtia* as described by Parker (1919, Entomological News, pp. 201-203) is anteriorly located from the base of the forceps. The species included in the genus herein described is of normal sarcophagid appearance, but does not have the fifth sternite divided.

The genus *Sarcofahrtia* Parker (1916, Pyche, XXIII, No. 5, pp. 131-139) lies close to the genus *Erythrandra* Brauer and Bergenstamm (1891, Zweifl. Kais. Mus., V, p. 368, and 1894, VI, p. 165) as based upon a comparison of specimens of the genotype type species which are *Erythrandra pictipes* Brauer and Bergenstamm and *Sarcofahrtia ravinia* Parker. Parker's species *Sarcofahrtia atlantica* (1919) is exceptionally close to the genotype of *Erythrandra*.

Curran described *Sarcofahrtia capitata* in 1928 (N. Y. Acad. Sci., XI, part 1, p. 96). This species is not a *Sarcofahrtia*.

***Sarcofahrtiopsis capitata* Curran**

CURRAN, 1928, N. Y. Acad. Sci., XI, part 1, p. 96.

MALE.—Head: front 0.270 of head-width in the single specimen; parafrontals and parafacials golden pollinose, the former with a row of minute hairs below near eye, the lowest one quite strong and bristle-like; frontal bristles about eight, diverging sharply below to about the middle of the second antennal joint; antennae black; third segment about three times the length of second and reaching almost to the vibrissae, which are normal and at the oral margin; palpi and proboscis black, normal; bucca about one-fourth the eye-height; postocular ciliae in two rows; back of head gray pollinose with numerous black and pale hairs, none before the metacephalic suture, outer verticals well developed.

Thorax with three to five black and golden stripes, pleurae with yellowish tinge; anterior acrosticals slightly larger than surrounding hairs; prescutellar bristles well developed; dorsocentrals two to three; sternopleurals three; scutellum with two pairs of marginal, one of subapical, and no apical bristles.

Abdomen with usual gray tessellation, tinged with yellow; first and second segments with laterals only, third segment with a depressed marginal pair, fourth with a marginal row of about twelve. Fifth sternite black with reddish pubescence on the posterior margins; not divided, but posterior margin deeply cleft in the center.

Hypopygium black; both segments with golden pollen; first segment with posterior row of six bristles, second segment with numerous long black hairs; genital features as figured by Curran.

Wings hyaline; costal spine absent; first vein hairy, third hairy almost to cross-vein; third costal segment about as long as fifth.

Legs black; middle tibia with one anterodorsal bristle; middle femur with comb; hind tibia without villosity.

Described by Curran from a specimen from Porto Rico. It is represented in this collection by one male specimen collected January 18, 1929, France Field, Canal Zone, Panama (C. H. Curran).

**SARCOPHAGULA** Van der Wulp

VAN DER WULP, 1887, Tijdsch. v. Ent., XXX, p. 173. ALDRICH, 1916, '*Sarcophaga* and Allies,' p. 39, Fig. 96.

*Sarcophagula* is an easily recognized tropical genus. It is extremely small, with a well-defined frontal stripe which has the anterior edge reddish, and is strongly silvery pollinose. It can be confused only with the genus *Sarothromyia* which, however, has the head-shape totally different.

**Sarcophagula occidua** Fabricius

FABRICIUS, 1794, 'Ent. Syst.,' IV, p. 315. ALDRICH, 1916, '*Sarcophaga* and Allies,' p. 39, Fig. 9 (redescribed and figured). ALDRICH, 1930, Proc. U. S. Nat. Mus., LXXVIII, Art. 12 (syn.).

The synonymy of this species is given in detail by Aldrich (1930). It is probably the most common of the tropical species. It is a scavenger and an excrement feeder. There have been several species described that are supposed to belong to this genus. None of these are known to occur in Panama.

**SAROTHROMYIA** Brauer and Bergenstamm

BRAUER AND BERGENSTAMM, 1891, Zweifl. Kais. Mus., V, p. 365. ALDRICH, 1916, '*Sarcophaga* and Allies,' p. 36.

Aldrich explains the genus as follows.

"Head of very peculiar shape, the lower edge very long and straight, the metacephalon built out behind in a lobe partially separated by a groove."

This character is ample. It separates the genus from all others now described.

**Sarothromyia femoralis** Schiner

SCHINER, 1868, 'Nov. Reise,' p. 316 (female, *Sarcophila*, Brazil). BRAUER AND BERGENSTAMM, 1891, Zweifl. Kais. Mus., V, p. 365. ALDRICH, 1916, '*Sarcophaga* and Allies,' pp. 37-38, Fig. 7. HALL, 1932, Ann. Ent. Soc. Amer., XXV, (3), (biology).

This is the most easily recognized species of Sarcophaginae in the tropics. It can be confused only with *Sarcophagula occidua* Fabricius.

The variety, *Sarothromyia femoralis* variety *simplex* Aldrich, described from Florida, has been reared as a scavenger on debris on ocean beaches.

**SARCOPHAGA** Meigen

MEIGEN, 1826, 'Syst. Besch.,' V, p. 14.

It is the intention of the present paper to make the available species of Sarcophaginae recognizable. Some of the species now included within this genus will be placed elsewhere, especially when additional material in the immature stages is available for study. Some of the species will be placed in genera that have already been proposed. All of them with the following composite of characters are herein included.

Head: more or less rectangular in profile, the length at the vibrissae about equal to the length at the antennae; frontal bristles bordering the frontal stripe, reaching at least to the insertion of the antennae and more or less diverging below; antennae inserted about the middle of the eye; orbital bristles usually absent in male; vibrissae at or but slightly above the oral margin; arista plumose.

Thorax: propleurae bare; postalar declivity with a tuft of hair; pro-episternum with several bristles and a tuft of hair; posterior dorsocentral bristles three or four (sometimes five).

Abdomen without discal bristles; sternites of male subequal in width and overlapping tergites; fifth sternite usually deeply cleft, forming two lamellae of various shapes.

Legs: hind coxae hairy posteriorly; hind tibia with or without villosity.

Wings: first posterior cell open; discal angle rectangular; cubital vein always with setulae; lower lobe of squamae on upper surface without long hairs.

***Sarcophaga declinata*, new species****Figure 4**

MALE.—Head: front 0.183 of head-width (average of three specimens which measured, respectively, 0.189, 0.170, and 0.190); parafrontals and parafacials golden pollinose, the former without even microscopic hairs below near the eye; frontal bristles about nine, slightly diverging in the lower two to about the middle of the second antennal joint; antennae black, arista with extremely long plumosity for almost its entire length, with basal third yellow; third joint three times second, reaching almost to the vibrissae, which are normal and at the oral margin; facial ridges hairy over half the distance to the base of the antennae; palpi and proboscis black, both normal; bucca about one-fourth the eye-height, with numerous black hairs; two well-defined rows of postocular bristles; back of head with numerous pale hairs around middle and below, outer vertical slightly larger than neighboring hairs.

Thorax with the usual three to five black stripes; dorsocentral bristles two to three; acrosticals present in slight prescutellars only; sternopleurals three; scutellum with three pairs of marginal, one of subapical, and one of apical bristles.

Abdomen gray tessellated; first and second segments with laterals only, third with median marginals; fourth segment with marginal row of about twelve bristles. Fifth sternite divided, arms reddish brown, with short black setae on the inside edges.

Hypopygium black, densely yellowish gray pollinose with numerous black hairs; first segment with a marginal row of about six bristles; forceps and accessory plate yellowish, the former very peculiarly shaped and differing radically from that of any species heretofore described; genital parts as in accompanying figure.

Wings hyaline tinged with brownish; costal spine minute; first vein bare; third with several setulae; third costal segment about equal in length to fifth.

Legs black; middle tibia with one anterodorsal bristle; middle femur with comb; hind tibia with rather long, sparse hairs.

**FEMALE.**—Like the male except in the usual female characteristics. There are several long parafacial setae just outside the ascending row on the facial ridges.

Described from eight males and four females collected December 22, 1928, to January 11, 1929, on Barro Colorado Island, Canal Zone, Panama (C. H. Curran).

**HOLOTYPE MALE AND ALLOTYPE FEMALE.**—In The American Museum of Natural History.

**PARATYPES.**—In U. S. National Museum and in the author's collection.

### ***Sarcophaga rudicompages*, new species**

#### Figure 5

**MALE.**—Head: front 0.210 of head-width in single specimen; parafrontals and parafacials yellowish pollinose, the former with the usual row of minute hairs below near eye; frontal bristles about seven, the lower diverging to about the middle of the second antennal joint; antennae black, third segment three times the length of second and reaching almost to the vibrissae, which are normal and at the oral margin; palpi and proboscis black, normal; bucca about one-fourth eye-height; a single row of postocular bristles; a few pale hairs around neck and below, none pale before the metacephalic suture. Outer verticals not differentiated.

Thorax with the usual three to five black stripes; intermediate gray stripes and pleurae yellowish; dorsocentrals two to three; acrosticals present only as prescutellars; sternopleurals three. Scutellum with two pairs of marginals, a pair of slight subapical, and no apical bristles.

Abdomen gray tessellated; third segment with pair of median marginals and several laterals; fourth segment with about twelve marginals. Fifth sternite not cleft, black.

Hypopygium black, both segments yellowish gray pollinose; first segment with seven bristles on the posterior margin; genital parts as figured.

Wings hyaline; costal spine minute; third costal segment slightly shorter than fifth in length; first vein hairy, third hairy to cross-vein.

Legs black; middle tibia with two anterodorsal bristles; hind tibia without villosity.

**HOLOTYPE.**—Male, in The American Museum of Natural History, from Barro Colorado Island, Canal Zone, Panama, December 21, 1928 (C. H. Curran).

### ***Sarcophaga accurata*, new species**

#### Figure 6

**MALE.**—Head: front 0.238 of head-width (average of two specimens which measured, respectively, 0.250 and 0.226); parafrontals and parafacials yellowish pollinose, the former with several very minute hairs below near eye; frontal bristles about eight, diverging only in the lower two to about the middle of the second antennal joint; antennae black, third joint two and one-half times the length of the second and reaching almost to the vibrissae, which are normal and at the oral margin; palpi and



proboscis black, ordinary; bucca about one-fourth the eye-height; one well-defined row of postocular bristles, a few pale hairs around the middle and below; none before the metacephalic suture. Outer verticals not differentiated.

Thorax with the usual three to five black stripes, the intermediate gray ones and pleurae tinged with yellow; anterior dorsocentrals two; posterior dorsocentrals three; acrosticals present in prescutellars only; sternopleurals three. Scutellum with two pairs of marginal, a pair of slight subapical, and no apical bristles.

Abdomen gray tessellated; first and second segments with lateral bristles only, third with median marginal pair; fourth with marginal row of about twelve.

Hypopygium black, densely gray pollinose; first segment with about six marginal bristles; genital parts as figured.

Wings hyaline with a brownish cast; costal spine minute; third costal segment about equal in length to fifth; first and third veins hairy.

Legs black; middle tibia with one anterodorsal bristle; hind tibia without villosity. Described from two male specimens collected February 16 and 19, 1929, on Barro Colorado Island, Canal Zone, Panama (C. H. Curran).

HOLOTYPE.—In The American Museum of Natural History.

PARATYPE.—In the U. S. National Museum.

### ***Sarcophaga pyrrhopyga*, new species**

#### **Figure 7**

MALE.—Head: front narrow, 0.216 of head-width in single specimen; parafrontals and parafacials golden pollinose, the latter with but one or two slight hairs below near eye; frontal bristles about ten, diverging widely below and reaching to about the middle of second antennal joint; orbitals absent, outer verticals slightly larger than surrounding hairs; antennae black, third joint three times second, reaching almost to vibrissae, which are normal and at the oral margin; bucca about one-fourth eye-height; palpi and proboscis black, ordinary; arista with rather long plumosity for three-fifths its length; back of head with three rows of postocular ciliae, with abundant pale hair around the middle and below, none before the metacephalic suture.

Thorax with the usual three to five black stripes, sides tinged with golden; acrosticals present only in slight prescutellars; dorsocentrals two to three; sternopleurals three. Scutellum with three pairs of marginal and one of subapical bristles.

Abdomen tessellated, three shifting black stripes; first and second segments with laterals only, third with median marginal pair, fourth red, the pollinose stripes golden, with a marginal row of about twelve bristles; all sternites wide; the ventral posterior surface of the fourth segment with numerous long hairs. Fifth sternite divided, reddish, posteriorly with two elongate arms projecting ventrally.

Hypopygium red, slightly dusted with golden pollen; first segment rather large, with a posterior row of about eight bristles; second segment small with rather abundant hairs; genital parts as figured.

Wings hyaline; costal spine absent; third costal segment about as long as fifth and sixth together; first vein bare, third with setae about two-thirds the distance to the cross-vein.

Legs black, middle femur without comb; middle tibia with one anterodorsal bristle, hind tibia bare.

FEMALE.—Unknown.

Described from a single male specimen collected December 23, 1928, on Barro Colorado Island, Canal Zone, Panama (C. H. Curran).

HOLOTYPE.—In The American Museum of Natural History.

The head-shape suggests an affinity with the genus *Notochaeta*, to which it does not belong.

### ***Sarcophaga rapax* Walker**

WALKER, 1849, 'List of Dipt. Brit. Mus.,' IV, p. 818. TOWNSEND, 1892, *Psyche*, VI, p. 220 (*helicis*). COQUILLETT, 1895, *Proc. Acad. Nat. Sci. Phila.*, p. 317 (*Helicobia*). COQUILLETT, 1911, *Proc. U. S. Nat. Mus.*, XXXVII (7719) p. 550 (*Hartiga* Desvoidy). ALDRICH, 1916, '*Sarcophaga* and Allies,' p. 158, Fig. 74 (*Sarcophaga helicis* Townsend). ALDRICH, 1930, *Proc. U. S. Nat. Mus.*, LXXVIII, Art 12, p. 15 (syn).

The genus *Helicobia* was based upon this species. The setulae on the first wing-vein was its main character. The genus has been used periodically ever since its proposal. There are a number of well-defined groups in *Sarcophaga*, the species of which are plainly related. This is clearly shown by a study of the homology of the male genitalia. The character of the hairy first vein cuts across these well-defined groups, showing that it can be of but specific, or at most, of group importance. The name *Helicobia*, as based upon the character of the hairiness of the first vein, should be discarded. Coquillett (1910) states that *Helicobia* equals *Hartiga* Desvoidy. Enderlein (1928, *Arch. f. Klass., u. Phyl. Ent.*, Band I, Heft 1) places *Helicobia* as a synonym of *Bercaea* Desvoidy, 1830. Both conclusions are based upon superficial characters.

*Sarcophaga rapax* Walker is one of the most common of the sarcophagids in the southern areas of the United States. It is not tropical in distribution. The literature suggests that this species occurs in Panama, but specimens of it were not present in the collections studied by the writer. It is probable that the species does not occur in Panama.

The species is commonly reared as a scavenger. According to reports it was reared from decaying meats, from dead animals of various sorts, and from living as well as dead arthropods. It is a true grasshopper parasite.

### ***Sarcophaga chirotheca*, new species**

#### Figure 8

MALE.—Head: front 0.261 of head-width (average of five specimens: 0.267, 0.289, 0.276, 0.231, and 0.246); parafrontals and parafacials golden pollinose, the latter with a single row of quite long hair below near the eye; frontal bristles about twelve, diverging below to about the middle of the second antennal joint; antennae black, third joint three times the length of the second and reaching almost to the

vibrissae, which are normal and at the oral margin; arista with long plumosity for over three-fifths of its length; palpi and proboscis black, ordinary; bucca one-fourth the eye-height, golden pollinose and with only black hair before the metacephalic suture; back of head with three rows of postocular ciliae and numerous pale hairs around the middle and below.

Thorax golden gray pollinose with three to five black stripes; pleurae with bright golden spots; anterior acrosticals absent, posterior dorsocentral bristles four; sternopleural bristles three; prescutellar bristles one pair. Scutellum with three pairs of marginal and a pair of large apical bristles.

Abdomen silvery gray, tessellated, with three shifting black stripes, and bright golden lateral spots; median marginal bristles on the third segment, fourth segment with twelve marginal bristles.

Hypopygium red; first segment with golden pollen, and the marginal bristles in the form of poorly defined tufts on each side; second segment with numerous black hairs. Genital parts as figured.

Wings hyaline; costal spine absent; third costal segment as long as the fifth and sixth; third vein with several setulae.

Legs black; middle femur with a well-defined comb; middle tibia with one anterodorsal bristle; hind tibia bare.

**FEMALE.**—Unknown:

Described from a male specimen selected from a long series of this species collected January 5–12, 1929, on Barro Colorado Island, Canal Zone, Panama (C. H. Curran).

**HOLOTYPE.**—Male deposited in The American Museum of Natural History.

This species belongs to the provisional "H" group, having four posterior dorsocentral bristles, the male hypopygium red or reddish, and the hind tibia of the male without long hair. The details of the forceps and the shape and appearance of the head suggest some similarity with the so-called *Oxysarcodexia* Townsend group. This species is not closely related to any species known to me at present in the morphology of the genital parts.

### ***Sarcophaga chrysostomata*, new species**

#### **Figure 9**

**MALE.**—Head: front 0.208 of head-width in the single specimen; parafrontals and parafacials silvery yellow pollinose, the latter with a single row of minute hairs below near the eye; frontal stripe rather well-defined; frontal bristles about nine, reaching to about the middle of the second antennal joint where they diverge slightly; antennae reddish black, third joint over three times the length of the second and reaching almost to the vibrissae, which are normal and at the oral margin; arista with long plumosity for over three-fifths of its length; palpi and proboscis black, both ordinary; bucca one-third the eye-height with many pale and a few black hairs before the metacephalic suture; back of head with two rows of postocular ciliae and abundant pale yellow hairs around the middle and below.

Thorax yellowish gray pollinose with the usual three to five black stripes; pleurae with yellowish pollinose spots; anterior acrosticals absent; posterior dorsocentral bristles four, only the posterior two being large; sternopleural bristles three; pre-

scutellar bristles one. Scutellum with two pairs of marginal and one of apical bristles. Posterior declivity with a tuft of black hair in its center.

Abdomen silvery gray pollinose with the usual tessellation and the three shifting black stripes; median marginal bristles on the third abdominal segment; fourth segment with a marginal row of about twelve bristles. Fifth sternite black, divided, with numerous black hairs on two widely divergent arms.

Wings hyaline, costal spine absent; third costal segment as long as fifth and sixth together; third vein with a few setulae.

Legs black; middle femur without comb; middle tibia with long hair and one anterodorsal bristle; hind tibia with long hair.

Hypopygium red; first segment black with black hair and with the hind margin silvery pollinose; second segment red with abundant black hair. Internal parts as figured.

Described from a single male specimen collected May 8, 1926, at Miraflores, Canal Zone, Panama (C. T. Greene).

HOLOTYPE.—In the U. S. National Museum (Cat. No. 49759).

This species differs from *S. chrysostoma* Wiedemann, with which it could easily be confused, by the lack of the comb upon the middle femur and by the diagnostic internal morphological details of the male genitalia.

### ***Sarcophaga gulo* Fabricius**

FABRICIUS, 1805, 'Syst. Antl.,' p. 283 (*Musca*). TOWNSEND, 1915, Ins. Ins. Mens., III, p. 118 (*Paraphrissopodia*). ALDRICH, 1916, 'Sarcophaga and Allies,' p. 193, Fig. 88 (*Sarcophaga wiedemanni*). TOWNSEND, 1918, Proc. Ent. Soc. Wash., XX, p. 20 (*Paraphrissopodia lamanensis* Desvoidy). ALDRICH, 1930, Proc. U. S. Nat. Mus., LXXVIII, Art. 12, pp. 2-3 (syn.).

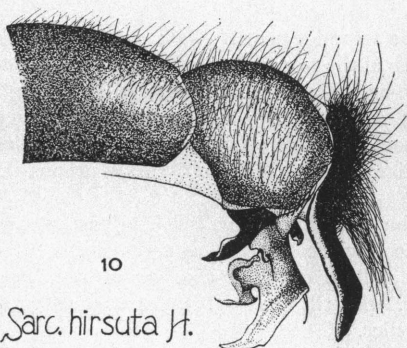
The genus *Paraphrissopodia* Townsend was based upon this species. Enderlein (1928) thought that *Sarcophaga lamanensis* Desvoidy (1830) and *Sarcophaga chrysostoma* Wiedemann (1830) were the same species, and what Townsend had in 1915 when he proposed the genus. That such is not the case is shown in the above synonymy. Such an identity would make *S. gulo* Fabricius the genotype of *Paraphrissopodia*, should this genus be accepted. Both species are herein considered as belonging to the genus *Sarcophaga*, *sensu lato*.

*Sarcophaga gulo* Fabricius is an easily recognized species. It seems to be related in some respects to *Sarcophaga amoena* Aldrich and the group to which the latter species belongs, but it is distinct from these in chaetotactic as well as in genital characteristics.

### ***Sarcophaga hirsuta*, new species**

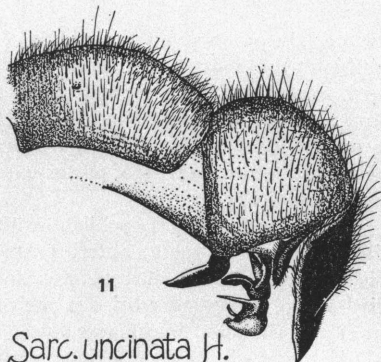
#### **Figure 10**

MALE.—Head: front 0.199 of head-width (average of five specimens: 0.187, 0.200, 0.192, 0.196, and 0.220); parafacials and parafontals golden pollinose, the latter with a single row of minute hairs below near eye; frontal bristles about ten, slightly



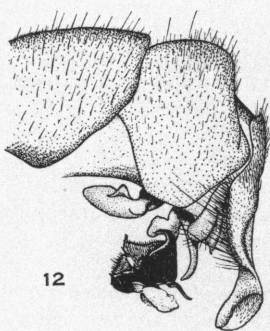
10

*Sarc. hirsuta* H.



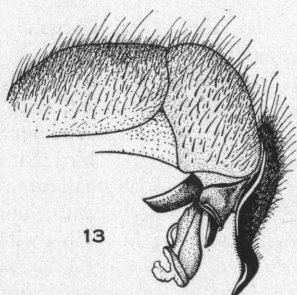
11

*Sarc. uncinata* H.



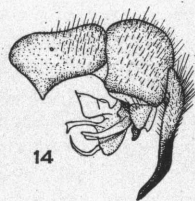
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*Sarc. cassidifera* Eng.



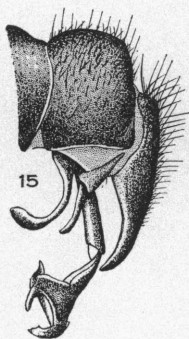
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*Sarc. urceola* H.



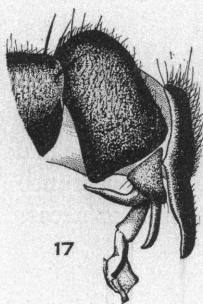
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*Sarc. chrysostoma* Vd.



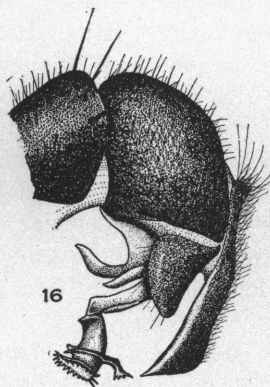
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*Sarc. scelestus* var. *aduncta* H.



17

*Sarc. egregia* H.



16

*Sarc. postuncinata* H.



divergent below to about the middle of the second antennal joint; antennae black, third joint two and one-half times the length of the second and reaching two-thirds to the vibrissae, which are normal and at the oral margin; arista with medium length plumosity for over three-fifths of its length; palpi red, proboscis black, both ordinary; bucca one-third the eye-height, golden pollinose, with black and yellowish hairs; back of head with one row of postocular ciliae and abundant whitish hairs around the middle and below.

Thorax yellowish gray pollinose with the usual three to five black stripes; pleurae with golden yellow spots; anterior acrostical bristles absent; posterior dorsocentral bristles four, the two just before the scutellum only being large; sternopleural bristles two, prescutellar bristles one pair. Scutellum with two pairs of marginal, one of preapical, and one of large apical bristles.

Abdomen silvery gray pollinose with yellowish pollinose lateral spots and with the usual three shifting black stripes; no median marginal bristles; the fourth segment with a marginal row of about ten bristles and with the posterior margin distinctly reddish. Fifth sternite red, divided, with brushes of abundant black setae on the outer margin of the widely divergent arms.

Hypopygium red; first segment long with black anterior margin and with golden yellow posterior spots; second segment red, with abundant black hair. Internal morphological details of the male terminalia as figured.

Wings hyaline; costal spine absent; third costal segment as long as the fifth and sixth segments together; third vein with small setae almost to the cross-vein.

Legs black; middle femur without comb; middle tibia with one anterodorsal bristle and with long abundant hair; hind tibia with long villosity.

**FEMALE.**—Unknown

Described from a male specimen selected from a series of eight males collected May 8, 1926, at Miraflores, Canal Zone, Panama (C. T. Greene) and two males collected January 23, 1929, at Fort Randolph, Canal Zone, Panama (C. H. Curran).

**HOLOTYPE.**—In the U. S. National Museum (Cat. No. 49760).

*Sarcophaga hirsuta* very closely resembles *S. capitata* Aldrich and *A. amoena* Aldrich. It is separated from *S. capitata* by the lack of median marginals on the third abdominal segment, by the yellow palpi, by the black first hypopygial segment, and by various details of the structure of the male hypopygium. *S. hirsuta* is separated from *S. amoena* Aldrich by the black on the first segment of the terminalia, the yellow palpi, and certain differences in the male hypopygia which include the lack of the peculiar twisted appearance of the forceps in the side view, and the possession of a smaller accessory plate which lacks the indentation on the apical margin.

***Sarcophaga occipitalis* Thomson**

THOMSON, 1869, 'Eug. Resa.,' p. 532 (female, Peru, South America). TOWNSEND, 1912, Proc. U. S. Nat. Mus., XLIII, p. 357. ALDRICH, 1916, '*Sarcophaga* and Allies,' p. 187 (*S. cotyledonia*, male and female, Porto Rico). ALDRICH, 1930, Proc. U. S. Nat. Mus., LXXXVIII, part 12, p. 12 (syn.).

*Sarcophaga occipitalis* Thomson is one of the most striking of the tropical species. It is seemingly widespread, having been collected from southern Mexico to Peru. There is but one specimen in the collections from Panama.

The synonymy regarding the species is listed in full by Aldrich (1930).

***Sarcophaga uncinata*, new species**

Figure 11

MALE.—Head: front 0.200 of head-width in the single specimen; parafrontals and parafacials golden pollinose, the latter with a single row of bristles below near eye; frontal bristles about fifteen in number, diverging below to about the middle of the second antennal joint; orbital bristles absent; outer vertical bristles absent; antennae black; third joint three times the length of the second and reaching three-fourths the distance to the vibrissae, which are slightly above the oral margin; arista with long plumosity for three-fifths of its length; palpi and proboscis black, normal; bucca one-third the eye-height, with a few black and abundant pale hairs; back of head with two rows of postocular bristles; pale hairs around the middle and below.

Thorax yellowish gray pollinose, with three to five black stripes, pleurae golden; anterior acrostical bristles absent; posterior dorsocentral bristles four; sternopleural bristles three; prescutellar bristles one slight pair. Scutellum with two pairs of marginal, no preapical, and one pair of apical bristles.

Abdomen tessellated, with three black stripes; no median marginal bristles; fourth segment with twelve marginal bristles.

Hypopygium: First segment red with black slight hairs and no marginal bristles; second segment red; morphological details as figured.

Wings hyaline; costal spine absent; third costal segment as long as fifth and sixth; first vein bare; third vein with a few setae.

Legs black; middle femur without comb; middle tibia with long abundant hair and with one anterodorsal bristle; hind tibia with long villosity.

FEMALE.—Unknown.

Described from a single male specimen collected June 22, 1929, at Corozal, Canal Zone, Panama (C. H. Curran).

HOLOTYPE.—Deposited in The American Museum of Natural History.

This species is closely related to *Sarcophaga otiosa* Williston and *S. pexata* Van der Wulp. It differs from *S. otiosa* in having shorter and more compact forceps. It differs from *S. pexata*, as I understand the species, in having its forceps only slightly separated in rear view with no undulation along the inner edges.

***Sarcophaga cassidifera* Engel**

Figure 12

ENGEL, 1931, Konowia, X, pp. 152–153, Fig. 21 (Bolivia).

MALE.—Head: front 0.293 of head-width (average of two specimens, 0.289 and 0.277); parafrontals and parafacials thinly golden pollinose, the latter with a single row of minute hairs below near eye; frontal bristles about eleven, strongly diverging

below to about the middle of the second antennal joint; outer vertical bristles absent; antennae black, third joint three times the length of the second and reaching almost to the vibrissae, which are normal and at the oral margin; arista with long plumosity for over three-fifths of its length; palpi and proboscis black, ordinary; bucca about one-third the eye-height, thinly golden pollinose with only black hairs; back of head with three rows of postocular ciliae and numerous pale hairs around the middle and below.

Thorax yellowish gray pollinose with three to five black stripes; the pleurae brilliant golden spotted; anterior acrostical bristles absent; posterior dorsocentral bristles four, only two large; sternopleural bristles three; prescutellar bristles one. Scutellum with two pairs of marginal and one of apical bristles.

Abdomen silvery gray pollinose, tessellated, with three shifting black stripes; median marginal bristles on the third segment, fourth segment with a marginal row of about twelve bristles.

Hypopygium with the first segment red, slightly golden pollinose and with numerous black hairs; second segment red with numerous black hairs; morphological details of the internal genitalia as figured.

Wings hyaline; costal spine absent; third costal segment as long as fifth and sixth together; third vein hairy halfway to the cross-vein.

Legs black; middle femur without comb; middle tibia with one anterodorsal bristle and with long dense villosity; hind tibia with abundant long hair.

FEMALE.—Like the male except for the normal sexual differences.

Described by Engel from El Cairo, Bolivia, August 26, and Fortin Esteras, Bolivia, March 25. The specimens in this collection were taken June 5, 1929, on Barro Colorado Island, Canal Zone, Panama (C. H. Curran).

This species belongs to the provisional "F" group, having four posterior dorsocentral bristles, hind tibia of the male with long hair, and the male terminalia red. It shows some relationship to the *Paraphrissopoda* Townsend group, but the male hypopygial structure shows no similarities with any previously described species. Engel pointed out that this species goes into Enderlein's proposed genus *Villenuviella*.

### ***Sarcophaga capitata* Aldrich**

ALDRICH, 1916, '*Sarcophaga* and Allies,' p. 209, Fig. 98. TOWNSEND, 1918, Proc. Ent. Soc. Wash., XX, p. 20 (states that the female which Aldrich included here is the same as his *auribarbata*). ALDRICH, 1930, Proc. U. S. Nat. Mus., LXXVIII, part 12, p. 27.

Like so many other sarcophagid species, it is almost impossible to determine this form from other closely allied species without inspection of the male genitalia. The figures given by Aldrich clearly show these differences.

*Sarcophaga capitata* Aldrich has been rarely collected in Panama. The records show that it occurs through Central America, as well as in Jamaica in the West Indies.

***Sarcophaga urceola*, new species**

## Figure 13

MALE.—Head: front 0.200 of head-width (average of two specimens, 0.200 and 0.200); parafrontals and parafacials golden pollinose, the latter with a well-defined row of setae below near the eye; frontal bristles about twelve in number, diverging below to about the middle of the second antennal joint; antennae black, third joint three times the length of the second and reaching almost to the vibrissae, which are normal and at the oral margin; arista with long plumosity for more than three-fifths of its length; palpi and proboscis black, ordinary; bucca about one-third the eye-height, with numerous pale hairs both before and posterior to the metacephalic suture; back of head with two rows of postocular ciliae, and with numerous pale hairs around the middle and below.

Thorax yellowish gray pollinose with three to five black stripes; pleurae with golden spots; anterior acrosticals absent; posterior dorsocentral bristles four; sternopleural bristles two—a small third in one specimen; prescutellar bristles one pair. Scutellum with two pairs of marginal and one of large apical bristles.

Abdomen tessellated, with three shifting black stripes and lateral golden spots; median marginal bristles on the third segment; fourth segment reddish, with a marginal row of about twelve bristles.

Hypopygium red or reddish; first segment golden pollinose, with numerous black hairs; second segment with abundant long black hair. Genital parts as figured.

Wings hyaline; costal spine absent; third costal segment longer than the fifth and sixth together; first vein bare, third with setulae more than halfway to the cross-vein.

Legs black; middle femur with comb; middle tibia with long dense villosity and with one anterodorsal bristle; hind tibia with long hair.

FEMALE.—Unknown.

Described from two male specimens collected December 21, 1928, on Barro Colorado Island, Canal Zone, Panama (C. H. Curran).

HOLOTYPE.—Male, in The American Museum of Natural History.

This species belongs to the provisional "F" group, having four posterior dorsocentral bristles, the male hypopygium red or reddish, and the hind tibia of the male with long hair. There are no closely related species that have been previously described.

***Sarcophaga chrysostoma* Wiedemann**

## Figure 14

WIEDEMANN, 1830, 'Aus. Zwielfl.,' XI, p. 356 (West Indies). SCHINER, 1868, 'Nov. Reise.,' p. 313, notes (Brazil). VAN DER WULP, 'Amer. Dipt.,' III, p. 36 (Bahia). BOTTCHE, 1913, Deut. Ent. Zeit., p. 363. MATTOS, 1919, Brazil Medico, XXXVI, No. 5, 'Sarcophagas de São Paulo,' p. 47. ALDRICH, 1924, Annals Ent. Soc. Amer., XVII, p. 210 (on type). CLEARE, L. D., 1926, 'Rept. of the Biol. Div. Brit. Guiana,' Rept. Dept. Sci. and Agric., pp. 65-68.

Ample material shows that *Sarcophaga chrysostoma* Wiedemann is quite a common species in the West Indies and from Mexico through

Central America to South America. As Aldrich states, it is closely allied to *S. amoena* Aldrich, *S. capitata* Aldrich, and *S. occipitalis* Thomson.

Mattos (1919) makes *S. capitata* Aldrich and *S. occipitalis* Thomson synonyms of *S. chrysostoma* Wiedemann.

Aldrich made an examination of the type, which is in the Vienna Museum, May 12, 1923, and said at the time that it resembled the species *S. amoena* Aldrich, differing mainly in the presence of median marginals on the third abdominal segment and the lack of the notch in the tip of the accessory plate, as well as differing in genital morphology.

MALE.—Head: front 0.198 of head-width (average of five specimens; 0.194, 0.208, 0.169, 0.216, and 0.184); parafrontals and parafacials yellow pollinose, the former with the usual row of minute hairs below near eye; frontal bristles about eleven, divergent in the lower two or three to middle of second antennal joint; ocellar present; outer verticals absent; antennae black, third joint three times length of second, reaching three-fourths the distance to the vibrissae, which are normal and at the oral margin; palpi and proboscis black, ordinary; bucca about one-fourth the eye-height with only a few black hairs, rest pale; back of head with two rows of post-ocular ciliae, around middle and below with pale hairs; head quite long.

Thorax with usual three to five black stripes, the black ones very dense, lateral edges of dorsum somewhat golden pollinose; posterior dorsocentral bristles four, only the last two large; no anterior acrostical bristles; sternopleural bristles three, middle one large; prescutellar bristles one. Scutellum with two pairs of marginal, no sub-apical, and one pair of large apical bristles.

Abdomen slightly reddish, gray pollinose, tessellated, the usual three shifting black stripes; first and second segments with lateral bristles only; third with median marginal pair; fourth with marginal row of about twelve; lateral spots on abdomen somewhat golden pollinose.

Fifth sternite widely divided V-shape, close to base of arms with numerous short black bristles, almost a pad, edges of arms with gradually diminishing bristles.

Hypopygium red. First segment red, long, slightly pollinose, with numerous black hairs; no marginal row; second segment red, globose, with many scattered black hairs. Forceps black, long, curving strongly forward to sharp point; covered with hair behind; in rear view not strongly divergent except at base. Accessory plate triangular, somewhat longer than wide, yellow, covered with black hairs at base. Posterior clasper black, straight, indented on anterior margin toward tip, which is bluntly pointed. Anterior clasper scythe-shaped, yellow, blackish at tip, curving strongly forward. Penis yellow, rear margin straight, anterior margin near tip with two long apophyses with barbs on inner edges; above these, two long yellow arms pointing anteriorly, curving in a circle forward, their ends overlapping; immediately above these, two yellow arms pointing anteriorly, quite wide, a hooklike tip to each.

Wings hyaline; costal spine absent; first vein bare, third with several hairs; third costal segment a little longer than fifth and sixth together.

Legs black; middle femur with comb; middle tibia with abundant villosity and one anterodorsal bristle; hind tibia with long hair.

Pedescribed from five male specimens selected from a long series collected on the northern coast of South America and throughout Central America and the West Indies to northern Mexico.



*S. chrysostoma* Wiedemann is reported by Mr. L. D. Cleare, Jr., as being an effective parasite upon second-generation *Remigia punctularis* Hut., on sugar cane, at Georgetown, Demarara, in 1924.

***Sarcophaga scelestas aduncta*, new variety**

Figure 15

HALL, 1931, Entomological News, XLII, p. 285, Fig. 4 (*S. scelesta*).

This variety differs from the typical form only in having the anterior claspers distinctly lobate at the tips, and the penis distinctly divided. This is not apparent in the species as described from Texas and from Brazil.

***Sarcophaga postuncinata*, new species**

Figure 16

MALE.—Head: front 0.190 of head-width in the single specimen; parafrontals and parafacials golden pollinose, the latter with a single row of bristles below near eye; frontal bristles about ten in number, diverging below to the middle of the second antennal joint; outer vertical bristles absent; orbital bristles absent; antennae black, third joint two and one-half times the length of the second, and reaching three-fourths to the vibrissae, which are normal and at the oral margin; arista with medium length plumosity for three-fifths of its length; palpi and proboscis black, normal; bucca one-fourth the eye-height, with black hairs, none pale before the metacephalic suture; back of head with three rows of postocular bristles, pale hairs around the middle and below.

Thorax yellowish gray pollinose, with three to five black stripes; pleurae yellowish; anterior acrostical bristles absent; posterior dorsocentral bristles four; sternopleural bristles three; prescutellar bristles one pair. Scutellum with two pairs of marginal, one of preapical, and one of apical bristles.

Abdomen tessellated, with three shifting black stripes; median marginal bristles on second and third segments; fourth segment black, with twelve marginal bristles.

Hypopygium: first segment black, with a row of about six marginal bristles; second segment black; morphological details as figured.

Wings hyaline; costal spine absent; third costal segment as long as fifth; first vein bare; third vein with several setulae.

Legs black; middle femur with comb; middle tibia without villosity and with one anterodorsal bristle; hind tibia bare.

FEMALE.—Unknown.

Described from a male specimen collected January 15, 1929, at Patilla Point, Canal Zone, Panama (C. H. Curran).

HOLOTYPE.—Male, deposited in The American Museum of Natural History.

*S. postuncinata* has four posterior dorsocentral bristles, the male genitalia are black, and the hind tibia of the male lacks villosity. I know of no closely related described species.

**Sarcophaga egregia**, new species

## Figure 17

MALE.—Head: front 0.173 of head-width (average of three specimens, 0.181, 0.180, and 0.160); parafrontals and parafacials silvery and golden pollinose, the latter with a single row of minute hairs below near the eye; frontal bristles about twelve, diverging below to the middle of the second antennal joint; antennae black, third joint three times the length of the second and reaching almost to the vibrissae, which are normal and at the oral margin; arista with long plumosity for three-fifths of its length, palpi and proboscis black, ordinary; bucca one-fifth the eye-height, golden pollinose with black hair, none pale before the metacephalic suture; back of head with two rows of postocular ciliae and pale hairs around the middle and below.

Thorax silvery and golden pollinose with the usual three to five black stripes; pleurae with golden spots; no anterior acrostical bristles; four pairs of posterior dorso-central bristles; three sternopleural bristles and one pair of prescutellar bristles. Scutellum with two pairs of marginal, one of subapical, and one of apical bristles.

Abdomen silvery and golden pollinose, tessellated, and with the usual three shifting black stripes; the third segment with a pair of median marginals; the fourth with a marginal row of about twelve bristles.

Hypopygium black; first segment with yellowish pollen and a marginal row of about four hairs. Internal parts as figured.

Wings hyaline; costal spine absent; third costal segment about as long as fifth; first vein bare, third with several setulae.

Legs black; middle femur without comb; middle tibia with one anterodorsal bristle; hind tibia without villosity.

FEMALE.—Unknown.

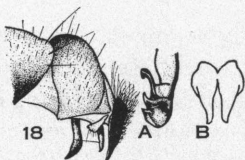
Described from a male specimen selected from a series of thirteen males collected January 15 to February 5, 1929, at Fort Sherman and Fort Randolph, Canal Zone, Panama (C. H. Curran).

HOLOTYPE.—Male, in The American Museum of Natural History.

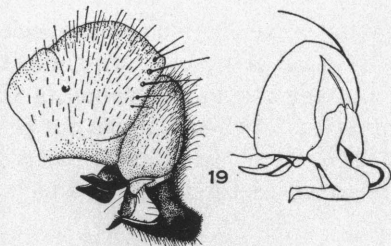
**Sarcophaga aurigena** Townsend

TOWNSEND, 1911, Ann. Ent. Soc. Amer., IV, pp. 129–130 (*nomen nudum*). TOWNSEND, 1912, Proc. U. S. Nat. Mus., XLIII, pp. 357–358. TOWNSEND, 1917, Proc. Biol. Soc. Wash., XXX, p. 191 (*Trixosarcophaga*). HALL, 1928, Ann. Ent. Soc. Amer., XXI, p. 141, fig. 12 (syn.). ENGEL, 1931, Konowia, X, p. 146 (*S. tessellata* Fabricius?).

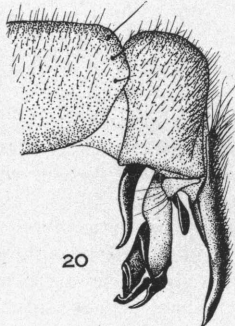
It was stated in 1928 that Townsend's types were females, these being from Peru. There is no question that the species is one of the so-called *Ravinia* group. In the type series there were several male specimens, one of which was from Trinidad River, Panama. This specimen, being in the best condition of any in the series, and having been labeled *Trixosarcophaga aurigena* Townsend, by Townsend himself, was re-described in 1928 in order that other workers who did not have access to the type series could recognize the species. It is felt that Townsend correctly placed the males with the females.



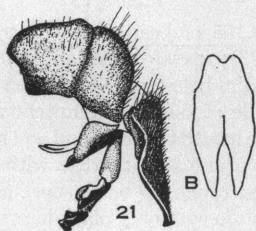
*Sarc. megista* H.



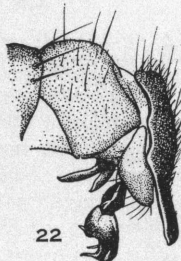
*Sarc. calx* H.



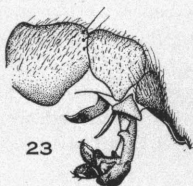
*Sarc. retrocita* H.



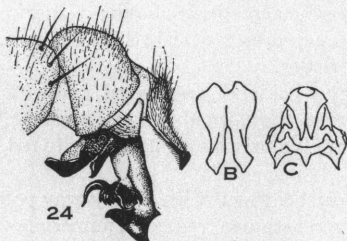
*Sarc. elaborata* H.



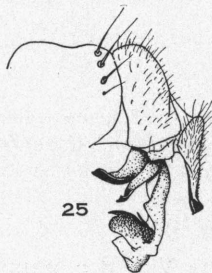
*Sarc. retusa* H.



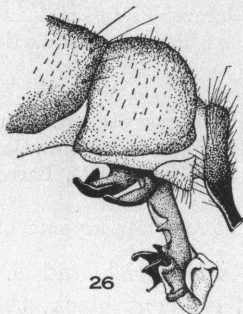
*Sarc. cyaniforceps* H.



*Sarc. sanguisuga* H.



*Sarc. afficta* Vd.W.



*Sarc. vesica* H.



What Engel figured as this species obviously belongs to the so-called *Oxysarcodexia* group of Townsend. This group is so closely allied within that nothing but an inspection of the male genitalia suffices for a determination. Although it can not be said with certainty, it appears that what Engel had listed as *S. aurigena* might be *S. tessellata* Fabricius. There are at least four species which appear very close to this.

***Sarcophaga megista*, new species**

Figure 18

MALE.—Head: front 0.155 of head-width (average of five specimens: 0.181, 0.140, 0.154, 0.140, and 0.163); parafrontals and parafacials golden pollinose, the latter with a coarse row of hairs below near eye; frontal bristles about nine, diverging below to about the middle of the second antennal joint; antennae black, third joint two and a half times the length of the second and reaching almost to the vibrissae, which are normal and at the oral margin; arista with long plumosity for over three-fifths of its length; palpi and proboscis black, normal; bucca about one-fourth the eye-height, deep yellow pollinose with only black hair before the metacephalic suture; back of head with two rows of postocular ciliae and black and pale hairs around the middle and below.

Thorax silvery gray pollinose, with the usual three to five black stripes; pleurae with golden spots; anterior acrosticals absent; posterior dorsocentral bristles four; sternopleural bristles three; prescutellar bristles one pair. Scutellum with two pairs of very minute apical bristles.

Abdomen silvery gray pollinose, tessellated, and with three shifting black stripes; median marginal bristles on the third abdominal segment; fourth segment red, with a marginal row of about twelve bristles. Fifth sternite red, short, divided, with only a few hairs at base.

Hypopygium red; first segment with silvery gray pollen and with a marginal row of about six bristles; second segment red, with numerous short seta-like hairs. Genital features as figured.

Wings hyaline; costal spine absent; third costal segment about as long as fifth; first vein bare, third vein with several setulae.

Legs black; middle femur with comb; middle tibia with one anterodorsal bristle; hind tibia without villosity.

FEMALE.—Unknown.

Described from a male specimen selected from a series of 17 males collected January 11 to February 21, 1929, at Patilla Point, Barro Colorado Island, Canal Zone, Panama (C. H. Curran) and July 26, 1924, Barro Colorado Island, Canal Zone, Panama (N. Banks).

HOLOTYPE.—Male, in The American Museum of Natural History.

Differs from *S. bakeri* Aldrich and *S. trivialis* Van der Wulp in having the first genital segment black, the forceps not like those of *Oxysarcodexia*, and the fifth sternite protuberant.

***Sarcophaga calx*, new species**

## Figure 19

**MALE.**—Head: front 0.212 of head-width in the single specimen; parafrontals and parafacials golden pollinose, the latter without any traces of the usual row of minute hairs below near eye; frontal bristles about nine, diverging but slightly below and reaching to about the middle of the second antennal joint; antennae black, third joint over three times the length of the second and extending almost to the vibrissae, which are normal and at the oral margin; facial ridges with ascending hair; arista with long plumosity; palpi and proboscis black and ordinary; bucca about one-third the eye-height, with black hair, none pale before the metacephalic suture; back of head with three rows of postocular ciliae and numerous pale hairs around the middle and below.

Thorax yellowish gray pollinose with the usual three to five black stripes; anterior acrosticals absent; posterior dorsocentral bristles four; sternopleural bristles three; prescutellar bristles one. Scutellum with two pairs of marginal, one of preapical, and one of apical bristles.

Abdomen silvery and golden pollinose, tessellated, with three shifting black stripes and golden lateral spots; median marginal bristle on the third segment; fourth segment with a row of about twelve marginal bristles. Lateral edges of third and fourth segments with large tufts of elongate black hair; fourth sternite with a peculiar brush of setae on the hind margin. Fifth sternite red, divided, the inside arms ending with a distinct spur.

Hypopygium red; first segment globose with a marginal row of about ten bristles; second segment small, rounded, with short curling black hair; internal parts as figured.

Wings hyaline; costal spine absent; third costal segment about as long as fifth; first vein bare; third vein with a few setulae.

Legs black; middle femur with comb, below with long hair; middle tibia with one anterodorsal bristle and with a villosity which slightly exceeds the diameter of the tibia; hind tibia without villosity.

**FEMALE.**—Unknown.

Described from a single male specimen collected June 9, 1911, at Taboga Island, Panama (August Busck).

**HOLOTYPE.**—Male, in the U. S. National Museum (Cat. No. 49761).

***Sarcophaga lambens* Wiedemann**

WIEDEMANN, 1830, 'Aus. Zweifl.' p. 365. TOWNSEND, 1892, Journ. Inst. Jam. (*Sarcodexia sternodontis*). ALDRICH, 1916, 'Sarcophaga and Allies,' p. 265 (*Sarcophaga*). ALDRICH, 1927, Journ. Ec. Ent., XX, p. 590 (summary of rearing records). ENDERLEIN, 1928, Arch. Klass. u. Phyl. Ent., Band 1, Heft 1, p. 19 (*Cricobrachia anisitsiana*). ALDRICH, 1930, Proc. U. S. National Museum, LXXVIII, part 12, p. 11 (syn.). ENGEL, 1931, Konowia, X, p. 146, Fig. 16.

Rearing records of this species as summarized by Aldrich (1927) show that it is a parasite of various arthropods, as well as a scavenger. It has been reared from decaying beef in South Carolina.

The species is widespread in distribution. It has been collected



from South Carolina through the tropics to South America. It seems to be most common in Central America and in the West Indies.

The male genitalia have been illustrated in a fine diagnostic manner by Engel.

***Sarcophaga xanthosoma* Aldrich**

ALDRICH, 1916, '*Sarcophaga* and Allies,' p. 274, Fig. 131.

This species is not represented in the Panama collection. It was originally described from Prof. J. S. Hine's collection from Guatemala. There are so many species of this group in the insular range that it was thought best to include it in the key. It will probably be found in Panama.

***Sarcophaga placida* Aldrich**

ALDRICH, 1925, Proc. U. S. National Museum, LXVI, part 18, p. 24, Fig. 1b.

Originally described from specimens reared from dead arthropods in the Canal Zone, Panama.

This species resembles *S. pedunculata* Hall (1931, Entomological News, XLII, p. 284, Fig. 3), but differs in respect to the male hypopygium. Aldrich described the penis of *S. placida* in detail. He states that "the penis is short, mostly black, the terminal segment consisting mostly of three structures: (a) A flat transverse divided posterior plate; (b) two slender black filaments coming up in the middle and recurved; (c) two lateral black rods, tapering and recurving forward, connected on the anterior side with a transparent membrane which forms a half-cylinder or trough, closing the anterior side of the organ."

Both *S. pedunculata* Hall and *S. placida* Aldrich have whitish tufts of hair on each side of the scutellum. The chaetotaxy seems to be much the same.

This species is known only from the type series.

***Sarcophaga retrocita*, new species**

**Figure 20**

MALE.—Head: front 0.235 of head-width in an average of three specimens (0.227, 0.242, and 0.236); parafrontals and parafacials silvery and golden pollinose, the latter with several minute hairs below near the eye; frontal bristles about eight, slightly diverging below to about the middle of the second antennal joint; antennae black, third joint two and a half times the length of the second and reaching about to the vibrissae, which are slightly above the oral margin; arista with long plumosity for four-fifths of its length; palpi and proboscis black, both ordinary; bucca one-third the eye-height, golden pollinose, with yellow hair both before and behind the meta-cephalic suture; back of head with two rows of postocular ciliae and whitish hairs around the middle and below.

Thorax silvery and golden pollinose, with the usual three to five black stripes; pleurae with golden spots; no anterior acrostical bristles; four pairs of posterior dorsocentral bristles; three sternopleural bristles; one pair of prescutellar bristles. Scutellum with two pairs of marginal, one of preapical, and one of apical bristles.

Abdomen silvery and brownish pollinose, tessellated, with the three shifting black stripes; median marginal bristles on the third abdominal segment; fourth segment reddish on the hind margin with a marginal row of about twelve bristles.

Hypopygium red; first segment golden pollinose, globose, with a marginal row of several long hairs; second segment seemingly small because of the difference in size between the first and the second; reddish, with small black hairs.

Legs black; middle femur without comb; middle tibia with two anterodorsal bristles; hind tibia without long hairs.

Wings hyaline; no costal spine; third costal segment as long as fifth; first vein bare, third with a short row of hair.

FEMALE.—Unknown.

Described from a male specimen selected from a series of three, collected February 4 to 6, 1929, at Corozal, Panama (C. H. Curran).

HOLOTYPE.—Male, in The American Museum of Natural History.

### ***Sarcophaga elaborata*, new species**

#### Figure 21

MALE.—Head: front 0.198 of head-width (average of two specimens, 0.196 and 0.200); parafrontals and parafacials golden pollinose, the latter with the usual row of bristles below near eye; frontal bristles about ten in number, diverging below to the middle of the antennal joint; orbital bristles absent; antennae black, third joint twice the length of the second and reaching almost to the vibrissae, which are normal and at the oral margin; arista with long plumosity for three-fifths of its length; palpi and proboscis black, normal; bucca one-fourth the eye-height, with black hairs, none pale before the metacephalic suture; back of head with three rows of postocular bristles; pale hairs around the middle and below.

Thorax yellowish gray pollinose, with three to five black stripes; pleurae yellowish, anterior acrostical bristles none; posterior dorsocentral bristles four; sternopleural bristles three; prescutellar bristles one pair. Scutellum with two pairs of marginal, one of preapical, and one of apical bristles.

Abdomen tessellated, with three shifting black stripes; median marginal bristles on the third segment; fourth segment black, with twelve marginal bristles.

Hypopygium: first segment red, with very short, slight hairs and without marginal bristles; second segment red; morphological details as figured.

Wings hyaline; costal spine absent; third costal segment as long as fifth; first vein bare; third vein with a few setulae.

Legs black; middle femur without comb; middle tibia without villosity, with one anterodorsal bristle; hind tibia bare.

FEMALE.—Unknown.

Described from a male selected from a series of two collected at Corozal, Panama, January 21, 1929 (C. H. Curran).

HOLOTYPE.—Male, in The American Museum of Natural History.

Belongs to the provisional "H" group, it having four posterior dorso-central bristles, the hind tibia of the male without long hair, and the male genitalia red.

There are no closely related described species.

***Sarcophaga retusa*, new species**

Figure 22

MALE.—Head: front 0.198 of head-width (average of five specimens: 0.195, 0.210, 0.206, 0.187, and 0.193); parafrontals and parafacials golden pollinose, the latter with the usual row of bristles below near eye; frontal bristles about nine in number, diverging below to about the middle of the second antennal joint; outer vertical bristles distinct; orbital bristles absent; antennae black; third joint three times the length of the second and reaching four-fifths the distance to the vibrissae, which are at the oral margin; arista with long plumosity for three-fifths of its length; palpi and proboscis black, normal; bucca one-fourth the eye-height, with black hairs, none pale before the metacephalic suture; back of head with three rows of postocular bristles, pale hairs around the middle and below.

Thorax yellowish gray pollinose, with three to five black stripes; pleurae yellowish; anterior acrostical bristles absent; posterior dorsocentral bristles four; sternopleural bristles three; prescutellar bristles one. Scutellum with two pairs of marginal, one of preapical, and one of apical bristles.

Abdomen tessellated, with three shifting black stripes; median marginal bristles on the third segment; fourth segment with twelve marginal bristles.

Hypopygium: first segment red with a row of six marginal bristles; second segment red; morphological details as figured.

Wings hyaline; costal spine absent; third costal segment as long as fifth; first vein bare; second vein with several setulae.

Legs black; middle femur with comb; middle tibia without villosity and with one anterodorsal bristle; hind tibia bare.

FEMALE.—Unknown.

Described from a male collected February 15, 1927, on Barro Colorado Island, Cana Zone, Panama, and selected from a series of eighteen specimens which shows the following distribution: Patilla Point, Fort Sherman and Fort Randolph as well as Barro Colorado Island, all being in the Canal Zone of Panama (C. H. Curran).

HOLOTYPE.—Male, in The American Museum of Natural History.

Belongs to the provisional "H" group, it having four posterior dorso-central bristles, the hind tibia of the male without long hair, and the male genitalia being red. I know of no closely related described species.

***Sarcophaga cyaniforceps*, new species**

Figure 23

Belongs in the so-called *Oxysarcodexia* group and is separated from the majority of these only by lacking red or reddish in the fourth abdominal segment. The male genitalia are different from those of other closely related species. The forceps are unique, the claspers are slight and of different appearance, and the penis is not of the usual type, although in general it is similar.

Described from a male specimen selected from a series of nineteen collected on Barro Colorado Island, December 22, 1928, to January 19, 1929; Corozal, Panama, January 19, 1929 (C. H. Curran); and Barro Colorado Island, June 20, 1924 (Nathan Banks); all in the Canal Zone, Panama.

HOLOTYPE.—In The American Museum of Natural History.

***Sarcophaga sanguisuga*, new species**

Figure 24

Belongs to the *Oxysarcodexia* group and is separated from the nearest related species, *S. afficta* Van der Wulp, by the elongated anterodorsal anterior transverse plates of the penis. It is separated from other closely related species by possessing median marginal bristles on the third abdominal segment. The forceps are rather widely separated in rear view, but this distance is subject to change, due to the traction necessary to pull the genitalia into view when relaxed.

Described from a male selected from a series of four collected at Miraflores Locks, January 17, 1929 (C. H. Curran) and Taboga Island, June 29, 1924 (Nathan Banks), all in the Canal Zone, Panama.

HOLOTYPE.—In The American Museum of Natural History.

***Sarcophaga afficta* Van der Wulp**

Figure 25

VAN DER WULP, 1896, 'Biol. Cent. Amer.,' Dipt., part 2, p. 286. ENDERLEIN, 1928, Arch. f. Klass. u. Phyl. Ent., Band 1, Heft 1, p. 28 (*Ctenoprosballia*). ALDRICH, 1930, Proc. U. S. Nat. Mus., LXXVIII, p. 36.

This species clearly belongs to the *Oxysarcodexia* group. Aldrich (1930), who saw the type specimens in Europe, gives a short diagnostic description of the species. The figure given by Aldrich lacks in detail, so another is given here.

***Sarcophaga vesica*, new species**

Figure 26

MALE.—Head: Front 0.192 of head-width (average of three specimens, 0.200, 0.187, and 0.190); parafrontals and parafacials golden pollinose, the latter with one or two minute hairs or two below near the eye, these being extremely small; frontal bristles about nine, diverging below to about the middle of the second antennal joint; antennae black, third joint two and a half times the length of the second and reaching three-fourths the distance to the vibrissae, which are slightly above the oral margin; arista with medium length plumosity for three-fifths of its length; palpi and proboscis black, normal; bucca one-fourth the eye-height, with numerous black hairs, none pale before the metacephalic suture; back of head with two rows of postocular ciliae and some pale hair around the middle and below.

Thorax silvery pollinose, with the usual three to five black stripes; anterior acrosticals but a little larger than surrounding hairs; posterior dorsocentral bristles four; sternopleural bristles three; prescutellar bristles one pair. Scutellum with two pairs of marginal, one of preapical, and no apical bristles.

Abdomen silvery pollinose, tessellated, and with three shifting black stripes; no median marginal bristles; fourth segment golden pollinose with a marginal row of about twelve bristles. Fifth sternite divided, the two arms approximated, the hind margins with a short row of small black setae.

Hypopygium red, both segments with golden pollen; a few hairs in a row on the hind margin of the first segment; both segments with black hairs. Genital features as figured.

Wings hyaline; costal spine absent; third costal segment about as long as fifth; first vein bare, third with several setulae.

Legs black; middle femur with comb; middle tibia with one anterodorsal bristle; hind tibia without long hair.

FEMALE.—Unknown.

Described from a male specimen selected from a series of three, collected April 24, 1926, at Ancon, Canal Zone, Panama (C. T. Greene), and one male with pupa, reared at Guayaquil, Ecuador, with the notation, "72 dias, by F. Campos."

HOLOTYPE.—Male, in the U. S. National Museum (Cat. No. 49762).

The pupa is of normal sarcophagine shape. The posterior spiracles (one of which is figured) are located in a normal pit, separated from each other by a distance equal to one-half the width of one plate. The anterior spiracles are fan-shaped with sixteen openings.

### ***Sarcophaga ochripyga* Van der Wulp**

VAN DER WULP, 1896, 'Biol. Cent. Amer.,' Dipt., part 2, p. 285. ALDRICH, 1916, 'Sarcophaga and Allies,' p. 284, Fig. 135 (*S. australis*). TOWNSEND, 1917, Proc. Ent. Soc. Wash., XX, p. 20 (*Oxysarcodexia ochripyga*). REINHARD, 1922, Entomological News (Texas). ENDERLEIN, 1928, Arch. f. Klass. u. Phyl. Ent., Band 1, Heft 1, p. 28 (*Ctenoprosballia*). ALDRICH, 1930, Proc. U. S. Nat. Mus., LXXXVIII, Art. 12, p. 36.

This species is not easily recognized, since there are others just about like it in the tropics. These do not occur in the insular range according to the collections seen. They are all species that belong to the *Oxysarcodexia* group, which fades gradually into several other groups. Unfortunately there are connecting links between the groups, and none of the groups can be completely separated. It is thought best not to try until more material has been seen. The *Oxysarcodexia* group is a catch-all for all undeterminable females with a golden pollinose shortened bucca and yellow terminalia. There are at least forty species on hand, most of them undescribed. They are extremely difficult to separate.

### ***Sarcophaga articulata*, new species**

MALE.—Head: front 0.200 of head-width in a single specimen; parafrontals and parafacials golden pollinose, the latter with a very small row of minute hairs below near the eye; frontal bristles about eight; diverging below to about the middle of the second antennal joint; antennae black, third joint about three times the length of the second, and reaching almost to the vibrissae, which are normal and at the oral

margin; arista with long plumosity for over three-fifths its length; palpi and proboscis black, ordinary; bucca about one-fourth the eye-height, black, with no pale hair before the metacephalic suture; back of head with a single row of postocular ciliae and some pale hair around the middle and below.

Thorax gray pollinose with the usual three to five black stripes; anterior acrostical bristles absent; posterior dorsocentral bristles four; sternopleural bristles three; prescutellar bristles one pair. Scutellum with two pairs of marginal, one of preapical, and no apical bristles.

Abdomen silvery gray pollinose, tessellated, with the usual three shifting black stripes; third segment with median marginal bristles both short and depressed; fourth segment with a marginal row of about twelve bristles. Fifth sternite red, divided, the two arms approximated, elongate.

Hypopygium red, golden pollinose; first segment with a marginal row of about six bristles; forceps small and apparently undivided.

Wings hyaline; costal spine absent; third costal segment about as long as fifth; first vein bare, third with several setulae.

Legs black; middle femur with comb; middle tibia with one anterodorsal bristle; hind tibia of male without long hair.

**FEMALE.**—Like male except for the usual female differences. The fourth abdominal segment is red.

Described from a single male and female, collected at Los Cascadas, Canal Zone, Panama, upon human excrement (C. H. Jennings).

**HOLOTYPE AND ALLOTYPE.**—In the U. S. National Museum (Cat. No. 49763).









