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DIPTERA

Two-winged Flies

As early as 1794 and 1805, Fabricius named and described flies from the Island of St. Thomas in the Virgin Islands. The earliest extensive records of Diptera from Puerto Rico, however, are the determinations and descriptions published by Herr Victor von Roeder: "Dipteren von der Insel Portorico" (Stettiner Entomologische Zeitschift, 337–349. Stettin, 1885) of the collections made by Dr. Juan Gundlach. Those made by Mr. August Busck in 1899 were listed, or described if new, by Mr. D. W. Coquillett in a "Report on a Collection of Dipterous Insects from Porto Rico" (Proc. U. S. National Museum, 22: 249–270. Washington, D. C., 1900). All of these earlier records are given by Dr. J. M. Aldrich in his "Catalogue of North American Diptera" (Smithsonian Misc. Collections, 46: (1444): 1–680. Washington, D. C., 1905). Dr. F. M. Root, of the School of Hygiene and Public Health at John Hopkins University, primarily interested in mosquitoes and flies as disease vectors, published "Notes on Mosquitoes and other Blood-Sucking Flies from Porto Rico" (Amer. Jour. Hygiene, 2 (4): 394–405, fig. 5. Baltimore, July 1922) after an extended survey in person.

Dr. C. H. Curran began describing "New Diptera from the West Indies," all of which were from Puerto Rico (American Museum Novitates No. 220, pp. 1–14. New York, June 19, 1926), continued with "New Neotropical and Oriental Diptera in the American Museum of Natural History" (American Museum Novitates No. 245, pp. 1–9, fig. 1. New York, January 27, 1927), but did not complete his account of the "Diptera or Two-winged Flies" for the Scientific Survey of Porto Rico and the Virgin Islands, 11 (1): 3–118, fig. 38, ref. 19. New York Academy of Sciences, New York, 1928, as this was followed by a "First Supplement of the Diptera of Porto Rico and the Virgin Islands" (American Museum Novitates No. 456, pp. 23, fig. 4. New York, February 11, 1931) and by several other papers on the members of the Tachinidae, Dolichopodidae, and Syrphidae. Prof. O. A. Johannsen of Cornell University published descriptions of "New Species of Nemocera from Puerto Rico" (Jour. Agr. Univ. P. R., 22 (2): 219–225. Río Piedras, May 1938).

Tipulidae: Craneflies

Dolichopeza (Megistomastix) acutiloba is one of the "New or little-known Species of West Indian Tipulida (Diptera) II" (Jour. Agr. Univ. P. R., 21(2): 179–190, pl. 1. Río Piedras, July 1937) described by Prof. C. P. Alexander from material collected by Don Julio García-Díaz on El Yunque while making "An Ecological Survey of the Fresh Water Insects of Puerto Rico" (Jour. Agr. Univ. P. R., 22 (1): 43–97, pl. 7, ref. 44. Río Piedras, April 15, 1938), and listed by him in his "Appendix A" (pp. 94–96).

Dolichopeza (Megistomastix) obtusiloba Alexander (1937–180) is also described from material collected by Don Julio on El Yunque: "general color brown, the praescutum with four paler stripes, length, 7.5 mm., characters very similar to those of *acutiloba*, differing especially in the structure of the male hypopygium."

Dolichopeza (Megistomastix) portoricensis, described (as a *Megistomastix*) by Prof. C. P. Alexander as "A Peculiar new Crane-fly from Porto Rico" (Psyche, 19: 63–66, pl. 1. Cambridge, 1912) was also from El Yunque, collected by C. W. Richmond at an elevation of 2,800 feet, February 20, 1900. It is "the smallest Tipuline species in the Island", with "apically hairy wings, with a peculiar veination, and characterized by the greatly elongated antennae of the male."

Megistocera longipennis Macquart, first collected in Puerto Rico by Dr. Gunlach and noted by him "no es rara," was identified by von Roeder (1885-338) as a *Tipula*. Since Gunlach's time, however, it has not been collected in Puerto Rico, which seems rather surprising as it is "one of the two largest Tipulidae of the Greater Antilles" according to Prof. Charles P. Alexander, writing of "The Crane-Flies of Puerto Rico" (Jour. Dept. Agr. P. R., 16 (4): 347–387, p. 6. San Juan, February 1933).

Brachypremna unicolor described by Baron C. R. Osten Sacken in his "Studies on Tipulidae" (Berliner Entomologische Zeitschrift, 31: 329–40. Berlin, 1887) from three males collected in Puerto Rico in 1835 by Herr C. Moritz, has not since been found here, altho abundant in Hispaniola and Cuba, and since recorded from Grenada.

Limonia (Limonia) hoffmani was named by Prof. C. P. Alexander in "Records and Descriptions of Neotropical Crane-flies (Tipulidae, Diptera) III" (Jour. N. Y. Ent. Soc., 35 (3): 265–6. New York, September 1927) for its collector, Dr. W. A. Hoffman, who first found it on El Yunque, and later at Villalba at an elevation of only 1,600 feet. Apparently it is quite common at the higher elevations, having also been found at Las Cruces, elevation 1,300 feet, and at Indiera, equidistant from Lares, Yauco and Maricao, in an abandoned coffee grove.

Limonia (Neolimnobia) diva (Schiner), was collected on El Yunque by Dr. M. D. Leonard, according to Prof. Alexander (1933-357), and was since found by Don Julio there.

Limonia (Dicranomyia) brevivena (Osten Sacken), subspecies torrida was described by Prof. C. P. Alexander (1933-358) from material collected at Puerto Real on Vieques Island by Dr. M. D. Leonard, "differing from typical *brevivena* O. S. chiefly in the details of body-coloration."

Limonia (Dicranomyia) distans (Osten Sacken), a Tipulid with "general coloration brown, with a sparse golden-yellow pollen" occurring from the southern United States to Paraguay, has been found by Dr. M. D. Leonard on Vieques Island, and at Río Piedras in Puerto Rico.

Limonia (Dicranomyia) divisa Alexander is a yellow Tipulid from eastern North America, "recurring in the mountains of Hispaniola and Puerto Rico," at El Yunque and Villalba.

Limonia (Rhipidia) domestica (Osten Sacken), occurs from the southern United States to Argentina, and has been noted at numerous localities in Puerto Rico, as well as on Vieques Island by Dr. M. D. Leonard. It is readily distinguished, according to Prof. Alexander (1933-360), "by the coloration of the antennae, the two subterminal segments being pale yellow, contrasting abruptly with the blackened remainder."

Limonia (Rhipidia) tetraleuca was described by Prof. Alexander (1937-182) from material collected by Don Julio García-Díaz on El Yunque, with "antennae brown, with four subterminal segments white."

Limonia (Geranomyia) antillarum Alexander has been collected at Coamo Springs, Villalba and elsewhere in Puerto Rico, and intercepted in a grapefruit grove at Bayamón, mis-identified as the more northern *L.* (*G.*) *rostrata* Say.

Limonia (Geranomyia) cinereinotata (Alexander) is a cranefly with black head, "enclosing a silvery triangle," which occurs in northern South America "northward in the Antilles to Puerto Rico and Hispaniola." Previously recorded by Prof. Alexander (*in* Curran 1928-9) as his *Geranomyia domingensis* from Mameyes, it has since been taken at Rio Piedras and on El Yunque.

Limonia (Geranomyia) myersiana Alexander, known only from Cuba and Puerto Rico, was found by Dr. M. D. Leonard on El Yunque (Alexander 1933-363), and by Dr. W. A. Hoffman at El Semil, Villalba.

Limonia (Geranomyia) rufescens, originally described from Puerto Rico by Hermann Loew as an *Aporosa:* "Beschreibung einiger neuen Tipularia terricola" (Linnaea Entomologica, 5: 385-406. 1951. see p. 396, fig. 9-12 of pl. 2), was listed by Herr Roeder, and noted by Dr. Gundlach: "el ejemplar típico era de Puerto Rico. Hasta ahora no se ha encontrado en

otras islas." Not only has this species not been found in other islands, but it has not since been found in Puerto Rico, and Prof. Alexander (1933–363) notes its possible synonymy with Loew's *tibialis*.

Limonia (Geranomyia) subrecisa was described by Prof. Charles P. Alexander (1933–364) from material collected by Dr. M. D. Leonard on Vieques Island, being most similar to his *recisa* of Central America.

Limonia (Geranomyia) tibialis (Loew), "originally described from Brasil, but not known to have a vast range in the neotropics" according to Prof. Alexander (1933–365), was collected by Dr. M. D. Leonard on Vieques Island, and in Puerto Rico was found by Don Julio (1938–95), and by Dr. W. A. Hoffman at Villalba.

Limonia (Geranomyia) virescens (Loew), originally described from St. Thomas, is somewhat doubtfully applied by Prof. Alexander (1933–365) to craneflies from Las Cruces, but later this determination was given definitely to Dr. W. A. Hoffman for material he had found at El Semil, Villalba.

Helius (Helius) albitarsis, described as a *Rhamphidia* from Puerto Rico by Baron C. R. Osten Sacken (1887–184), has since been repeatedly found on El Yunque.

Polymera (Polymera) geniculata, described by Prof. Charles P. Alexander (Insecutor Inscitiae Menstruus, 3: 106–7. Washington, D. C., 1915), the type from Carolina, Puerto Rico, in crab holes under rocks, has since been "reared by Dr. W. A. Hoffman from a pupa taken February 20, 1927 in an eddy of a rapidly flowing rocky stream at Barranquitas," according to Prof. Alexander (1933–367), and is also listed by Don Julio (1938–95).

Shannonomyia hoffmani, included among the "New or little-known Species of West Indian Tipulidae (Diptera) I" (Jour. Agr. Univ. P. R., 20 (4): 877–882, fig. 4. Río Piedras, January 1937) described by Prof. Charles P. Alexander, was named for the collector. It is a grey cranefly, associated at light on El Yunque with the pale yellow *S. leonardi.*

Shannonomyia leonardi, described by Prof. Charles P. Alexander (1933–368) from material collected on El Yunque by Dr. M. D. Leonard, is a pale yellow cranefly with spotted wings, since listed by Don Julio (1938–95).

Shannonomyia triangularis, described as a *Pilaria* by Prof. Charles P. Alexander (1927–270), the type collected on El Yunque by Dr. W. A. Hoffman, is "known only from Puerto Rico and apparently restricted to the mountainous section of the Luquillo National Forest" according to Dr. Alexander (1933–369). It is listed by Don Julio (1938–95) without specific locality.

Hexatoma (Eriocera) ocellifera, described as an *Eriocera* by Prof.

Charles P. Alexander (1915–104) from a unique type collected by Mr. R. H. Van Zwaluwenburg at Mayagüez, has not since been found anywhere.

Hexatoma (Eriocera) **trifasciata,** described as an *Eriocera* by Herr Victor von Roeder (1885–338) from a unique type collected by Dr. Gundlach, presumably at or near Mayagüez, has since been found at Las Mesas, near Mayagüez, over a quiet pool in a small stream at an elevation of 900 feet by Mr. A. H. Madden, and on El Yunque by Don Julio García-Díaz, according to Prof. C. P. Alexander as recorded on page 126 in "New or little-known Species of West Indian Tipulidae (Diptera) IV" (Jour. Agr. Univ. P. R., 23 (2): 91–130, pl. 2. Río Piedras, September 7, 1939).

Gnophomyia (Gnophomyia) **diazi** was described and named by Prof. Charles P. Alexander (1937–184) after Don Julio García-Díaz, who collected the type female on El Yunque, a black cranefly about 5.0 mm. long, June 7, 1935 at light.

Gonomyia (Lipophleps) **bicornuta** Alexander (1927–276), the type from El Yunque, has since been repeatedly collected there.

Gonomyia (Lipophleps) **bifiligera** Alexander (1933–372), the type from Las Cruces, Puerto Rico, has since been found at El Semil, Villalba.

Gonomyia (Lipophleps) **monacantha,** described by Prof. Charles P. Alexander (1937–184) as differing from the cosmopolitan *G.* (*L.*) *helophila* Alexander "chiefly in the structure of the male hypopygium, notably of the outer dististyle," the type from Vieques Island, is abundant in Puerto Rico, collections having been made by Prof. James G. Needham and Don Julio García-Díaz at Lares, the Río Blanco and Río Yúnez. Previous records of *G.* (*L.*) *helophila* from Vieques Island and Santurce, Puerto Rico by Prof. Alexander (1933–373), and at Coamo by him (*in* Curran 1928–9), are mis-identifications of this local species, and are to be referred to it.

Gonomyia (Lipophleps) **orthomera** Alexander (1937–185), the type from Río Tanamá, others from Río Cidra, collected by Prof. Needham and Don Julio, is a yellow cranefly, 4.5 mm. long, with thorax variegated by brown.

Gonomyia (Lipophleps) **pleuralis** (Williston) is a common neotropical cranefly, first collected in Puerto Rico at Aguadilla by Mr. August Busck, and reported by Mr. D. W. Coquillett as an *Atarba* (*Gonomyia*) and since, according to Prof. Alexander (1933–374), found at Coamo and Santurce. It is characterized by a dark brown stigmal area. Don Julio (1938–95) lists it as having been collected by him, but without noting the locality.

Gonomyia (Lipophleps) **producta** Alexander, originally described from Antigua, was collected on Vieques Island by Dr. M. D. Leonard, according to Prof. Alexander (1933–374).

Gonomyia (Lipophleps) **subterminalis** Alexander (1927–175), described from a male collected by Dr. W. A. Hoffman on El Yunque, and most

abundant there, has been found at Las Cruces, at an elevation of 1,300 feet, according to Prof. Alexander (1933–374). It is also listed by Don Julio (1938–95).

Teucholabis (Teucholabis) portoricana Alexander (1937–880) was described from a male collected by Dr. W. A. Hoffman at El Semil, Villalba, differing from *T.* (*T.*) *myersi* of Cuba and southern Florida chiefly in the structure of the male hypopygium.

Trentepholia (Paramongoma) niveitarsis, described as a *Mongoma* by Prof. Charles P. Alexander in "A Synopsis of Part of the Neo-Tropical Crane-Flies of the Subfamily Limnobidae" (Proc. U. S. National Museum, 44 (1966): 501. Washington, D. C., April 30, 1913), the type from El Yunque, is, so far as known, found only in the Luquillo Mountains. Prof. Alexander (1933–375) identifies a single broken male from the Blue Mountains of Jamica as "what appears surely to represent this same species."

Polymeda (Mesocyphona) caloptera (Say) is a widely-distributed cranefly of the eastern United States, of which specimens which have "the white wing spots somewhat more reduced in area," according to Prof. Alexander (1933–377), have been found on El Yunque.

Polymeda (Mesocyphona) portoricensis (Alexander) (1933–377), the type from El Yunque, others from Las Cruces, is known only from Puerto Rico. It is listed by Don Julio (1938–95), as an *Erioptera*.

Toxorhina (Toxorhina) fragilis, originally described by Herr Hermann Loew (1851–401) from a type female collected in Puerto Rico by Moritz, is listed by Herr von Roeder and by Dr. Gundlach, who notes: "El tipo era también de Puerto Rico, donde solamente ha sido observado la especie." Prof. Alexander (1933–378) re-describes what he presumes to be this species from Cuban and Hispaniolan males, none of either sex having been found subsequently in Puerto Rico.

Blephariceridae

Paltostoma argyrocincta Curran (1927–1), "opaque black or brown, with silvery white areas apparent from different views, length about 4.5 mm.; scutellum brown, narrow, shaped like the 'cap' of a broadly opened 'toad-stool;' thorax (and abdomen) without trace of hairs," was described from material collected by Dr. Frank E. Lutz at Río Grande. It has since been collected by Prof. James G. Needham and Don Julio García-Díaz on El Yunque and from the Río Sabana, as noted by Prof. O. A. Johannsen (1938–223).

Psychodidae: Moth Flies

Telmatoscopus albipunctatus (Williston), the common large moth fly of Puerto Rico, has repeatedly been noted here since its original identi-

fication as a *Psychoda* by Dr. J. M. Aldrich in 1922, and as a *Pericoma* by Dr. C. H. Curran in 1930. Its very elongate black maggots are sometimes to be found in enormous numbers in containers of dirty water, wiggling at or near the surface, with adults continually emerging and climbing up the side. The adults have feathery white antennae, white tarsi and spines on the legs, and white spots on the wings, surprisingly beautiful and delicate in contrast with the disgusting habitat of the larvae, which have been reared on a dead cockroach and other insect debris in water, and are commonly found feeding on liquid manure or the slime that accumulates in poorly designed plumbing.

Psychoda alternata Say, as determined by Dr. Alan Stone from specimens intercepted on "palo de mato" (*Adenanthera pavonina*) in Bayamón, is not an indoor species.

Psychoda severini listed by Dr. Stahl as *Psychoda phalaenoides* L., is a smaller, less decorative species, of which one or two adults are often noted lurking about the drain of a wash basin.

Maurina hirta, described by Prof. O. A. Johannsen (1938–224) from larvae, pupae and adults collected by Prof. James G. Needham and Don Julio García-Díaz at the Río Guaynabo and Río Yúnez, differs from *Maurina angustipennis* Williston of St. Vincent, which has the wings uniformly covered with black hair, in that its wings are hairless, "basal sections of R_5 and M_2 obliterated."

Of **Phlebotomus cayennensis** Floch and Abonnene, G. B. Fairchild and Marshall Hertig described (Annals Ent. Soc. America, 41 (4): 462–4. Columbus, December 1948) the new subspecies **puertoricensis** from material collected in caves and hollow "bucare" trees at Lares in the summer of 1947 by José Romero and H. Trapido, and **viequesensis** from material collected in a tree hole near Laguna Yanuel and the old Spanish fort at Isabel II, Vieques Island, in June 1947 by J. Andrews and H. Trapido.

Tendipedidae (Chironomidae): Midges

Pentaneura marmorata was described by Prof. O. A. Johannsen as one of his "New Species of Nemocera from Puerto Rico" (Jour. Agr. Univ. P. R., 22 (2): 219–225. Río Piedras, May 1938) from material collected by Prof. James G. Needham and Don Julio García-Díaz from the Río Cidra, March 23, 1925. It is a pale yellow midge with white halteres, 2.5 mm. long.

Pentaneura monilis (L.), variety **peleensis** Walley came to light at Tortuguero Lagoon, August 15, 1935, according to Prof. Johannsen (1938–220).

Coelotanypus insulanus was described by Prof. O. A. Johannsen (1938–220) from females taken at the Río Yúnez by Prof. Needham and Don

Julio, August 11, 1935: a yellowish midge with reddish brown thorax, length 2.2 mm.

Coelotanypus concinnus (Coquillett), originally described from Florida, was attracted to light at the Cartagena Lagoon, as identified by Prof. O. A. Johannsen (1938–220).

Cardiocladius obscurus Johannsen was also attracted to light at the Cartagena Lagoon, August 9, 1935, as identified by Prof. Johannsen (1938–220).

Cricotopus aberrans was described by Prof. O. A. Johannsen (1938–220), the type from Río Tamaná, others from Río Yúnez and Río Cagüitas: a small yellow midge, 1.8 mm. long, with abdomen mostly brownish, halteres white.

Cricotopus conformis, described as a *Crictopus* by Dr. C. H. Curran (1928–12), the type from Guane, Cuba, others from Manatí, Puerto Rico, is characterized by having the "tibiae whitish, the apical third or less of the anterior pair blackish; femora blackish, the narrow bases reddish; length 2.75 to 3 mm." This brownish midge was found by Prof. Needham and Don Julio at Lares and on the Ríos Yúnez, Tanamá and Cidra, according to the identifications of Prof. Johannsen (1938–221).

Cricotopus insolitus, described as a *Crictopus* by Dr. C. H. Curran (1928–11), the types from Mayagüez, others from Manatí, has "all the tibiae whitish" and is from 2.0 to 2.25 mm. long. It was collected by Prof. Needham and Don Julio on El Yunque, and on the Ríos Cidra, Yúnez and Tanamá, according to Prof. Johannsen (1938–221).

Corynoneura (Thienemaniella) similis Malloch was taken at light near the Río Cidra and the Río Yúnez by Prof. Needham and Don Julio, as identified by Prof. Johannsen (1938–221).

Pseudochironomus fulviventris Johannsen was taken at light at El Yunque and on the Río Yúnez by Prof. Needham and Don Julio, according to the identifications given by Prof. Johannsen (1938–221).

Tendipes (Stenochironomus) furcata was described by Prof. O. A. Johannsen (1938–221) from material collected on El Yunque, characterized by the "lack of wing bars, combined with the peculiar furcate dististyles."

Tendipes anonymus, originally described from St. Vincent by Prof. S. W. Williston as a *Chironomus,* is recorded by Mr. W. V. Tower (1912-6) as having been reared from water in old pail, at Mayagüez.

Tendipes bulbosa (Garry), originally described as a *Chironomus* from Cuba, was collected from Guánica, Cartagena and Tortuguero Lagoons, and from the Río Yúnez by Prof. Needham and Don Julio according to Prof. Johannsen (1938–222).

Tendipes redeuns (Walker), reported by Mr. D. W. Coquillett (1900–

250) as a *Chironomus* collected by Mr. August Busck in Puerto Rico, has not since been found here.

Tanytarsus (Rheotanytarsus) meridionalis, a pale yellow midge with the abdomen somewhat greenish, at least when the insect is alive, was described by Prof. O. A. Johannsen (1938–222) from a great abundance of material collected by Prof. Needham and Don Julio, the type from Río Yúnez, others from Río Cidra, Río Tanamá, Quebrada Jobo, and such widely divergent environments as the Luquillo Mountains and Tortuguero Lagoon.

Heleidae (Ceratopogonidae): Punkies

Culicoides furens (Poey), originally described from Cuba (1853–236), was first recorded from Puerto Rico by Dr. F. M. Root (1922–396) as being "the common sand-fly of the coastal region." In "A Review of the Species of Culicoides of North and Central America and the West Indies" (Amer. Jour. Hygiene, 5 (3): 274–301. Baltimore, 1925), Dr. W. A. Hoffman notes specific localities of collection: Río Piedras and Aguirre, and later wrote: "This species is common everywhere near the sea; reared from larvae at and above tide level in the Condado Lagoon, 1928, and in small pools at Escambrón, 1933. It is a vicious biter," and when the wind is not blowing makes life almost unsupportable along the north coast from the Condado, thru Ocean Park and the region on all sides of Laguna San José, to Boca Cangrejos, Laguna Quiñones, Loíza Aldea and in mangrove swamps near Pt. Picúa, Fajardo and Humacao Playa, to people who are susceptible to its bite. When the wind blows, these minute little flies take shelter close to the ground, and will be noted only by barefooted persons resting on the grass, but as the breeze fades in the late afternoon they venture forth, sometimes flying as high as the second stories of houses. They are small enough to penetrate the mesh of all ordinary mosquito bars, and only the finest muslin will protect helpless babies from their attack. Much of the region where they are most abundant appears to be desirable residential region, but in fact is uninhabitable by persons who are most allergic to their bites. "The Effect of Chloroform on some Insect Bites" (Science, 94 (2429): 66. Lancaster, July 18, 1941) is claimed by Dr. W. A. Hoffman to be most prompt in relieving local annoyance, being most effective if applied promptly, and superior to carbon tetrachloride. It is especially recommended for use against this species of punkie, which is cited as being "common and annoying along the costal plain." The most optimistic persons living in the heavily infested region of north Puerto Rico hope that this plague will be abated as more houses are built, but until the margins of the near-by swamps are eliminated, the influx of

additional people only serves to provide additional hosts to be annoyed. Of all the numerous chemicals tested during World War II to protect soldiers of the U. S. Army against attack by punkies in other swampy areas of the world, the most promising is dimethyl phthalate alone, or mixed 6:2:2 with 2-ethyl-1, 3-hexanediol and indalone (n-butyl mesityl oxide oxalate). The commercial availability of such chemicals is no longer restricted to the armed forces. "Eveready" formula No. 612, manufactured by the National Carbon Company, Inc., of New York, is 1,3 ethyl hexanediol, and "Dimelone," manufactured by Dodge and Olcott Company, is bicyclo-(2,21)-5-heptene-2,3-dicarboxylic acid, dimethyl ester. Both of these compounds show high efficiency against punkies and mosquitoes, both are poorly absorbed by the skin, and both possess an odor not highly objectionable to most people. For efficiency and safety, there is little or no difference between them.

Culicoides borinqueni, described by Drs. Irving Fox and W. A. Hoffman as one of "New Neotropical Biting Sandflies of the Genus Culicoides (Diptera: Ceratopogonidae)" (P. R. Jour. Public Health & Tropical Medicine, 20 (1): 108–11, fig. 5. San Juan, September 1944) found in Puerto Rico, is from a type collected at Palmas Abajo.

Culicoides (Hoffmania) inamollae Fox and Hoffman (1944–110) is described from material collected at Mayagüez by Dr. George S. Tulloch.

Culicoides guttatus (Coquillett) is re-described and illustrated by Dr. Irving Fox from material collected at Camp Tortuguero in his "Notes on Puerto Rican Biting Midges or Culicoides (Diptera: Ceratopogonidae)" (Bulletin Brooklyn Ent. Soc., 44 (1): 29–34, pl. 1, ref. 4. Brooklyn, February 1949.)

Culicoides hoffmani Fox, originally described from Camuto, Trinidad, from a single female, has subsequently been associated with the male by Dr. Fox (1949–29) from material reared from tree-hole débris at Mameyes and Luquillo.

Culicoides loughnani jamaicensis Edwards has male and female associated and re-described by Dr. Fox (1949–32) from material taken in a light-trap at Sabana Seca.

Culicoides trilineatus Fox, originally described from St. Thomas, has male and female associated and re-described by Dr. Fox (1949–30) from material reared from tree-hole débris at Luquillo.

Culicoides phlebotomus (Williston), described originally as a *Ceratopogon* from St. Vincent, was identified by Dr. J. M. Aldrich from specimens collected on the beach at Mameyes, and by Prof. O. A. Johannsen from others on the beach at Pt. Cangrejos. As to the comparative abundance of these species of "las plagas o jején" in Puerto Rico, no estimate is possible. To aid in their more rapid identification, however, Dr. Irving

Fox has published on "The Respiratory Trumpet and Anal Segment of the Pupae of some Species of *Culicoides* (Diptera: Ceratopogonidae)" (P. R. Jour. Public Health & Tropical Medicine, 17 (4): 412–425, pl. 2. San Juan, June 1943), based on material collected and mounted by Dr. W. A. Hoffman, of which illustrations had been made by Dr. F. M. Root.

Helea (Brachypogon) impar, described as a *Ceratopogon* by Prof. O. A. Johannsen from material collected by Prof. James G. Needham and Don Julio García-Díaz on El Yunque, has a black thorax, with the antennae, legs and most of the abdomen yellowish, length 0.8 mm.

Ceratopogon punctipennis Williston and Ceratopogon sequax Williston, both originally described from St. Vincent, were listed by Mr. D. W. Coquillett (1900–250) as having been collected in Puerto Rico by Mr. August Busck.

Atrichopogon sp., as identified by Dr. Alan Stone, was intercepted on cactus blossom at Barceloneta.

Forcipomyia eriophora (Williston), as identified by Dr. J. M. Aldrich, was repeatedly noted in Puerto Rico before listed as *Ceratopogon* by Dr. C. H. Curran (1928–11) from Mayagüez and the Dominican Republic. Dr. Richard T. Cotton first saw these flies, black with white markings, "with their mouthparts firmly fixed in tobacco hornworms, feeding voraciously, their bodies so distended with the body juices of the host as to be quite green, and so intent on feeding as to be quite sluggish and not easily disturbed." Tobacco hornworms, the larvae of *Phlegethontius sextus jamaicensis* Butler, appear to be the only caterpillars attacked. Half a dozen or more flies attacking a single hornworm at one time have subsequently been noted by Messrs. E. G. Smyth and Francisco Sein Jr.

Forcipomyia flava (Williston) was identified by Dr. Alan Stone from material collected by Dr. Harry Pratt at Tortuguero Lagoon. *Forcipomyia galapagensis* (Coquillett), *F. erucicida* Knab and *F. crudelis* Knab are in synonymy with this fly, originally described from St. Vincent.

Forcipomyia pergandei (Coquillett) was identified by Prof. O. A. Johannsen from larvae, deeply constricted between segments, with two white balls on most segments sticking up above the general level of the insect, abundant on rotten ñame (*Dioscorea* sp.) at Isabela, and later found on rotten banana corm at Río Piedras. The pupae are formed with the anterior end sticking out of the larval skin.

Forcipomyia propinqua (Williston) was identified by Dr. Alan Stone from material intercepted at Mayagüez by Mr. A. G. Harley: a species originally described as a *Ceratopogon* from St. Vincent.

Forcipomyia raleighi Macfie was identified by Dr. Alan Stone from material collected at Tortuguero Lagoon by Dr. Harry Pratt.

Stilobezzia coquilletti Keiffer was identified by Dr. Alan Stone from specimens intercepted in a grapefruit grove near Arecibo, and in a grapefruit grove near Añasco by Mr. A. G. Harley.

Culicidae: Mosquitoes

Dr. Harry D. Pratt of the U. S. Public Health Service, stationed in Puerto Rico for five years (1941–46), is expecting to publish as complete and definitive a report on the mosquitoes of the Island as the extensive and intensive investigations of many specialists now makes possible. This is to appear in the "Puerto Rican Journal of Public Health and Tropical Medicine" of the School of Tropical Medicine in the near future. In anticipation of this publication, the present treatment of the Culicidae here is merely an outline, in extent not to be considered as an index of the relative or economic importance of the family.

Chaobrus (Sayomyia) brasiliensis (Theobald) was first recorded from Puerto Rico, at Mayagüez by Dr. G. S. Tulloch discussing "The Mosquitoes of Puerto Rico" (Jour. Agr. Univ. P. R., 21 (2): 137–169, fig. 9, ref. 26. Río Piedras, April 1937). "Adults were taken in large numbers from light-trap collections, yet the larvae were encountered in only one instance: in a pool formed by a spring in heavily shaded woods." It is listed by Lane (1942–141).

Chaobrus festivus Dyar & Knab, as identified by Dr. Robert Matheson, was listed by Don Julio García-Díaz (1938–95), having been collected while making his ecological survey of fresh water insects of Puerto Rico.

Dixa (Dixella) hoffmani, described by J. Lane (Sao Paulo) in "Dixinae e Chaoborinae, Revisao das espécies neotrópicas (Diptera, Culicidae)" (Revista de Entomologia, 13 (1–2): 81–148, fig. 7, pl. 4, ref. 20. Río de Janeiro, 1942), was from larvae collected by Dr. W. A. Hoffman at Pueblo Viejo and Barranquitas, of which one female (type) was reared to adult. This is the species previously reported as doubtfully *Dixa clavulus* Williston, but which Dr. F. W. Edwards later told Dr. Hoffman was not that, but quite distinct and new.

Corethrella brakeleyi (Coquillett), originally described as a *Corethra* from New Jersey, is now considered by Dr. Alan Stone and H. R. Dodge to be, in part, what Dr. G. S. Tulloch (1937–153) lists as *C. appendiculata* Grabham from Mayagüez (many records), Maricao and Dorado. "The larva, although small in size, is an effective predator on first and second-stage *Culex* larvae. It is found in many open country habitats having clean water, in crab holes, and (referring to an undescribed species) in large numbers in the leafbases of bromeliads." *Corethrella* (*Corethrella*) *tripunctata*, described by J. Lane (1942–120) from a type collected at

Carolina, Puerto Rico, at an elevation of 100 feet by Miss Clara South Ludlow, is *C. brakeleyi* according to Drs. Harry Pratt and Alan Stone.

Corethrella sp. nov. is what Dr. W. A. Hoffman collected from a tree hole near Guayama and reported under the name *Corethrella appendiculata* Grabham, and was found by Dr. Tulloch in the leaf-bases of bromeliads. As reported in his "Ecological Notes on Mosquitoes associated with Bromeliads" (Jour. Agr. Univ. P. R., **22** (4): 499–501. Río Piedras, March 23, 1939), the water there enclosed is a very acid environment for mosquito larvae, "the range of pH value being 3.8 to 6.6."

Corethra punctipennis Say, listed by Herr von Roeder and Dr. Gundlach, does not occur in Puerto Rico according to Dr. W. A. Hoffman.

Wyeomyia sp., listed by Dr. C. R. Twinn (*in* Curran 1928–10), a single damaged female from Adjuntas, was first reported with (incorrect) species identification *mitchellii* from Jamaica (Theobald) by Dr. W. A. Hoffman: reared from larvae in bromeliad on El Yunque, November 4, 1934. Subsequently collected there and in the Maricao Forest by Dr. G. S. Tulloch (1937-141), the small bluish-green adults with conspicuous white markings on the hind legs, sometimes "attack man, but cannot be considered fierce biters." The bright yellow larvae, with slightly flattened bodies "move about with a gliding motion over the debris in the leaf bases of the bromeliad (*Catopsis berteroniana*). The water in which they live is either slightly or distinctly acid, having a hydrogen ion concentration corresponding to a pH ranging between 4.0 and 6.5. The temperature of the water varies between 68° and 81°F., being lower on the higher points such as Mt. Britton in the Luquillo National Forest and higher at such points as Maricao." Drs. A. Earl Pritchard and Harry D. Pratt, in presenting their "List of the Mosquitoes of Puerto Rico" (Public Health Reports, **59** (7): 232–3, ref. 6. Washington, D. C., February 18, 1944) consider that the local records represent "a new species."

Anopheles (Nyssorhynchus) albimanus Wiedemann, the most common vector of malaria in the costal lowlands of Puerto Rico, is characterized by "the black and white spotted wings, a broad white band on the hind tarsus, and black and white banded palpi in the female." It was first listed by Herr von Roeder and Dr. Gundlach, and by Dr. L. O. Howard, H. G. Dyar and Fred. Knab in their monumental work on the "Mosquitoes of North and Central America and the West Indies" (**4**: 524–1064. Washington, D. C., 1917) on page 984. In "A Study of Mosquitoes in San Juan, Porto Rico" (Circ. No. 14, P. R. Agr. Expt. Station, pp. 23. Mayagüez, 1912), Mr. W. V. Tower recorded its abundance "in rain-water barrels." This is hardly the most common environment for the larvae, for Dr. F. M. Root in his "Notes on Mosquitoes and other Blood-sucking Flies from Porto Rico" (Amer. Jour. Hygiene, **2** (4): 394–405, fig. 5. Baltimore,

July 1922) found them "in many different kinds of pools, swamps, irrigation ditches, etc., often unshaded, but usually with some aquatic vegetation, more abundant near the coast and lagoons than a few miles inland. Adults attack man readily in the evening." As a result of his "Malaria Surveys in Porto Rico" (P. R. Health Review, 1 (4): 12–18. San Juan, October 1925), Dr. W. C. Earle was convinced that this species was locally "the most important vector of malaria." Dr. H. W. Kumm, recording "The Geographic Distribution of Malaria-carrying Mosquitoes" (Amer. Jour. Hygiene, Monographic Series No. 10, Baltimore, 1929), listed collections at Salinas, Aguirre, Guayama, Fajardo, Caguas, Río Piedras, Sunoco, Cataño and San Germán, and Dr. W. C. Earle in his further study on "Malaria in Porto Rico" (Amer. Jour. Tropical Medicine, 10 (3): 207–230, ref. 8. Baltimore, 1930) records its distribution "throughout most of the island." Dr. Earle's more recent studies are "Notes on the Life-History of *Anopheles albimanus* and *grabhamii*" (P. R. Jour. Public Health and Tropical Medicine, 7 (3): 381–4. San Juan, December 1931), and a year later in the same Journal (8 (3): 227–242), "Some Observations of Anti-mosquito Screening and Screening Methods." His conclusions on "Malaria in Porto Rico in its Relation to the Cultivation of Sugar Cane" (Southern Medical Journal, 23 (5): 449–452. Birmingham, May 1930) are that it is quite possible to grow sugar-cane under irrigation without increasing the malaria prevalence if adequate drainage is provided, as is shown by "The Relation between Breeding Areas, *Anopheles albimanus* density, and Malaria in Salinas, Puerto Rico" (Southern Medical Journal, 30 (9): 946–950. Birmingham, 1937). Indeed, "it was necessary to bring practically all of this enormous breeding area under control before the mosquito density was definitely reduced. The malaria prevalence was not affected until this mosquito density was brought down and maintained at an extremely low figure." With Dr. H. H. Howard as junior author, Dr. Earle's final contribution to local studies is "The Determination of *Anopheles* Mosquito Prevalence" (Bol. Asn. Medica de P. R., 28: 233–240. San Juan, 1936).

The very extensive collection records of Dr. G. S. Tulloch (1937–152) include at their extremes Cartagena Lagoon and Las Marías. He notes that the larvae "appear to breed with equal ease in brackish and fresh water, as they were taken in water having 950 parts of chlorine per 100,000 parts of water. The adults are active only at night; during the day they remain in hiding and consequently little is known of their diurnal activities." Indeed, it is a "wild" mosquito, "which feeds on humans during twilight or at night and seldom remains inside houses for more than a few hours," according to Drs. Porter A. Stephens and Harry D. Pratt in their report on the first year's "Work with Residual DDT Spray in Puerto Rico"

(Science, 105 (2715): 32–33. Baltimore, January 10, 1947). By spraying the interior of all the houses in Humacao Playa with DDT three times during the year, "there was a progressive decrease in percentage of positive malaria" of the inhabitants from 5.8 percent to 0.91 percent a year later, as compared with little change in the check of Loíza Aldea, a comparable community in which none of the houses was sprayed with DDT. This mosquito has not been found on Mona Island, but Drs. Pritchard and Pratt (1944–233) collected it on Vieques Island, as well as at every military camp in Puerto Rico. They noted in "A Comparison of Light Trap and Animal Bait Trap Anopheline Mosquito Collections in Puerto Rico" (Public Health Reports, 59 (7): 221–232, fig. 7. Washington, D. C., February 18, 1944) that both sexes are attracted to the light trap, and even for the collection of females, the light trap is generally superior, especially during the dark phase of the lunar cycle.

In the "Relation of Plants to Malaria Control in Puerto Rico" (Supplement No. 200 to the Public Health Reports, pp. 38, fig. 10, ref. 11. Washington, D. C., December 1947), Dr. Harry D. Pratt shows how the role of plants, even those growing on dry land, is complicated by rainfall, and how sand bar formation at the mouth of rivers emptying into the ocean affects the breeding of *Anopheles albimanus*. In his "Studies on the Comparative Attractiveness of 25-, 50- and 100-watt Bulbs for Puerto Rican *Anopheles*" (Mosquito News, 4 (1): 17–18. Albany, N. Y., 1944), he showed that "the traps attracted *albimanus* in numbers which were approximately proportional to the wattage of the three bulbs." He also found that the "Influence of the Moon on Light Trap Collections of *Anopheles albimanus* in Puerto Rico" (Journal of the National Malaria Society, 7 (3): 212–220, fig. 6, ref. 8. Baltimore, September 1948) was so marked that "an index of 1 to 5 *albimanus* per light trap per night during the 'bright phase' " was the equivalent of 5 to 20 mosquitoes during the dark phase of the moon.

Intensive studies were initiated (1948–49) and summarily terminated by Dr. John W. H. Rehn, Chief of Party for the Columbia University Malaria Mosquito Field Research Project, as to its host preferences, night resting and feeding, daytime resting, and the possibility of the aestivation of immature stages. These lacunae were apparent when Dr. J. M. Henderson spoke "On the Possibility of Eradicating the Malaria Mosquito in Puerto Rico" (Bol. Asn. Medica de P. R., 39 (3): 89–96. San Juan, March 1947) and proposed "The Eradication of *Anopheles albimanus* in Puerto Rico—An Ecological Discussion" (Mosquito News, 8 (2): 45–49 and 8 (3): 97–101. Albany, N. Y., June and September 1948).

Anopheles (Anopheles) grabhamii Theobald is first recorded from Puerto Rico by Howard, Dyar & Knab (1917–1009). Mr. W. V. Tower (1921–6) notes that its "legs are very long; the last ankle segment is white

and there is a black band next to the claw." This is hardly the most distinguishing characteristic of this yellowish-brown *Anopheles*, but rather "the almost circular black scales on the wings," as pointed out by Dr. Harry D. Pratt. Indeed, due to his studies, it is now possible to be certain of "The Identification of the First Stage Larvae of Puerto Rican *Anopheles*" (Public Health Reports, 58 (47): 1715–7, fig. 1. Washington, D. C., November 19, 1943), *grabhamii* having "subantennal hair with branches on only one side of a slender central shaft." Dr. F. M. Root (1922–395) noted it "throughout the coastal plain, but in smaller numbers than *A. albimanus*; breeding places much more local and difficult to find, all well shaded, with considerable aquatic vegetation." Dr. G. S. Tulloch (1937–153) found it breeding in brackish water, in which may be included his record of *A.* (*A.*) *crucians* (Wiedemann): a single larva in the brackish water of a hoof print near Guánica Lagoon. Dr. W. C. Earle thought "*Anopheles grabhamii* (Theobald) a possible Vector of Malaria" (Bol. Assn. Med. P. R., 28: 228–232. San Juan, 1936) of minor importance due to its comparative indifference to humans. Drs. Pritchard and Pratt (1944–233) found it on Vieques Island (where it had previously been collected by Dr. W. A. Hoffman), and at all but one of the military camps in Puerto Rico, noting that "because of its more restricted breeding habitats, this species is more local in its distribution."

Anopheles (Anopheles) vestitipennis Dyar & Knab was first reported from Puerto Rico by Dr. Harrison G. Dyar in describing "The Male of *Anopheles vestitipennis* Dyar & Knab (Diptera: Culicidae)" (Insecutor Inscitiae Menstruus, 12 (10): 171. Washington, D. C., 1924), based on collections made by Dr. H. A. Johnson. This is the largest of the Puerto Rican *Anopheles*, according to Dr. Harry D. Pratt. It is generally blacker in color, with black and white wing scales irregularly scattered over the entire wing. The blackish legs have many small whitish dots or bands. Drs. Pritchard and Pratt (1944–230) note the scarcity of males vs. females, and of both sexes vs. those of other Anophelines. The first record of a larva: in a ditch in a cane field at Barceloneta, is by Dr. H. A. Johnson, "Occurrence of *Anopheles vestitipennis* in Porto Rico" (Amer. Jour. Tropical Medicine, 6 (2): 153–5. Baltimore, March 1926). That of all species is included by Dr. W. H. W. Komp in "The Anopheline Mosquitoes of the Caribbean Region" (National Institute of Health Bulletin No. 179, pp. 1–195. Washington, D. C., 1942). Dr. W. C. Earle (1925–12 and 1930–214) found it quite abundant at certain seasons (October to January) along the coast. It has not been found to date on Vieques Island.

Toxorhynchites (Toxorhynchites) portoricensis, described as a *Megarhinus* by Herr Victor von Roeder (1885-337) from material collected by Dr. Gundlach, is restricted in its larval environment to tree-holes, as noted

by Dr. Root (1922–395), and the leaf bases of bromeliads, according to Dr. Tulloch (1937-151). Mr. W. V. Tower in 1927 found larvae in a tin can, and Dr. W. A. Hoffman collected them in a treehole near Guayama, and reared them to adult. Distribution is from sea-level, at Mayagüez, to an elevation of 2,000 feet at Maricao, where Dr. Tulloch (1939–500) made his only collection in a bromeliad.

Uranotaenia cooki Root, originally described from Port-au-Prince, Haiti, where adults were found by Capt. C. C. Cook resting on the under surfaces of jetting ledges of rocks over pools in the intermittent stream back of Rue Turgeau, was first found in Puerto Rico by Capt. T. H. G. Aitken, with Dr. Harry D. Pratt, as noted by the latter in his discussion of "The Genus *Uranotaenia* Lynch Arribalzaga in Puerto Rico" (Annals Ent. Soc. America, 39 (4): 576–84, fig. 9., ref. 14. Columbus, December 1946). This was also reported by Lt. Com. Albert A. Weathersbee in "A Note on the Mosquito Distribution Records of Puerto Rico and of the Virgin Islands" (P. R. Jour. Public Health and Tropical Medicine, 19 (4): 643–5. San Juan, June 1944), who subsequently had found the larvae "in a marsh among a thick growth of *Typha* in eastern Puerto Rico" at Ensenada Honda. They have since been found in water densely shaded by water hyacinth (*Piaropus crassipes*) at Salinas, and at Ponce, Humacao, Loíza and various north coast points. They are characterized by having a golden-brown head.

Uranotaenia lowii Theobald, whose larvae almost always have a black head, was first noted in Puerto Rico by Dr. F. M. Root (1922–397) "in grassy, meadow pools kept filled for some time by frequent rains, as at Río Piedras." Dr. Tulloch (1937–151) found it in "open country situations" from Rincón to Cartagena Lagoon and Guánica. Dr. Pratt (1946–582) notes it as being "one of the commonest mosquitoes in light trap collection in Puerto Rico, 500 to 1000 specimens of both sexes sometimes being collected in a single, overnight catch, especially during the rainy season," at north coast localities and on Vieques Island.

Uranotaenia sapphirina (Osten Sacken), first recorded from Puerto Rico by Dr. F. M. Root (1922–397) as *U. socialis* Theobald, from "a small swampy ditch containing *Spirogyra* in a young cane field near Río Piedras," was found by Dr. Tulloch (1937–151) in small numbers at Cabo Rojo and Mayagüez. According to Dr. Pratt (1946–583), it "occurs over most of Puerto Rico throughout the year" and on Vieques Island.

Orthopodomyia signifera (Coquillett) was collected by Lt. Com. Albert A. Weathersbee (1944–643) in the Caribbean National Forest at an elevation of 2,300 feet.

Psorophora (Janthinosoma) confinnis (Lynch Arribalzaga) was found on Vieques Island by Lt. Com. A. A. Weathersbee (1944–644), and re-

ported from Vieques and from five localities in Puerto Rico by Drs. Pritchard & Pratt (1944–233). Under the name *Psorophora jamaicensis* Theobald, this mosquito was first reported from Puerto Rico by Howard, Dyar & Knab (1917–581) from a collection made at Bayamón in 1899 by Mr. August Busck, and Dr. F. M. Root (1922–399) found "larvae in temporary rain pools at Río Piedras, and in a recently flooded irrigation ditch at Aguirre." Dr. G. S. Tulloch (1937–143) collected them only at Mayagüez, especially along the seacost, noting that "the adults are large and vicious biters."

Psorophora (Janthinosoma) johnstonii (Grabham), originally described from Jamaica, was reported from Culebrita and Ponce, Puerto Rico by Dr. Harry D. Pratt in his description of "The Larva of *Psorophora* (*Janthinosoma*) *coffini* Dyar and Knab and a Key to the *Psorophora* Larvae of the United States and the Greater Antilles" (Proc. Ent. Soc. Washington, 48 (8): 209–14, fig. 1, ref. 5. Washington, D. C., November 1, 1946).

Psorophora (Janthinosoma) pygmaea Theobald, first reported from Puerto Rico by Dr. G. S. Tulloch (1937–142): at Mayagüez and at many points on the south coast, is a large, well-marked mosquito which bites human beings during the day as well as at night. "The larvae are large, have inflated air tubes, and prefer to live in temporary fresh water ground pools containing little or no vegetation. They are able to develop in brackish water, for at Lake Guánica they were found in hooftrack pools containing 665 parts of chlorine per 100,000 parts of water." Distribution is by no means confined to the south coast, for Drs. Pritchard and Pratt found this species at Borinquen Field (north of Aguadilla) and at Fort Buchanan (west of San Juan), and Lt. Com. Weathersbee (1944–644) on Vieques Island. Both this and the preceeding species, and also such typical salt marsh mosquitoes as *Aedes taeniorhynchus* and *Aedes sollicitans*, have been noted by Dr. Harry D. Pratt (1947–9) to develop in enormous numbers in the flats of pickleweed (*Batis maritima*) after heavy rainfall. "The eggs of these salt marsh mosquitoes are laid on the damp soil. As the land becomes dry, the embryos develop inside the eggs, and they are ready to hatch with the next rainfall. If the water stands on such places for 4 or 5 days, production of (these four species) may be tremendous."

Mansonia (Mansonia) indubitans Dyar & Shannon was first collected in Puerto Rico by Dr. G. S. Tulloch (1937–146) at Sabana Grande and at Cartagena Lagoon, the larvae "attached to the submerged stems of *Pistia stratiotes*," locally known as "lechuguilla de agua," being reared to adult, described and figured. Drs. Pritchard & Pratt (1944–233) found this species at Tortuguero Lagoon, and at Fort Buchanan. The record of *Taeniorhynchus perturbans* Walker from Puerto Rico, by Dr. L. O. Howard

in his "Notes on the Mosquitoes of the United States" (Bulletin No. 25, new series, Div. Ent., pp. 70. Washington, D. C., 1900), may refer to this species, or to the following.

Mansonia (Mansonia) flaveolus (Coquillett), originally described as a *Taeniorhynchus* from the Island of St. Thomas, the type having been collected by Mr. Aug. Busck, occurs in Puerto Rico, the larvae and pupae having been found at Carolina on the roots of water spoon (*Hydromystria stolonifera*), as reported by Dr. Harry D. Pratt in discussing "*Mansonia indubitans* Dyar & Shannon—a New Mosquito Addition to the United States Fauna" (Journal Kansas Ent. Soc., 18 (4): 121–9, fig. 14, ref. 6. Manhattan, October 1945). The adult female of *flaveolus* is definitely yellowish or golden in color, and has palpi more than half the length of the proboscis. Indeed, to this species should be referred all records of *Mansonia* (*Mansonia*) *titillans* (Walker), as identified by Dr. Alan Stone, which was intercepted at Mayagüez by Mr. A. G. Harley, and reported by Dr. Tulloch (1937–146). It is not rare, having been collected by Drs. Pritchard & Pratt at Laguna Tortuguero, at Gurabo and Carolina, at Borinquen Field (north of Aguadilla), Fort Buchanan (west of San Juan), and also on Vieques Island.

Aedes (Stegomyia) aegypti (Linnaeus), described from the West Indies by Fabricius as *Culex fasciatus*, and thus first listed from Puerto Rico by Herr C. Moritz (1836–377) as the only identified species, and subsequently by Dr. Gundlach, is given in Van Zwaluwenburg's list as *Aedes* (*Stegomyia*) *calopus* Meigen, and when mentioned by Mr. W. V. Tower (1908–38, 1912–6 and 1921–5). This is the yellow fever mosquito, noted by Dr. F. M. Root (1922–397) as "very common in and around houses, everywhere swarming in artificial containers around houses," and ever ready to serve as a vector of the disease if any person or animal infected with yellow fever arrives in the regions where it does not now exist. Dr. C. R. Twinn (*in* Curran 1928–10) records it from Mona Island, and it is still a common species there despite the scarcity of people to bite and of artificial containers of water. Dr. W. A. Hoffman collected it on Vieques Island in December 1937, and Dr. G. S. Tulloch (1937–145) has records from "all parts of the coastal plains of Puerto Rico and in many of the towns high in the mountains. The adults are fierce biters and attack freely and without warning during the day and early in the evening." Apparently adults are little attracted to light traps, for Drs. Pritchard and Pratt found it only at Ponce. Physiologically, this mosquito has been intensively studied by Dr. E. B. McKinley, who described "The Salivary Gland Poison of *Aedes aegyptii*" (Proc. Soc. Expt. Biol. & Medicine, 26 (9): 806–9. New York, June 1929), and Dr. R. Kudo describes in his "Studies on Microsporidia

parasitic in Mosquitoes viii. On a Microsporidian, *Nosema aedis* nov. spec., parasitic in a larva of *Aedes argenteus* (*aegyptii*) of Puerto Rico" (Archiv. Protistenk. 49 (1): 23–28, pl. 2, ref. 47. Jena, January 15, 1930).

Aedes (Finlaya) mediovittatus (Coquillett) is first recorded from Puerto Rico by Mr. W. V. Tower (1908–38 and 1912–6), who collected larvae at Mayagüez in hollow tree trunks, tin cans and bamboo pots. Dr. C. R. Twinn (*in* Curran 1928–10) lists a single female from Naguabo, Drs. Pritchard and Pratt (1944–233) found it only at Carolina, but Dr. W. A. Hoffman reared it from larvae in tree holes and bamboo thickets at Yauco, Guayama, Toa Alta, Sabana Llana and Pueblo Viejo. Dr. G. S. Tulloch (1937–145) adds no new locality records. Lt. Com. Weathersbee (1944–644) records it from Vieques Island.

Aedes (Taeniorhynchus) sollicitans (Walker), the common bronze or golden-brown migrating salt marsh mosquito of the Atlantic coast, was first collected in Puerto Rico by Dr. W. A. Hoffman at San Juan in October 1930, his identification being confirmed by Dr. F. M. Root. Drs. Pritchard and Pratt (1944–233) made light trap collections at Fort Buchanan (west of San Juan), and also on the south coast, where Dr. G. S. Tulloch (1937–143) had found it most abundant: at Guayama, Aguirre and Guánica, larvae occurring in brackish pools adjacent to Guánica Lagoon. Lt. Com. Weathersbee (1944–644) records collecting it on Vieques Island.

Aedes (Taeniorhynchus) taeniorhynchus (Wiedemann), a small black and white salt marsh mosquito, common on both the Pacific and Atlantic coasts of the United States, was re-described as *Culex portoricensis*, the type from Puerto Rico, by Miss C. S. Ludlow (Canadian Entomologist, 39: 386. London, Ontario, 1905). Dr. F. M. Root (1922–397) used the name *Aedes* (*Taeniorhynchus*) *portoricensis* for the larvae, which he found in temporary rain pools near large lagoons at Río Piedras and Aguirre, the adults biting man by day. Dr. W. A. Hoffman made repeated collections at Dorado and San Juan, and Dr. G. S. Tulloch (1937–144) found it at Mayagüez and Guánica, the larvae "in clean, dirty, fresh and brackish pools." Drs. Pritchard and Pratt (1944–233) found it attracted to light traps on Vieques Island, and at Losey Field (south of Juana Díaz), at Tortuguero Lagoon, and at other points on the north coast.

Aedes (Ochlerotatus) tortilis (Theobald) was first collected in Puerto Rico by Dr. G. S. Tulloch (1937–143) at Las Mesas, near Mayagüez, at an elevation of 1,000 feet, and subsequently on Maricao mountain at an elevation of 3,000 feet. Dr. Tulloch's "records for *Aedes nubilus*, *A. condolescens* and *A. scapularis* are based on material which probably was" this species, according to Drs. Pritchard & Pratt (1944–232), who made light trap collections at five widely separated localities in Puerto Rico.

Culex (Micraedes) americanus (Neveu-Lemaire) larvae were found

by Dr. G. S. Tulloch (1937–148 and 1939–500) in the water in the leaf bases of bromeliads, malangas and "rábano cimarrón" (*Dieffenbachia seguine*), with a pH of 3.8 to 6, only at the higher elevations: at Maricao and on El Yunque. He assumes that the adults do not attack warm-blooded animals. It was first reported from Puerto Rico by Mr. W. V. Tower (1908–38 and 1912–6) as *Culex bisulcatus* Coquillett, reared from larvae in an old pail at Mayagüez. In synonymy with *americanus*, according to Dr. Alan Stone and Colonel W. H. W. Komp, is also **Culex antillum-magnorum** Dyar, as determined by Dr. F. M. Root, which Dr. W. A. Hoffman found in the water in bromeliads at Jájome Alto and on El Yunque. Presumably at El Yunque Don Julio García-Diaz (1938–95) collected the material which was determined as this species by Dr. Robert Matheson.

Culex (Melanoconion) atratus Theobald was first recorded from Puerto Rico by Dr. F. M. Root (1922–400), who reared "a single male from a pupa collected in a semipermanent roadside swamp at Martín Peña", and identified other adults reared by Dr. W. A. Hoffman on Monteflores Hill, Santurce, and in cattail swamp and small lake at Sardinera, Dorado. Dr. G. S. Tulloch (1937–148) found larvae at Mayagüez, and Drs. Pritchard and Pratt (1944–233) collected adults at light traps near San Juan, at Laguna Tortuguero, and on the south coast at Losey Field, south of Juana Díaz.

Culex (Culex) bahamensis Dyar & Knab was first collected by Dr. W. A. Hoffman as larvae in the turbid outlet of a small lake at Sardinera, Dorado August 15, 1930, his identification of the adults being confirmed by Dr. F. M. Root. Dr. G. S. Tulloch (1937–149) noted larvae so abundant in brackish water near Salinas that it appeared black, and also found them in hoof-track pools around Guánica Lagoon. In light traps, Drs. Pritchard and Pratt (1944–233) collected adults at Ensenada Honda, and on Vieques Island, where Lt. Com. Weathersbee (1944–644) also found them.

Culex (Melanoconion) erraticus Dyar & Knab was redescribed from Puerto Rico by Dr. F. M. Root (1922–400 to 405, fig. 3) as *Culex (Choerophora) borinqueni*, "the commonest 'wild' Culex in the Porto Rican coastal plain, found breeding in all sorts of ditches, slow streams, pools and marshy places," as at Río Piedras, Martín Peña and Aguirre, but subsequently identified as *Culex inhibitator* Dyar & Knab the specimens collected by Dr. W. A. Hoffman at Dorado. Under the latter name, Dr. G. S. Tulloch (1937–147) records numerous collections from the west coast. Dr. W. V. King and G. H. Bradley in "Notes on *Culex erraticus* and related Species in the United States (Diptera, Culicidae)" (Ann. Ent. Soc. America, 30 (2): 345–57, illus. Columbus, June 1937) indicate the synonymy under which Drs. Pritchard and Pratt (1944–233) record their collections at

light traps at Tortuguero Lagoon, at Fort Buchanan (west of San Juan) and at Losey Field (south of Juana Díaz). Lt. Com. Weathersbee (1944–644) collected this mosquito on Vieques Island.

Culex (Culex) chidesteri Dyar larvae are reported by Dr. H. D. Pratt (1946–581) in a reservoir at Salinas.

Culex (Culex) habilitator Dyar & Knab, first identified from Puerto Rico by Dr. F. M. Root from material collected by Dr. W. A. Hoffman at Dorado in a stagnant ditch, October 1, 1930, was found by Dr. G. A. Tulloch (1937–149) breeding in brackish water at Guánica Lagoon, in brackish pools near the Añasco River and in swampy fresh-water areas in Mayagüez. Lt. Com. Weathersbee (1944–644) and Drs. Pritchard and Pratt (1944–233) record it from Vieques Island, the latter collecting adults by light trap at six points in Puerto Rico.

Culex (Culex) janitor Theobald is "known only from adults collected in the mouths of crab holes" according to Dr. G. S. Tulloch (1937–150), who records collections by himself at Mayagüez and Dorado, and by Dr. W. A. Hoffman at Pueblo Viejo.

Culex (Culex) nigripalpus Theobald, first recorded from Puerto Rico by Mr. W. V. Tower (1912–6) as *Culex similis* Theobald, was found by Dr. F. M. Root (1922–399) as larvae "in small numbers in temporary meadow pools at Río Piedras, and in enormous numbers in a ditch highly polluted with sewage at Fajardo." Dr. Root also identified for Dr. Hoffman material from a small pond at Dorado. It has been intercepted at San Juan and at Mayagüez, Dr. G. S. Tulloch (1937–149) noting that it "is probably the most abundant of all tropical forms of *Culex*," listing many collection records from the western end of the Island. Listed from Vieques Island by Lt. Com. Weathersbee (1944–644) and by Drs. Pritchard & Pratt (1944–233), it was collected by the latter from light traps at six points in Puerto Rico.

Culex (Melanoconion) opisthopus Komp, as reported by Drs. Harry D. Pratt, W. W. Wirth and D. G. Denning in their paper on "The Occurrence of *Culex opisthopus* Komp in Puerto Rico and Florida, with a Description of the Larva (Diptera: Culicidae)" (Proc. Ent. Soc. Washington, 47 (8): 245–51, pl. 2, ref. 3. Washington, D. C., November 1945), is known to occur from Cataño to Ensenada Honda: the larvae in sluggish streams with rank vegetation, or pools alongside in dense shade, and the adults attracted to both horse and light traps. It is the only Puerto Rican *Culex* having the last segment of the hind tarsus entirely white, according to Dr. Pratt.

Culex (Melanoconion) pilosus Dyar & Knab larvae were found at Mayagüez by Dr. G. S. Tulloch (1937–147) in a roadside ditch, resting "on their backs on the bottom of the pool, and when disturbed, exhibiting a peculiar

wiggling motion of the hinder parts of the body which is different from that of any other tropical *Culex* encountered." Adults were taken in light traps at Laguna Tortuguero and at Fort Buchanan (west of San Juan) by Drs. Pritchard & Pratt (1944–233).

Culex (Culex) quinquefasciatus Say, first recorded for Puerto Rico by Dr. Augustin Stahl as *Culex pipiens* L., was listed by Mr. W. V. Tower (1908–38) as *Culex cubensis* Bigot, and under the present name by Howard, Dyar & Knab (1917–237): the specimens collected by Mr. Tower at Mayagüez, those from Guayama by R. A. Pearson, and those from Vieques Island by C. C. Craft. Lt. Com. Weathersbee (1944–644) also found it on Vieques, as did also Dr. W. A. Hoffman in 1937, but the first record from Mona Island is by Prof. J. A. Ramos (1947–55) who found it "extremely abundant and troublesome at Sardinera beach, April 4–7, 1944." In Mr. W. V. Tower's later papers (1912–6 and 1921–5), he calls it "the common house mosquito of the tropics" and gives notes on its habits. As *Culex fatigans* Wiedemann Dr. F. M. Root (1922–399) noted it "common everywhere in the coastal plain, breeding in all sorts of artificial containers and biting man readily in the evening," having collected it at Ponce, Aguirre, Río Piedras and Quebradillas. Dr. C. R. Twinn (*in* Curran 1928–10) found that most of the mosquitoes submitted for his examination from Puerto Rico were "this common household mosquito of the tropics."

Dr. W. A. Hoffman reporting, with R. A. Marín and A. M. B. Burke, on "Filariasis in Porto Rico" (P. R. Journal Public Health & Tropical Medicine, 4 (3): 120–7, map. San Juan, March 1928) found it in all localities examined, but scarcer at the higher altitudes, and for "Insectae Borinquenses" (1936–331) wrote: "apparently well distributed throughout the Island, being encountered at such high altitudes as Maricao and above Aibonito in great numbers. It prefers polluted water and breeds in latrines and septic tanks." Dr. G. S. Tulloch (1937–150) records many collections, and that the larvae "are able to develop in clear water or in water heavily laden with sewage. The adults enter houses in great numbers in search of blood, and from the standpoint of annoyance it is most important. It is probably the only vector of filariasis in Puerto Rico." The collections at light trap reported by Drs. Pritchard & Pratt (1944–233) are from the north coast and the interior of the Island, and from Losey Field on the south coast. The effectiveness of spraying with DDT for its control was shown at the Isabela cotton ginnery, where this was the only mosquito found with the other dead insects on the floor and window-sills, and earlier, when Dr. Harry D. Pratt sprayed the basement of the main building of Experiment Station at Río Piedras, May 20, 1944, full of adults coming from stagnant pools in the dried-up and polluted river nearby.

Culex (Culex) secutor Theobald, re-described as the new species *Culex*

toweri by Dr. Harrison G. Dyar & Fred Knab in their "Descriptions of some American Mosquitoes" (Jour. N. Y. Ent. Soc., 15 (1): 13. New York, March 1907) from Puerto Rico, is reported by its collector, Mr. W. V. Tower (1912–6), as reared from larvae in bamboo pots at Mayagüez, but earlier (1908–38) both under this name and as *Culex salinarius* Coquillett. Dr. W. A. Hoffman collected it at Jájome Alto, June 18, 1930, as determined by Dr. F. M. Root, and Dr. G. S. Tulloch (1937–150) found larvae only in deeply shaded pools in the lowlands: at Mayagüez, and in permanent pools at high altitudes in the Luquillo and Maricao Forests.

Deinocerites cancer Theobald, the crab-hole mosquito of the West Indies, was first reported from Puerto Rico by Dr. F. M. Root (1922–405), who thought it "probably found throughout the coastal plain near the ocean and the lagoons, where crab-holes occur. Adults or larvae were collected at Martín Peña, Río Piedras and Aguirre," and at Dorado by Dr. W. A. Hoffman. Dr. G. S. Tulloch (1937–147) made collections at Mayagüez, and Drs. Pritchard & Pratt (1944–233) at light traps at four points in Puerto Rico as well as on Vieques Island, where Lt. Com. Weathersbee (1944–644) also found it.

Fungivoridae (Mycetophilidae): Fungus Gnats

Fungivora merdigera, described by Messrs. F. Knab and R. H. Van Zwaluwenburg as "A second *Myceptophila* with Dung-Bearing Larva (Diptera: Mycetophilidae)" (Entomological News, 29 (4): 138–142, pl. 1. Philadelphia, April 1918), the type from Aibonito, was subsequently reared from larvae on "pomarrosa" (*Eugenia jambos*) at Mayagüez, and from the type locality on "guamá" (*Inga laurina*) by Dr. Richard T. Cotton. Mycetophilids with "dung-capped larvae are rare," according to Mr. Knab, "the only other known being from the Amazon rain forests."

Fungivora insipiens (Williston), determined as a *Mycetophila* by Dr. Alan Stone, originally described from St. Vincent, was intercepted by Mr. R. G. Oakley resting on *Inga vera* at Jayuya.

Leia mutchleri, described by Dr. C. H. Curran (1928–14) from a type male from Adjuntas, is "black above; wings with two brown fasciae; length 4.25 mm." Specimens intercepted at Añasco have been identified as a species of *Leia*, presumably not this.

Boletina incompleta, described by Dr. C. H. Curran (1928–13) from a type female at Adjuntas, has clear wings, and is "pale rusty yellow, the abdomen mostly black; length 3.5 mm."

Lycoria tritici (Coquillett), as identified by Dr. Alan Stone, was reared from larvae in cachaza in soil around begonia seedlings being grown by Mr. Miguel A. Díaz at Río Piedras. Both sexes were present, for the adults were often in coitu, occurring in large numbers, but the maggots seemed to

cause no injury to the tender plants. This is a common continental gnat, of some economic importance, found in greenhouses and outdoors in tobacco seedbeds, and in wheatfields, the larvae feeding on the roots and mining in the stems.

Lycoria hartii (Johannsen), determined as a *Sciara* by Dr. O. A. Johannsen in 1932, was reared from earth in a can in which larvae of *Diaprepes abbreviatus* larvae were being fed on sprouting corn, at Isabela.

Numerous additional species of *Sciara* (or *Lycoria*) are known to be present in Puerto Rico, but lacking accompanying males, specific identification is impossible. Most annoying are the great numbers of stinking black midges that, at about monthly intervals, are attracted to lights for two or three nights during the winter months in the northwestern corner of the Island. They do not fly as high as the second story of houses, but so many may come to electric lights of one story houses, and die on the food on the dining table that it becomes inedible before it can be removed. These gnats do not bite, and indeed they do not ordinarily get on people, but the odor of only a few is so powerful that when they come in large numbers one can only turn out the light and leave the world to them. All are females and neither Dr. O. A. Johannsen nor Miss Elizabeth G. Fisher could identify them as to species. They are so small as to be able to penetrate the mesh of any ordinary mosquito bar, so that one can not even read in bed after dark at the time when they are abundant.

Another species of *Sciara* (or *Lycoria*) has been reared by Mr. Thos. H. Jones from maggots in a cottony substance secreted by mealybugs on sugar-cane; Mr. A. G. Harley at Mayagüez reared others from chayote (*Sechium edule*), and adults of another species have been repeatedly collected from the leaves of corn plants.

Itonididae (Cecidomyiidae): Gall Midges

Asphondylia rochae Tavares, as determined by Dr. E. Porter Felt, was found by Prof. James G. Needham (1941–3) to be causing galls in the seed pods of *Jussiaea angustifolia*, and to be parasitized by *Rileya megastigma* Ashmead and *Callimome montserrati* Crawford.

Asynapta citrinae was described by Dr. E. Porter Felt: "A New Citrus Cambium Miner from Puerto Rico" (Jour. Dept. Agr. P. R., 16 (2): 117–8. San Juan, July 1922). The yellowish white larvae, 3.0 mm. in length when fully grown, injure grapefruit twigs in a manner similar to the West Indian *Asynapta mangifera* Felt larvae do the small twigs of grafted mango. The adults are 1.75 mm. long, pale yellow in color, with black eyes.

Arthrocnodax constricta was described by Dr. E. Porter Felt (Jour. Ec. Ent., 7 (6): 481. Concord, December 1941) from material "reared from garden beans infested with the common red spider, *Tetranychus bimaculatus*,

and probably predaceous thereupon, by Mr. Thomas H. Jones, June 21, 1913 at Río Piedras." The male is 1.0 mm. long, the female, 1.25 mm.; yellowish or yellowish-brown midges, with antennae as long as the body.

Arthrocnodax macrofila Felt, as determined by Dr. E. Porter Felt, was found on mite-infested cattle feed at Río Piedras, presumably preying upon the mites in the feed, "since that is a somewhat common habit for several species of this genus."

Karschomyia cocci, described by Dr. E. Porter Felt (Canadian Entomologist, 45 (9): 304–5. London, 1931) from material reared by Mr. Thos. H. Jones from the pink mealybug of sugar-cane, *Trionymus sacchari* (Cockerell), collected at Patillas, has repeatedly been reared from this host, and Mr. E. G. Smyth (192)–124) reared what he thought to be this species from another mealybug, *Pseudococcus virgatus* (Cockerell), on cotton. "The adults display the strange habit of hanging in rows festooned on strands of spider-web, where they perform a rocking motion by means of the wings," according to Mr. Smyth's observations.

Mycodiplosis insularis was described by Dr. E. Porter Felt (1913–305) from material reared by Mr. Thos. H. Jones from red spiders, *Caligonus antillarum* Banks, on leaves of "molinillo" (*Leonotis neptaefolia*) and of the common milkweed, *Asclepias curassavica.*

Kalodiplosis multifila Felt, first collected in Puerto Rico by Mr. August Busck, according to Dr. Felt, was subsequently identified by him from material reared by Mr. Francisco Sein from *Pseudococcus citri* (Risso) on mulberry.

Dasyneura eugeniae Felt was the tentative identification given by Mr. C. T. Greene of gall midges emerging from a witches' broom formed on a terminal shoot, really a deformed fruit, of crape myrtle (*Lagerstroemia indica*) at Río Piedras.

Itonida coccidarum (Cockerell), originally described as a *Cecidomyia* from Jamaica, was reported by Mr. D. W. Coquillett (1900–240) as found in Puerto Rico by Mr. Aug. Busck: "bred from larvae associated with *Dactylopius citri* and bred from *Lecanium hemisphaericum.*"

Ctenodactylomyia watsoni, described by Dr. E. Porter Felt from midges reared from galls in the leaves of seagrape (*Coccoloba uvifera*) by Prof. J. R. Watson in Florida, is presumably the same insect as that causing the galls of seagrape in Cuba to which Dr. Mel. T. Cook gave the name *Cecidomyia coccolobae.* Typical galls are common on seagrape leaves in Hispaniola and on Mona, the first identification of Puerto Rican material being by Dr. Felt for Mr. R. H. Van Zwaluwenburg at Mayagüez. They occur everywhere in Puerto Rico that seagrape grows, and to a lesser extent inland on some of the other species of *Coccoloba,* but are possibly most abundant at Guajataca, where leaves may be noted with possibly half of the leaf tissue hyper-

trophied by the poisons secreted by the maggots of this midge. From galls at Guajataca, a species of *Eurytoma* (Eurytomidae) and a species of *Telenomus* (Scelionidae), as determined by Mr. A. B. Gahan, have been reared.

Scatopidae

Scatopse pygmaea Loew, a continental March fly, reported also from St. Vincent, was found in Puerto Rico by Mr. Aug. Busck, as listed by Mr. D. W. Coquillett (1900–250). Dr. Wetmore reports one of these flies eaten by a hummingbird.

Bibionidae: March flies

Dilophus spinipes Say, as identified by Dr. Alan Stone, is another continental species found in Puerto Rico, adults having been found resting on the flowers of *Inga laurina* at Cayey. Dr. Wetmore reports a fly of this genus eaten by a hummingbird. Numerous individuals identified by Dr. Alan Stone as a species of *Dilophus* not *spinipes*, were found on flowers of "botoncillo" (*Borreria verticillata*) at Guajataca.

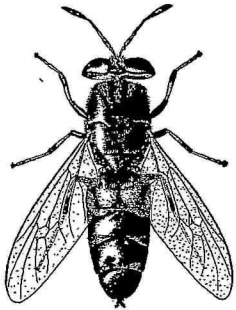
Simuliidae: Blackflies

Simulium haematopotum Malloch, as determined by Mr. J. R. Malloch, previously known from Cuba, Mexico and Central America, was first collected in the low hills back of Río Piedras by Mr. Thos. H. Jones. He noted that "their bite is painful and felt immediately after the fly lights on any exposed portion of the body. Very abundant, and writer was attacked on hands, forearms, neck and face. The flies were persistent, despite a bright sun and slight breeze. Only a slight swelling followed their bites," but he failed to note the small central spot of blood differentiating the lesion resulting from its attack from that caused by punkies. This record was listed by Drs. Harrison G. Dyar and Raymond C. Shannon in "The North American Two-winged Flies of the Family Simuliidae" (Proc. U. S. National Museum, 69 (10): 1–54. Washington, D. C., 1927), but the most extensive account is that by Mr. Schuyler Bradt, working under the direction of Dr. W. A. Hoffman, in his "Notes on Porto Rican Blackflies" (P. R. Journal Public Health and Tropical Medicine, 8 (1): 69–81, fig. 5. San Juan, September 1932). He found that the larvae prefer to attach themselves to vegetation in sluggish streams, and suggests cleaning the streams of vegetation and increasing the rapidity of their rate of flow to make conditions less favorable for their development. He saw them catch and devour mayfly nymphs, and be devoured in turn by the nymphs of dragon flies.

Simulium minusculum Lutz, as identified by Dr. J. M. Aldrich, "described from Brasil, also found in Costa Rica," was found by Mr. Francisco Seín to be abundant only in the spring around Río Piedras.

Simulium quadrivittatum Loew, originally described from Cuba, was first reported from Puerto Rico by Mr. J. R. Malloch in his paper on

"American Black Flies or Buffalo Gnats" (U. S. Dept. Agr., Bureau of Entomology Technical Series No. 26, pp. 83, pl. 6, ref. 26. Washington, D. C., April 6, 1914), on page 61, where collection at Utuado by C. W. Richmond is cited. Dr. Alex. Wetmore notes this blackfly eaten by the tody, and Dr. F. M. Root (1922–396) records his personal reactions to its bite. Presumably this is the more common species in Puerto Rico, being generally called locally "los majes," found usually in the more forested areas, in clearings in the woods, and specifically collected at Río Piedras, Bayamón, Cidra, Corozal, Utuado, Lares and San Sebastián.



The Stratiomyid fly, *Hermetia illucens* (Linnaeus), three times natural size. (Drawn by Fritz Maximilien.)

Stratiomyidae: Soldier flies

Hermetia illucens, described by Linnaeus as a *Musca* from South America, and recorded by Fabricius from the West Indies, has an extended distribution in the neotropics and in the United States as far north as Philadelphia. It is a large black, clear-winged fly, first collected in Puerto Rico by Drs. Stahl and Gundlach and listed by von Roeder. Dr. Gundlach notes: "Se posa muchas veces sobre los troncos de los árboles recién cortados," but less often noted in recent years on recently felled trees, when there are fewer trees to cut down. Sometimes individual flies are attracted to light at night, but normally it is a diurnal fly, not attracted to flowers, and only because it must rest somewhere, coming to rest on any particular wall, leaf, fruit or tree trunk. The larvae are tough, leathery, greyish-brown maggots, flattened and wrinkled at the lateral margins, sometimes to be found in large numbers feeding on decaying vegetation such as moist

paper cartons, well rotted cachaza, rotting grapefruit, or the debris from grapefruit or pineapple canneries. One has been found eaten by the introduced frog, *Rana catesbeiana* Shaw.

Hermetia albitarsis Fabricius, as *Hermetia sexmaculata*, is listed by J. Macquart (Hist. Nat. Dipt., 1:229. Paris, 1834) from Puerto Rico. Dr. C. H. Curran in his "First Supplement to the 'Diptera of Porto Rico and the Virgin Islands'" (American Museum Novitates No. 456, pp. 23, fig. 4. New York, February 11, 1931) states that "the absence of translucent yellowish or whitish spots on the second abdominal segment will at once distinguish this species from *illucens* Linnaeus," and records collection by Prof. W. T. M. Forbes at Las Cruces. Numerous unspotted adults have been taken at Río Piedras, and one at Guajataca. Mr. Policarpo González found numerous maggots in the dry buds of small dead coconut palms (*Cocos nucifera*) at Arroyo, all of which produced the slender, unspotted adults of this species.

Sargus bicolor was described from Puerto Rico by C. R. W. Wiedemann in his "Aussereuropaische Zweiflugelige Insekten," (2:41. 1830). It was not collected by Drs. Gundlach or Stahl, is not listed by von Roeder, and has not been found since.

Geosargus lucens (Loew), originally described as a *Sargus* from Cuba, was intercepted resting on achiote at Arecibo, as identified by Mr. C. T. Greene.

Macrosargus lateralis (Macquart), originally described as a *Sargus* from Cuba, has been repeatedly intercepted in Puerto Rico, as identified by Mr. C. T. Greene, in grapefruit groves in the metropolitan area, and collected by Mr. S. S. Crossman at Aibonito. This is a slender, iridescent purplish-blue fly of moderate size, its abdomen with whitish pubescent bands.

Neorondania chalybea Wiedemann, originally described from St. Thomas, is a stout blue-black fly, its prothorax striped and its flattened abdomen banded with silvery pubescence, first identified from Puerto Rico by Mr. F. Knab, listed by Mr. R. H. Van Zwaluwenburg (P. R. 1244) from *Spondias lutea*. Adults have repeatedly been noted sucking the juice from overripe jobo fruits on the ground, and from rotting oranges and grapefruit, and Mr. R. G. Oakley intercepted them at Ponce. Dr. Luis F. Martorell noted them in abundance resting on the screens around the kitchen, latrines, and dining room of the camp on Mona Island in 1939. Mr. Thos. H. Jones found the larve "beneath the stinking, flaking bark of dying papaya trees at Río Piedras," and in February 1940, Mr. Anacleto Ramos, gardener of the Experiment Station at Río Piedras, found maggots abundant, feeding on rotten pulp between fibers just under rind of the dead bark of a "yuma" palm, *Cocotrynax argentea*. Another *Neorondania*, not identified as to species by Mr. C. T. Greene, also occurs in Puerto Rico, adults having been

caught in fruit-fly traps, and maggots reared to adult, feeding on rotten banana stem, at Río Piedras.

Eulalia dorsalis (Fabricius), originally described as a *Stratiomys* from the West Indies, presumably St. Thomas, and found also in Santo Domingo, was first reported from Puerto Rico by Mr. D. W. Coquillett (1900–251), having been collected by Mr. August Busck. Dr. C. H. Curran (1928–17) lists specimens from San Juan, and identified for Dr. Stuart T. Danforth many which had been collected at Tortuguero Lagoon, Cartagena Lagoon, and at Mayagüez. Other specimens of an *Odontomyia*, intercepted at Arecibo, have been identified by Mr. C. T. Greene as "near *trivittata*."

Eulalia virgo (Wiedemann) a continental species originally described as a *Stratiomys* from Savannah, Georgia, and later collected at Trenton Falls, New York, was identified by Mr. C. T. Greene from adults found resting on a grapefruit leaf at Barceloneta.

Neurota bicolor (Wiedemann), originally described as a *Sargus* (1830–41) from Puerto Rico, was re-described by Dr. C. H. Curran (1931–2), from specimens from Vieques Island, noting that "Wiedemann states that the color is golden green, but this applies only when the insect is examined without magnification."

Nemotelus monensis, described by Dr. C. H. Curran (1928–16) from a single female from Mona Island, is "metallic greenish black, the front with yellowish white orbital spots below; length 3.0 mm."

Nothomyia calopus Loew, originally described from Cuba, is recorded by Dr. C. H. Curran (1928–16) from Adjuntas, and specimens identified by him have been taken at Mayagüez and Río Piedras.

Pedicella schwarzi, described by Dr. C. H. Curran (1928–16) from a male at Cayey, is a large fly, 12.0 mm. long, the "thorax bright metallic green, the abdomen cupreous-bronzed, the sides with greenish reflections."

Cyphomyia lasiophthalma Williston, originally described from St. Vincent, and by Dr. C. H. Curran (1928–17) recorded from St. Croix, and in Puerto Rico from Cayey, also occurs at many other points, and Dr. Stuart T. Danforth had specimens from Desecheo Island.

Microchrysa flaviventris Wiedemann, as identified by Mr. C. T. Greene, has been intercepted at Yauco by Mr. R. G. Oakley.

Microchrysa polita (Linnaeus), a European and North American species, was intercepted in a grapefruit grove at Garrochales, as determined by Mr. C. T. Greene.

Euryneurasoma slossonae Johnson, as determined by Mr. C. T. Greene, has been intercepted at light at San Juan, and a species of *Spyridopa* on mango blossoms at Mayagüez by Mr. A. G. Harley.

Tabanidae: Horseflies

Chrysops variegata (Degeer), as *Chrysops amazonius* was first reported from Puerto Rico by Camillo Rondani (Arch. Zool. Modena, 3: 81. 1863), according to Dr. Joseph C. Bequaert, writing on "The Tabinidae of the Antilles (Dipt.)" (Revista de Entomologia, 11 (1–2): 253–369, fig. 23. Rio de Janeiro, June 1940). As *Chrysops costatus* F., it was identified for Drs. Stahl and Gundlach by Herr von Roeder, and thus listed by them. Dr. Gundlach notes it as being "muy común en terrenos bajos, donde suele posarse encima de las orejas de los caballos para chupar la sangre por lo cual es insecto muy molesto," and Dr. F. M. Root (1922–405) calls it "mosca de mangle." Dr. H. L. Van Volkenburg (1932–25, 1933–23 and 1935–24) repeatedly mentions it as a pest attacking domestic animals, and indeed it occurs in sufficient abundance around Cartagena Lagoon that Dr. Stuart T. Danforth (1920–112 and 121) found it an item of food for the barn swallow and the prairie warbler, and being chased by the Bembecid wasp, *Stictia signata*. Indeed these wasps are so bold in their attempts to catch horseflies as to pounce on them when biting a mounted horse, and scaring both horse and rider. Dr. F. M. Root (1922–405) observed this horsefly captured in flight by a dragonfly, *Lepthemis vesiculosa* F. All records of occurrence in Puerto Rico are from coastal localities, the larvae presumably developing in the muddy water of mangrove swamps, but the species has an extensive neotropical distribution, having been originally described from Surinam. Rarely the flies attack man on head or arms, being especially annoying in the Seboruco woods around Laguna San José, and in paths thru the woods back of Río Piedras, and around Isabela Grove at Pt. Salinas, but are not nearly so common at present as twenty or thirty years ago. Dr. Bequaert translates the original description of *variegata* as being a "tawny-yellow tabanid, with cylindrical antennae, the thorax and abdomen with longitudinal brown stripes; the wing streaked with brown."

Lepiselaga crassipes (Fabricius), first reported from Puerto Rico by Dr. H. L. Van Volkenberg in "An Annotated Check List of the Parasites of Animals in Puerto Rico" (Circular No. 22, P. R. Agr. Expt. Station, pp. 1–12, ref. 49. Washington, D. C., January 1939, *also* Proc. Helminthological Soc. Washington, 5 (1): 7–8. Washington, D. C., 1939) as "collected by Luis Enrique Gregory at San Germán, February 1936, also by H. L. Dozier at Lake Guánica, April 1936, det. Alan Stone" is a decidedly rare Tabanid, with no other record from Puerto Rico cited by Dr. Bequaert (1940–285).

Tabanus (Stenotabanus) brunettii Bequaert (1940–319) of Cuba and Hispaniola, is known from Puerto Rico from a single specimen intercepted by Mr. R. G. Oakley at the Bartolomé finca in the mountains above Yauco, previously recorded as *Stenotabanus punctipennis* Brunetti— det. Dr. Alan

Stone. "In life the eye of the female is purplish-black with two narrow bluish-green cross-bands," according to Dr. Bequaert, who quotes in full the description of *Silvius punctipennis*.

Tabanus (Stenotabanus) caribaeorum Bequaert (1940–323), "medium-sized, light yellow, uniformly white pollinose, without markings; antennae pale yellowish with black annuli; legs pale yellow. Wings hyaline, distinctly spotted at cross-veins; length of female 9–12 mm., of male 10–11.5 mm.," occurs in the Cayman Islands and the Bahamas, and also on Mona Island, paratypes having been collected there by Dr. Luis F. Martorell.

Tabanus (Stenotabanus) nervosus, described by Dr. C. H. Curran (1931–4) from Cataño and San Juan, and not known to occur outside of Puerto Rico, but with subsequent records from Pt. Cangrejos, Dorado and Mayagüez, is "related to *T. psammophilus*, but readily recognized by the peculiar spots of the wings, the shape of the frons and the color of the antennae" (yellowish-red), according to Dr. Bequaert (1940–327). In "Insectae Portoricensis" (1923–214) it is listed as *Tabanus psamophilus* O.S.—det. C. T. Greene, with the note "on the beach, resting on dry seaweed, as which it is the same color, and in which its larvae live, feeding on sand fleas, at Pt. Cangrejos and at Vega Baja." Its most outstanding characteristic is the white pollinosity of its body making it almost indistinguishable when resting on dry seaweed.

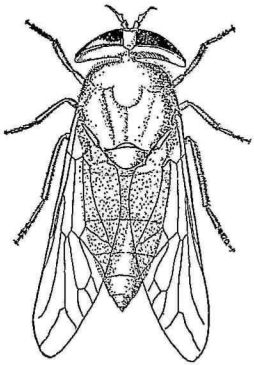
Tabanus (Stenotabanus) parvulus Williston, originally described from Santo Domingo, is known from Puerto Rico from a single female collected by Dr. W. A. Hoffman at Jájome Alto, as listed by Dr. C. H. Curran (1931–6), others noted by Dr. Bequaert (1940–343) having been collected by Dr. Stuart T. Danforth of Gonave Island, Haiti.

Tabanus (Stenotabanus) stigma Fabricius, originally described from St. Thomas, and also known from Antigua, was first recorded from Puerto Rico by Dr. C. H. Curran (1931–4): from Cataño, Dorado and Guayama, a greyish Tabanid, "the abdomen bears distinct, interrupted brownish fasciae on at least several of the segments." Dr. Bequaert (1940–332) records collections at Joyuda (Mayagüez) and Cidra.

Tabanus (Neotabanus) hookeri, described by Mr. F. Knab, from material collected by Dr. C. W. Hooker at Mayagüez, as one of "Some West Indian Diptera" (Insecutor Inscitiae Menustruus, 3 (4): 48–9. Washington, D. C., 1915) is "a small grayish-yellow species," according to Dr. C. H. Curran (1931–6), "the abdomen mostly reddish with three more or less distinct rows of pale spots. It is easily recognized by its small size (10 to 11.5 mm.) and the bare, shining reddish subcallus." He examined specimens collected on Vieques Island by Drs. M. T. Leonard and W. T. M. Forbes, but it is a common species in the coastal areas of Puerto Rico, others having been identified by Dr. Bequaert (1940–361) from Río Piedras, Pt. Cangrejos,

Garrochales and Cartagena Lagoon. It is considered by him as probably occurring all over South America, as well as in Barbados, Trinidad and all of the Greater Antilles.

Tabanus (Neotabanus) truquii Bellardi, according to Dr. Bequaert (1940–352), is known from Puerto Rico only from a single female intercepted at San Juan by Mr. A. S. Mills. It also occurs in Trinidad, the Cayman Islands, the Galapagos Islands, Colombia and in Central America north to the southern United States.



The Tabanid fly, *Tabanus* (*Neotabanus*) *hookeri* Knab, five times natural size. (Drawn by Fritz Maximilien.)

Rhagionidae (Leptidae): Snipe flies

Chrysopilus cubensis, described by Dr. C. H. Curran as one of "New Species of *Chrysopilus* from the Neotropical Region (Rhagionidae, Diptera)" (American Museum Novitates No. 462, p. 9. New York, March 17, 1931), also occurs in Puerto Rico, according to the identification by Dr. M. D. Leonard of a single male collected at Aibonito by Mr. S. S. Crossman, April 23, 1913.

Chrysopilus leonardi, described by Dr. C. H. Curran (1931–4) from a female collected by Dr. M. D. Leonard on Vieques Island, also occurs in Puerto Rico according to the identification of a female from Pt. Cangrejos, June 10, 1920.

Chrysopilus macularis Curran (1931–6) was described from a single female from El Yunque collected by Dr. M. D. Leonard.

Bombyliidae: Beeflies

Hyperalonia cerberus (Fabricius), described as an *Anthrax* from the West Indies, was first listed from Puerto Rico by Herr von Roeder, who identified the specimens which Dr. Gundlach found "muy común en terrenos desmontados." Dr. C. H. Curran (1928–19) lists it from Mona Island, as well as at many points in Puerto Rico, and (1931–7) from Vieques Island. It is a large fly, five-eighths of an inch long, and with a wing spread of almost an inch and a half, the wings mostly chocolate brown, with some clear areas, the abdomen banded with white pubescence near base and near tip, the thorax with stiff, long brown hairs. It is quite common in the coastal areas of the Island. Nothing is known as to the larval habits of this beefly. As *Exoprosopa serveillei* Macquart (never described), Mr. D. W. Coquillett (1900–251) lists as collected in Puerto Rico by Mr. Aug. Busck what is presumably this species.

Exoprosopa cubana Loew, as identified by Herr von Roeder, was found "rara" by Dr. Gundlach in Puerto Rico. Dr. C. H. Curran (1928–19) lists a specimen from Ponce. One collected by Dr. Luis F. Martorell on Mona Island was doubtfully identified by Mr. C. T. Greene as being a species near *E. dodrans* O. S.

Spogostylum "near *pluto* Wiedemann," is the identification by Mr. C. T. Greene of a beefly caught on Playa de Pájaros, Mona Island, by Dr. Luis F. Martorell, and also of one intercepted in a grapefruit grove at Arecibo.

Anthrax adusta Loew, originally described from Cuba, has been found at Guánica, as identified by Mr. C. T. Greene, and elsewhere in Puerto Rico. It is a medium-sized black beefly covered with stiff yellow-brown hairs, its wings yellowish near base.

Anthrax bigradata Loew, originally described from Cuba, was collected in Puerto Rico by Dr. Gundlach, as identified by Herr von Roeder, and listed by them.

Anthrax gideon Fabricius is identified by Dr. C. H. Curran (1928–19) from Ensenada and Mameyes.

Anthrax irroratus Fabricius was the identification by Dr. C. H. Curran of specimens from Utuado and Mayagüez in the AMC collection.

Anthrax oedipus Fabricius was listed from Puerto Rico by Dr. Gundlach.

Villa fauna (Fabricius), first recorded from Puerto Rico as *Anthrax faunus* by von Roeder, identifying specimens collected by Dr. Gundlach, is possibly most abundant in southwestern Puerto Rico, as Dr. Stuart T. Danforth had numerous specimens, as identified by Dr. Curran, from Coamo, Ponce and Mayagüez.

Villa gorgon (Fabricius), first recorded from Puerto Rico as *Anthrax*

gorgon by von Roeder and Dr. Gundlach, was also collected by Mr. Aug. Busck, as noted by Mr. D. W. Coquillett (1900–251), and indeed is possibly the most common local beefly. Dr. C. H. Curran (1928–21) records collections from all parts of coastal Puerto Rico, and Desecheo and Mona Islands, and (1931–8) from Vieques Island. Comparatively small, yellowish-brown, with spotted wings, its appearance by no means suggests its horrid specific name, altho it does indeed mean death to the grubs of the Scoliid wasp, *Elis haemorrhoidalis* (F.), parasitic on the third instar grubs of *Clemora* (or *Phytalus*) *apicalis*. On February 24th, 1922, the sandy field just beyond the bridge over the Bayamón River at Palo Seco was found recently plowed, exposing Scoliid cocoons from two of which the blunt end was cut off by the horns on the puparium of this fly, and adults emerged which were identified by Mr. C. T. Greene. This is reported in "Insectae Portoricensis" (1923–215) and by Mr. Harold E. Box (1925–334), giving a possible clue to the reason why Scoliid parasites are of so little importance in the control of white grubs in Puerto Rico: because of the abundance of beeflies, even tho the specific local host of but one other Bombyliid is known.

Villa lateralis (Say), found in the eastern United States, Mexico and Jamaica, is listed by Dr. C. H. Curran (1928–20) from many Puerto Rican localities, and the Islands of Mona, St. Thomas and St. John, and (1931–7) from Vieques Island.

Villa lucifer (Fabricius), described originally as *Bibio lucifer* from the West Indies, occurs in Louisiana, California, Mexico and the other Greater Antilles, being specifically recorded from Puerto Rico by von Roeder identifying the collections of Drs. Stahl and Gundlach. This is quite a large beefly, dark brown in color, with cloudy brownish wings, yellowish on the fore margins, which Dr. Gundlach found "común—suele posarse en el suelo." Listed by Van Zwaluwenburg (P. R. 78) from Mayagüez, it has most often been collected at Coamo Springs and at Ponce, Guayanilla, Yauco and Guánica on the south coast, also identified from Cartagena Lagoon by Dr. C. H. Curran, and listed by him (1928–21) from Arecibo. Mr. Harold E. Box (1925–342) records it parasitizing the grubs of the Scoliid wasp, *Campsomeris dorsata* F., and Mr. Walter F. Jepson (1936–21) found the adults of this hyperparasite almost as abundant on the flowers of *Kallstroemia maxima* growing on the side of a canefield near Yauco as the wasps themselves.

Phthiria fasciventris was described by Dr. C. H. Curran (1928–21) from a single male from Coamo Springs: "length 4.0 mm., head blackish; mesonotum opaque brown, humeri yellow; posterior calli and scutellum milky white, abdomen rusty brownish-red; wings hyaline, some of the veins with projecting stumps."

Geron senilis (Fabricius), originally described from the West Indies, but

widely distributed in the United States, and specifically known from St. Vincent and Jamaica, was reported from Puerto Rico by Dr. C. H. Curran (1928–22): Caguas and Ensenada, and identified by him from a single specimen collected by Dr. Luis F. Martorell on Mona Island.

Diplocampta roederi, described by Dr. C. H. Curran (1931–8) from specimens collected by Dr. M. D. Leonard on Vieques Island, others from St. Thomas, and from Ensenada, Puerto Rico, is a very dark beefly, 7.5 to 8.0 mm. long, "wings hyaline, with dark brown pattern" darkening the fore margin. "This species is very similar to *paradoxa* Jaennicke, and was identiqed as that species by von Roeder," and by Dr. Curran himself (1928–20): the specimens from St. Thomas and Ensenada, as a *Villa.*

Heterostylum ferrugineum (Fabricius), originally described as a *Bombylius* from the West Indies, was identified by Mr. F. Knab from Puerto Rico, specimens having been collected at Río Piedras, Mayagüez and Ponce. It is an opalescent dark orange in color, for denuded specimens, but normally densely covered with long orange-yellow pubescence, the eyes and antennae dark, the wings hyaline, yellowish at base and on fore margin. Dr. Luis F. Martorell found a single adult flying inside Viejo Lirio Cave on Mona Island, August 8, 1939.

Therevidae: Stiletto Flies

Psilocephala argentata Bellardi, described originally from Mexico, and found also in St. Vincent, was identified by von Roeder and noted by Dr. Gundlach as "rara" in Puerto Rico.

Psilocephala mónensis, described by Dr. C. H. Curran (1926–2) from a single female from Mona Island, has "halteres and legs wholly black; front long and very narrow; fourth posterior cell broadly open; length 7.5 mm."

Psilocephala morata Coquillett, as identified by Mr. C. T. Greene, was intercepted in tomato field at Loíza Aldea.

Psilocephala vexans, described by Dr. C. H. Curran (1926–2), the type from St. Thomas, others from El Yunque, Ensenada, Arecibo and San Juan, and many from Mona Island, has "halteres yellow; tibiae and first tarsal segment yellow with brown apices, the two following tarsal segments with yellowish bases; fourth posterior cell closed slightly before the margin of the wing; length 5 to 8 mm."

Asilidae: Robber Flies

Leptogaster cubensis (Bigot), collected in Puerto Rico by Dr. Gundlach and identified by von Roeder, was reported from Mona Island by Dr. C. H. Curran (1928–22).

Atomosia incisuralis Macquart, originally described from Cuba, is listed by Mr. R. H. Van Zwaluwenburg (P. R. 2708), and has since been repeat-

edly intercepted in Puerto Rico: in grapefruit groves at Bayamón, Añasco and Mayagüez. This is a clear-winged, little black fly, 6.0 mm. long, the fifth abdominal segment much the largest, all narrowly margined with white. Specimens of this genus in the AMC collection were considered by Dr. C. H. Curran to be a new species.

Ommatius marginellus (Fabricius), described as an *Asilus* from the West Indies, and having a wide neotropical distribution, was collected by Dr. Gundlach in Puerto Rico and listed by Van Zwaluwenburg (P. R. 107). It is quite a large black Asilid, the distal portion of the wings being opaquely ribbed, and occurs everywhere in coastal Puerto Rico, Dr. Luis F. Martorell having found it also on Mona Island.

Plesioma species "near *indecora* Loew" is the identification by Mr. C. T. Greene of another Asilid fly collected by Dr. Luis F. Martorell on Mona Island.

Allopogon danforthi was described by Dr. C. H. Curran in "New American Asilidae (Diptera)" (American Museum Novitates No. 806; 1–2. New York, 1935) on p. 8, the type from Puerto Rico, collected by Dr. Stuart T. Danforth.

Saropogon dispar Coquillett, as identified by Mr. C. T. Greene, has been intercepted in Santurce.

Townsendia argyrata was described by Dr. C. H. Curran (1926–1), the type from El Yunque, others from Coamo: "front brown pollinose except on the sides and lower portion; third antennal segment tapering from near base; anterior four tibiae silvery white pruinose; apex of each abdominal segment of the female reddish, length 4.0 mm."

Townsendia minuta Williston, as identified by Mr. C. T. Greene, was intercepted near Ensenada by Mr. R. G. Oakley.

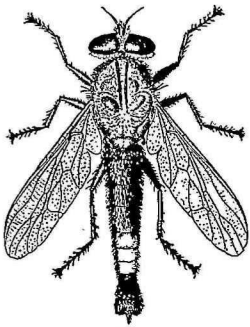
Proctacanthus rufiventris Macquart, originally described from Santo Domingo and Honduras, was identified by von Roeder and listed by Dr. Gundlach from Puerto Rico, but Dr. Stahl used the name *Proctacanthus lutescens* Loew. Mr. Aug. Busck found this, the largest, most powerful and possibly the most abundant of the Asilids of Puerto Rico, as noted by Mr. D. W. Coquillett. Repeated collections have been made since in all parts of the Island: twice noted carrying large grasshoppers, and another carrying a wasp, *Polistes crinitus*, at Aguada. The basal segment of its long, tapering abdomen is the darkest, the next two the brightest yellow-orange, the others darker yellow and narrower, the entire insect being from an inch to an inch and a quarter in length.

Erax bastardi Macquart was the identification by Herr Victor von Roeder of the Asilid fly which Dr. Gundlach listed as *Erax femoratus* Macquart; omitted by Dr. C. H. Curran (1931–9) from his table, "since the record is almost certainly based on a misidentification," altho it would appear that

this older name, based on specimens from Santo Domingo and Guiana, would have priority. *Erax* are large, grey flies, the males having part or all of the fifth to eighth abdominal segments silvery.

Erax forbesi Curran (1931–10) is 17 to 19 mm. long, "abdomen black, the sixth and seventh segments silvery," the type from Coamo Springs. To specimens in the AMC collection, from Coamo, Villalba, Yabucoa, Utuado and Mayagüez, Dr. Curran gave the MS name of *danforthi*.

Erax portoricensis was described by Prof. J. S. Hine (Ann. Ent. Soc. America, 12 (2): 128. Columbus, June 1919) from a single male from Ensenada, which had segments six and seven of the abdomen silvery.



The Asilid fly, *Erax bastardi* Macquart, three times natural size. (Drawn by Fritz Maximilien.)

Erax stylatus (Fabricius), originally described as an *Asilus* from the West Indies, is considered by Dr. Curran (1931–9) probably to be the *Erax rufitibia* Macquart of Haiti, which was Herr Victor von Roeder's identification (1885–339) of what Dr. Gundlach had collected in Puerto Rico, and also that of Mr. F. Knab of what Mr. R. H. Van Zwaluwenburg had found at Mayagüez. Specimens answering to the description in Dr. Curran's key have been taken in flight at Santa Isabel and attracted to light in the Guánica Forest.

Erax tortola Curran (1928–23), originally described from Tortola and St. Thomas, is represented in the AMC collection with specimens from Coamo and Mayagüez, as determined by Dr. Curran.

Dolichopodidae: Long-legged Flies

Chrysotus brevitibia was described by Mr. M. C. Van Duzee from a single male collected at Naguabo by Dr. Frank E. Lutz, one of the "New Dolichopodiae from the West Indies" (American Museum Novitates No. 262, p. 10, New York, March 29, 1927): "palpi whitish; front green; thorax blackish, scutellum green; abdomen very dark green, length 1.6 mm." With the "face of male usually much narrower than the front, the abdomen without strong bristles at apex," according to Dr. C. H. Curran (1928–27), "the members of this genus are among the smallest of the Dolichopodidae and are found on leaves and grass, especially in the vicinity of streams and swamps."

Chrysotus barbatus (Loew), originally described from the Middle West of the United States, but also reported from St. Vincent and Grenada, was listed by Mr. D. W. Coquillett collected in Puerto Rico by Mr. August Busck.

Chrysotus excavatus Van Duzee is listed by Mr. M. C. Van Duzee (*in* Curran 1928–28) from Aibonito, and has been since intercepted in a grapefruit grove at Arecibo.

Chrysotus flavus Aldrich, originally described from St. Vincent, is listed by Mr. Van Duzee (*in* Curran 1928–28) from Adjuntas.

Chrysotus flavohirtus Van Duzee would appear to be a relatively common species in Puerto Rico, listed by Mr. Van Duzee (*in* Curran 1928–28) from Arecibo, Manatí, Orocovis, Adjuntas and Coamo Springs.

Chrysotus inermis Aldrich, originally described from St. Vincent, and known from Cuba according to Mr. Van Duzee (*in* Curran 1928–28), is represented in Puerto Rico by a specimen from Mayagüez.

Chrysotus longipes was described by Mr. M. C. Van Duzee (1927–1) as being "very much like *inermis* Aldrich, but has the cross-vein at the middle of wing; the cilia of the calypters yellow, not brown as in *inermis*; the wings are not at all yellow and the palpi are all yellow." This is apparently a common species in Puerto Rico, described from eighteen specimens, length 1.8 mm., front of face of male blue, "its sides nearly parallel, green, thickly covered with gray pollen; thorax dark shining green with gray pollen; abdomen bronze-green, its hairs mostly yellow." The AMC collection contains specimens identified by Dr. Curran from Cidra, Mayagüez, Hormigueros and Cartagena Lagoon.

Chrysotus minuticornis was described by Mr. M. C. Van Duzee (1927–3) from a single specimen collected at Naguabo by Dr. Frank E. Lutz.

Chrysotus morrisoni Van Duzee is reported (*in* Curran 1928–29) from five Puerto Rican localities.

Chrysotus picticornis Loew, found in middle western and southern United States, Mexico and St. Vincent and Grenada, is listed by Mr. M. C. Van Duzee (*in* Curran 1928–27) from three Puerto Rican localities. It has been intercepted, swept from weeds at Naguabo, as identified by Dr. J. M. Aldrich.

Diaphorus simplex (Aldrich), originally described as a *Lyroneurus* from St. Vincent, found also in Grenada and Mexico, was listed from Puerto Rico by Mr. M. C. Van Duzee (*in* Curran 1928–29) at Aibonito, Caguas and Mayagüez.

Asyndetus interruptus (Loew), originally described as a *Diaphorus* from Cuba, is listed from San Juan, Puerto Rico by Mr. M. C. Van Duzee (*in* Curran 1928–29).

Asyndetus exiguus, described by Mr. M. C. Van Duzee (1927–4) from four males and two females collected by Mr. A. J. Mutchler on seagrape at Arecibo, "is much like *interruptus* Loew but is smaller (length 2 to 2.5 mm.); it has only delicate hairs on the lower surface of femora; the bristles on upper edge of tibiae are few and weak." The face of the male is "opaque with white pollen; palpi, proboscis and antennae black; thorax green with blue and bronze reflections, dorsum covered with thick white pollen; abdomen green with considerable white pollen."

Kierosoma albicincta Van Duzee, as identified by Mr. C. T. Greene, was found in great abundance resting on the walls of the Presbyterian Hospital in the Condado in March 1945. Described originally (1928–24) from Barro Colorado Island, C. Z., and from Biscayne Bay, Florida, this Dolichopodid fly has not previously been recorded from the West Indies.

Thrypticus fraterculus (Wheeler), described originally as an *Alphantotimus* from Wisconsin, but later found in Mexico, was listed by Mr. M. C. Van Duzee (*in* Curran 1928–30) from Puerto Rico: a single male with green femora from Naguabo.

Thrypticus violaceus Van Duzee, described from a single male collected by Dr. Frank E. Lutz at Arecibo, has the legs wholly pale. It is 1.5 mm. long, "face and front bright violet; dorsum of thorax green, anterior portion and scutellum violet; abdomen bright green with blue reflections; all bristles and hairs yellow." It has since been found at Aibonito and Coamo in Puerto Rico, and collected by Dr. Frank E. Lutz on Mona Island.

Plagioneurus univittatus Loew, originally described from Cuba, and recorded from Hispaniola, Florida and northern States, as well as Brasil and Grenada, is listed from Puerto Rico by Mr. M. C. Van Duzee (*in* Curran 1928–30): a single male from Cayey. Dr. C. H. Curran identified specimens in the AMC collection from Salinas, Cartagena Lagoon, San Germán, Sabana Grande and many from Mayagüez, while interceptions have been made at Añasco, Ciales and Guayama.

Gymnopternus sp. was the identification by Mr. C. T. Greene of a fly intercepted on weeds at Caguas. The only species of this genus recorded from the West Indies is *ruficornis* Aldrich, from St. Vincent.

Paraclius femoratus Aldrich, originally described from Mexico, is listed from Mayagüez, Puerto Rico by Mr. M. C. Van Duzee (*in* Curran 1928–30), having its "posterior femora broadly brown apically."

Paraclius filifer Aldrich, described originally from St. Vincent and known to occur in Grenada and Florida, was collected on Vieques Island by Mr. Aug. Busck as recorded by Mr. D. W. Coquillett.

Pelastoneurus aequalis Van Duzee (1927–5), described from a pair from Adjuntas, Puerto Rico, is most "nearly like *floridanus* Wheeler, but has the hypopygial lamellae longer, and oval; and the last section of fourth vein bent near basal third." These flies are 3.0 mm. long, with "thorax largely dark blue with green reflections; abdomen and scutellum green with coppery reflections."

Pelastoneurus fasciatus was described by Herr Victor von Roeder (1885–340) from material collected by Dr. Gundlach, presumably at Mayagüez, "observando solamente en Puerto Rico."

Mesorhaga albiciliata Aldrich, as identified by Dr. J. M. Aldrich, was taken by Mr. E. G. Smyth in the screen trap in the garden at Hda. Santa Rita, Guánica, June 30, 1914.

Sciapus albiciliatus, described as a *Psilopus* by Mr. M. C. Van Duzee (1927–10), the type from St. Thomas, others from Mona Island and from San Juan, Puerto Rico, is "a rather small, shining species with black or metallic femora, yellow tibiae and halteres; long white hair on lower surface of femora and with the fore tarsi ornamented with little bristles of long hair; length 4.3 mm." Its thorax and scutellum are blue, the abdomen green with coppery reflections.

Sciapus chrysoprasius (Walker), a widely-distributed neotropial Dolichopodid, was collected in Puerto Rico first by Dr. Gundlach and listed as a *Psilopus* by Herr Victor von Roeder. Specimens collected in grapefruit groves near Río Piedras and Vega Alta by Dr. Richard T. Cotton were identified by Dr. J. M. Aldrich as *Psilopus ciliipes* Aldrich, as listed in "Insectae Portoricensis" (1923–216), and others have since been intercepted in a grapefruit grove at Añasco. Mr. M. C. Van Duzee (*in* Curran 1928–33) places these species in synonymy, and records collections from Corozal and Naguabo.

Sciapus diffusus (Wiedemann), originally described from Brasil and also found in Mexico, was identified for Dr. Gundlach from Puerto Rico and reported by Herr Victor von Roeder. Dr. Curran identified specimens in the AMC collection from Mayagüez and Ponce as being in the genus *Condylostylus*; repeated interceptions have been made at Mameyes, San Juan,

Manatí and Arecibo, and Mr. M. C. Van Duzee (*in* Curran 1928–32) reports additional collections at Cayey and Adjuntas, and occurrence in Haiti, Jamaica and Cuba.

Sciapus digitatus Van Duzee, occurs in Cuba, Jamaica, Haiti and Dominica, according to its describer (*in* Curran 1928–32), and was found in Puerto Rico at Cayey.

Sciapus dimidiatus (Loew), a widely-distributed neotropical Dolichopodid listed by Dr. Aldrich as *Agonosoma dimidiatum*, was identified as a *Psilopus* by Herr Victor von Roeder for Dr. Gundlach's collection in Puerto Rico.

Sciapus dorsalis (Loew) is listed from Puerto Rico by Mr. M. C. Van Duzee (*in* Curran 1928–32), having been collected at Manatí, Arecibo and Aibonito.

Sciapus flavicornis (Aldrich), originally described as a *Gnamptopsilopus* from St. Vincent, is listed from Puerto Rico by Mr. M. C. Van Duzee (*in* Curran 1928–32), and also from Jamaica.

Sciapus graenicheri (Van Duzee) was first listed from Puerto Rico as *Psilopus caudatus* Wiedemann, as determined by Dr. J. M. Aldrich, in "Insectae Portoricensis" (1923–216), and subsequently noted as forming part of the food of a lizard: *Anolis krugii*. Dr. Stuart T. Danforth noted this fly as being eaten by the P. R. mango (1926–90), using the name *Condylostylus* given by Dr. Curran to specimens he had collected at Yauco, Joyuda, Mayagüez and Río Piedras. Mr. M. C. Van Duzee (*in* Curran 1928–33) lists numerous other localities of collection, the extremes being Tortuguero Lagoon and El Yunque.

Psilopus "near *insularis* Aldrich" was the determination by Mr. C. T. Greene of a Dolichopodid fly collected by Dr. Luis F. Martorell on Mona Island.

Sciapus jucundus (Loew), originally described from Cuba but recorded from many of the West Indies, was collected in Puerto Rico by Dr. Gundlach as identified by Herr Victor von Roeder, and has since been intercepted in a lima bean field at Vega Baja.

Sciapus leonardi Van Duzee, named after its collector, Dr. M. D. Leonard, occurs in the Okefenoke Swamp, Georgia (type locality), but also in Haiti, Dominica and Puerto Rico, according to Mr. M. C. Van Duzee (*in* Curran 1928–32), at Aibonito, Adjuntas and Tortuguero Lagoon.

Sciapus longicornis (Fabricius), described originally as a *Dolichopus* from the West Indies, was listed by Mr. D. W. Coquillett (1900–252) as having been collected in Puerto Rico by Mr. Aug. Busck.

Sciapus melampus (Loew), a Mexican Dolichopodid, has been identified as a *Psilopus* by Mr. C. T. Greene, intercepted on weeds at Mayagüez by Mr. A. G. Harley.

Sciapus mundus (Wiedemann), from Florida and Georgia, was identified by Dr. J. M. Aldrich as *Psilopus ciliatus* Loew, from Corozal, Puerto Rico.

Sciapus nubilipennis (Van Duzee) was described as a *Psilopus* (1927–7): a single male from Adjuntas, 5.5 mm. long, "with wings nearly like those of *infumatus* Aldrich, except that the costa is not ciliated; the middle basitarsus is ciliated below the erect bristles, which are longer than the diameter of the joint," with head, thorax, scutellum and abdomen mostly green.

Sciapus pilosus (Loew) was identified by Herr Victor von Roeder as a *Psilopus* from material collected in Puerto Rico by Dr. Gundlach, formerly known only from Cuba.

Sciapus portoricensis, described as a *Psilopus* by Jean Macquart in his "Histoire Naturelle des Diptéres" (1: 450, 2: 121, Paris, 1934–35), has since been intercepted at Mayagüez and at Loíza.

Sciapus pruinosus Coquillett is listed from Puerto Rico at Aibonito and Adjuntas by Mr. M. C. Van Duzee (*in* Curran 1928–33), and has since been intercepted at Maricao.

Sciapus psittacinus (Loew), a Florida Dolichopodid, was identified from Puerto Rico by Herr Victor von Roeder as a *Psilopus* collected by Dr. Gundlach.

Sciapus spinimanus (Van Duzee), described (1927–6), the type from "Sánchez, P. R.," is presumably not a Puerto Rican species, and indeed it seems quite possible that other records by Mr. Van Duzee given as "Dominica" refer, not to the Island in the Lesser Antilles of that name, but to the Dominican Republic, the eastern portion of the Island of Hispaniola.

Sciapus unicinctus (Van Duzee), described as a *Psilopus* (1927–6) from a pair from Aux Cayes, Haiti, other from St. John (U. S. Virgin Islands), is identified by Dr. C. H. Curran (1931–11) from material collected by Dr. W. A. Hoffman at Dorado, Puerto Rico. It is 5.0 mm. long, "front blue; lower part of face green, both covered with silvery white pollen; thorax blue with green reflections and rather short black bristles; abdomen green with black incisures and coppery reflections."

Empididae: Dance Flies

Phoneustica flavida (Williston), described as a *Drapetis* from St. Vincent, was identified as a *Tachydromia* by Mr. D. W. Coquillett (1900–251) reporting its collection in Puerto Rico by Mr. Aug. Busck. Dr. C. H. Curran (1928–25) reports collections at Mayagüez and Coamo, and later identified as this species those collected by Dr. Stuart T. Danforth at Cartagena Lagoon.

Drapetis gilvipes Loew, originally described from Texas, and reported from St. Vincent as *Drapetis xanthopodus*, occurs in Puerto Rico according to Dr. C. H. Curran (1928–25): a single male from Cayey.

Syneches pusillus Loew, recorded from St. Vincent, occurs in Puerto Rico according to Dr. C. H. Curran (1928–25): a single female from Orocovis.

Hybos electus Melander, of the clear-winged variety named *claripennis* by Dr. C. H. Curran (1928–25) from a male from Adjuntas, was previously known from Cuba and St. Vincent.

Hybos triplex Walker, originally described from Trenton Falls, New York, was listed from Puerto Rico by Mr. D. W. Coquillett (1900–251) as *Euhybos subjectus*, collected by Mr. Aug. Busck.

Hybos spinosus Curran (1928–25), the type a male from Adjuntas, Puerto Rico, 3.0 mm. long and black, differs from *triplex* Walker in "the largely pale anterior legs and different genitalia."

Euhybos spiniger, described by A. L. Melander in "Diptera: Empididae" of Genera Insectorum, fasc. 185:32. Brussels, 1927, the type from Utuado, Puerto Rico, "Dr. Curran thinks," according to Dr. M. D. Leonard, this "may be the same as his *Hybos spinosus*."

Phoridae: Humpbacked Flies

Megaselia aurea (Aldrich), described as a *Phora* from St. Vincent, was collected in Puerto Rico by Mr. Aug. Busck, as noted by Mr. D. W. Coquillett (1900-253).

Megaselia macrochaeta (Malloch) and **Megaselia subflava** (Malloch) are listed by Mr. R. H. Van Zwaluwenburg as *Aphiochaeta*, and as an *Aphiochaeta* Dr. J. M. Aldrich determined the specimens of **Megaselia picta** (Lehmann) which Mr. E. G. Smyth found attracted to "some dead *Belostoma* adults collected two nights ago." As a species of *Megaselia* "very close to *fungicola* (Coquillett)," Mr. C. T. Greene identified the Phorid flies intercepted on a polypore fungus.

Megaselia scalaris (Loew) is a common, cosmopolitan Phorid, described as a *Phora* from Cuba, and early reported from St. Vincent and Grenada and the eastern United States. Dr. G. E. Bohart in his paper on "The Phorid Flies of Guam" (Proc. U. S. National Museum, 96 (3205): 397–416, pl. 5, ref. 8. Washington, D. C., 1947), figures both sexes and re-describes this species, which he found "abundant in all inhabited areas and bred freely in such diverse materials as green cornstalks, rotting coconuts, carrion and human excrement. It was almost impossible to keep it from contaminating our cultures of other flies, and it bred freely in fresh stools under examination for intestinal parasites by the parasitology laboratory." In Puerto Rico it has been intercepted in the rotten silk of sweet corn at Mayagüez, in rotten fruit of *Annona glabra* at Palo Seco, in rotten papaya fruit at Arecibo, in hot pepper fruit at Arroyo, and without host record at Bayamón and Adjuntas. It has been repeatedly reared from dead May

beetles, from dead termites poisoned with Paris green, and from other dead insects. Dr. C. H. Curran (1928-43) reports more than forty specimens collected by Dr. Frank E. Lutz on Mona Island, and occurrence in others of the Greater Antilles.

Dohrniphora venusta (Coquillett), as identified by Mr. C. T. Greene, has been reared from dead termites, *Nasutitermes costalis* Holmgren, killed by Paris green in the comejenera, and from other dead insects, as well as from decaying bean pods at Río Piedras.

Conicera latimana, described by Mr. J. R. Malloch as "A New Species of *Conicera* from Puerto Rico" (Proc. Ent. Soc. Washington, 26 (4): 73. Washington, D. C., April 1924), was from a type from Ciales. Presumably it was this species, identified as *Conicera aldrichii* Brues, which Dr. Alex. Wetmore found eaten by a hummingbird.

Puliciphora borinquensis was described by Dr. Wm. Morton Wheeler as "A New Wingless Fly from Porto Rico" (American Museum of Natural History, Bulletin No. 12, Article 14, pp. 267–71, pl. 34. New York, 1906).

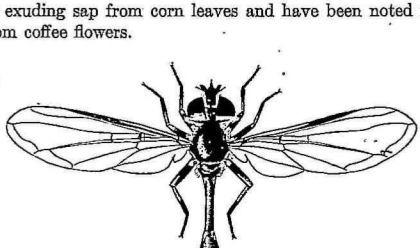
Syneura cocciphila (Coquillett), originally described as a *Phora* from Mexico, reared from "larvae infesting dead adults of *Icerya purchasi*," was first reared from the same host in Puerto Rico by Mr. Francisco Seín shortly after the cottony cushion scale became established in the metropolitan area of San Juan. This was reported by Dr. M. D. Leonard (1932-1106), by Dr. C. T. Brues (Psyche, 39 (4): 141. Cambridge, December 1932) and by Wolcott & Seín (1933-213). At Sao Paulo it has been found infesting *Icerya brasiliensis*, and in Puerto Rico has been reared from *Crypticerya rosae* R. &. H., at Ponce. On Mona Island it was reared from adult cottony cushion scales.

Syrphidae: Flower Flies

Baccha capitata Loew, originally described from Cuba, was first collected in Puerto Rico by Dr. Gundlach and listed by Victor von Roeder, and in Van Zwaluwenburg's list is No. 5035, "on *Aphis* sp." It is a large, yellow and brown fly, with the broadly spatulate abdomen characterizing many of this genus, but decidedly not abundant, adults having been reared from the dull yellow, opalescent puparia at Comerío, Vega Baja and Río Piedras. Mr. Thos. H. Jones noted them associated with hemispherical scales. Dr. M. R. Smith (1942-26) in the coffee region back from Mayagüez found the larvae on coffee twigs not attacked by ants, altho "often observed destroying scales."

Baccha clavata (Fabricius), originally described as a *Syrphus* from the West Indies but since found widely distributed in the United States, Mexico, Brasil and and the Galápagos Islands, was first collected in Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder. It was also found

by Mr. Aug. Busck, as listed by Mr. Coquillett, and is given in Van Zwaluwenburg's list as P. R. 88. The adult is a slender, blue-black fly, with two yellowish spots on either side of the spatulate abdomen, the larvae being so common as predators on aphids of all kinds on numerous wild hosts as well as on economic plants, that larva, puparium and adult are figured in "Afidos de Importancia Económica en Puerto Rico" (Circular No. 59, Est. Expt. Insular, Río Piedras, pp. 11, fig. 20. San Juan, September 1922). These flies occur in all parts of Puerto Rico, and are possibly most often noted ovipositing among colonies of aphids, but they also suck exuding sap from corn leaves and have been noted feeding on nectar from coffee flowers.



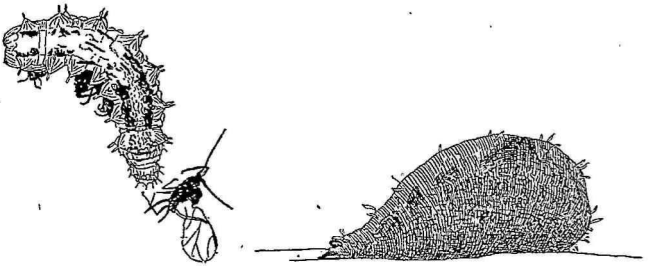
The Syrphid fly, *Baccha clavata* (Fabricius), six times natural size. (Drawn by G. N. Wolcott.)

Baccha (Ocyptamus) conformis Loew, originally described from Cuba, was first collected by Dr. Gundlach in Puerto Rico, presumably at Mayagüez, as listed by von Roeder. In Van Zwaluwenburg's list it is P. R. 1207, and has since been intercepted on mango blossoms at Mayagüez. It is a slender, entirely black Syrphid fly, which Dr. Luis F. Martorell found "flying very low" under trees of "corcho" (*Pisonia albida*) growing along the Carmelita trail on the plateau of Mona Island.

Baccha cylindrica (Fabricius), originally described as a *Syrphus* from the West Indies, is identified by Dr. C. H. Curran (1928-36) from all of the larger Virgin Islands, from El Yunque, Arecibo and Mayagüez in Puerto Rico, and from Mona Island, and in the AMC collection from many more Puerto Rican localities.

Baccha (Ocyptamus) dimidiata (Fabricius), described as a *Syrphus* from the West Indies, and since found in Mexico and the Amazona region of Brasil, is identified by Dr. C. H. Curran (1928-36) from all the larger Virgin Islands, and from El Yunque, Cayey, Aibonito and Mayagüez.

Baccha (Ocyptamus) fasciatus, described from Puerto Rico by Herr Victor von Roeder (1885-342), the type collected by Dr. Gundlach, and noted by him as "observado solamente en Puerto Rico," is large, slender, dark blue, with pictured wings. The larvae have been observed feeding on aphids on coffee leaves at Indiera in the mountains back of Yauco, and on milkweed aphids on the giant milkweed (*Calotropis procera*) at Yauco. Adults have been collected in a cane field at Salinas, and flying among weeds on Mona Island by Dr. Luis F. Martorell.



Larva of *Baccha clavata* (Fabricius), which has just finished feeding on an aphid, and puparium, both about six times natural size. (Drawn by G. N. Wolcott.)

Baccha (Ocyptamus) fuscipennis Say, as determined by Mr. C. T. Greene, has been intercepted at Palo Seco and Dorado.

Baccha gracilis Williston was identified by Dr. C. H. Curran (1928-35) from El Yunque.

Baccha incompta Austen, originally described from Brasil, was identified by Dr. C. H. Curran (1928-36) from Adjuntas.

Baccha (Ocyptamus) latiusculus Loew, originally described from Cuba and recorded from the other Greater Antilles, was collected in Puerto Rico by Dr. Gundlach, as listed by Herr von Roeder, and by Mr. Aug. Busck, as noted by Mr. D. W. Coquillett. Mr. Thos. H. Jones, writing on the "Aphides or Plant-Lice attacking Sugar-Cane in Porto Rico" (Bulletin No. 11, Board of Commissioners of Agriculture P. R., pp. 19, pl. 2. San Juan, 1915), noted the larvae, called a species of *Ocyptamus*, feeding on the yellow aphid of sugar-cane, *Sipha flava* Forbes. They feed on any kind of aphid on any host, even on water lily, and occur in all parts of the Island in great abundance. The adults have a parallel-sided abdomen, bright chestnut in color in life, becoming darker in museum specimens.

Baccha ornatipes was described by Dr. C. H. Curran (1927-3) from a single male from Cayey.

Baccha parvicornis Loew, described originally from Cuba, was first collected in Puerto Rico by Dr. Gundlach, as recorded by Herr von Roeder. It is a large but very slender Syrphid fly, light yellow in color, present in all parts of the Island. Of an adult reared from a puparium on the under side of a coffee leaf covered with fluff from the nymphs of *Ormenis pygmaea*, it may be presumed that the larva had fed on the Fulgorid nymphs. Apparently the maggots are not specific in their choice of hosts however, for others have been found associated with a heavy whitefly infestation on the leaves of *Inga laurina* at Cabo Rojo, and with a heavy infestation of mealybugs on a leaf of *Erythrina glauca* at Río Piedras.

Baccha stenogaster Williston, previously known from Brasil and Mexico, was first identified from Puerto Rico by Mr. C. T. Greene, reared from larvae feeding on mealybugs, *Phenacoccus gossypii* T. & C., on cotton at Maunabo in February 1922, and the next year found feeding on *Pseudococcus adonidum* mealybugs on "New York" (*Solanum wendlandii*) at Río Piedras. Dr. C. H. Curran (1928–35) identified this fly from St. Croix and St. Thomas, and from Adjuntas and Coamo in Puerto Rico, and many specimens from Mayagüez for Dr. Stuart T. Danforth. It is a very slender, small, dark fly, with clear but somewhat whitish wings.

Allograpta fuscisquama was described by Dr. C. H. Curran (1927-4), the type from Ensenada, Puerto Rico; others from Mona Island, St. Thomas, St. Croix and Tortola; 7.0 to 8.5 mm. long, yellowish head, thorax shining greenish black, legs reddish yellow, the abdomen with a complicated pattern in yellow, brown and black. Dr. Curran identified specimens in the AMC collection from Yauco, Villalba, Coamo, Utuado, Río Piedras and Humacao.

Allograpta limbata (Fabricius), originally described as a *Scoeva* from the West Indies, was identified from Puerto Rico by Mr. C. T. Greene: adults reared from larvae and pupae in the arrows or "guajanas" of sugar-cane at Río Piedras and Cidra, presumably feeding on the leafhoppers or leafhopper nymphs of *Nesosteles guajanae* (DeLong). The dark brown, half-moon shaped spot on the bright yellow scutellum is conspicuous, and corresponds with what Dr. Curran describes for his *fuscisquama*—"Scutellum dull yellow with a large, transverse, discal black spot, the pile long and sparse; ventral fringe black, long" so closely, and in other details, as to suggest the synonymy of the two names.

Mesogramma arcifera Loew, originally described from Cuba as *Mesograpta arcifer*, and known also from Jamaica, was first collected in Puerto Rico by Mr. Aug. Busck, as listed by Mr. Coquillett, and in Van Zwaluwenburg's list is P. R. 109. Its black scutellum is outlined apically in yellow, the second segment of the abdomen has two semi-circular yellow marks, those more distad are yellow with obscure brownish markings. Dr. C. H.

Curran (1928-41) lists collections from many points in Puerto Rico, and indeed it is one of the most abundant of Syrphid flies, especially in high malojillo meadows. It has been repeatedly intercepted on mango flowers at Mayagüez, but it has not been reared, and nothing is known of its immature or host relationships.

Mesogramma aurulenta Williston, originally described from Santo Domingo, was identified by Mr. C. T. Greene from a specimen collected by Mr. S. S. Crossman at Aibonito, which has a reddish abdomen except at base. Others are from El Yunque.

Mesogramma basilare (Wiedemann), originally described from Brasil, and known from several of the Lesser Antilles, was identified as *Toxomerus* by Prof. C. L. Metcalf from Puerto Rico: swept from grass at Coloso, Manatí, Caguas and Point Cangrejos.

Mesogramma boscii (Macquart), of the eastern United States and Mexico, was identified as a *Mesograpta* by von Roeder, and listed by Drs. Stahl and Gundlach from Puerto Rico.

Mesogramma duplicata (Wiedemann), a South American Syrphid, is listed by Dr. C. H. Curran (1928-38) from many localities in Puerto Rico.

Mesogramma difficilis, described by Dr. C. H. Curran as one of "New Diptera belonging to the Genus *Mesogramma* Loew (Syrphidae)" (American Museum Novitates Number 405, pp. 14, fig. 3. New York, March 1, 1930) from a single male from Coamo, others from Caguas, Adjuntas, Aibonito, Corozal, and Manatí, is "related to *duplicatus* Wiedemann, having a length of 5.5 to 6.0 mm., face and front yellow, mesonotum greenish black, abdomen orange, with black bands and spots".

Mesogramma floralis (Fabricius) was identified by Dr. C. H. Curran (1928-39) from many localities in Puerto Rico and from the Virgin Islands of St. Thomas and St. John.

Mesogramma laciniosa Loew, originally described from Cuba, was identified for Dr. Gundlach in Puerto Rico by Herr Victor von Roeder, and listed by Mr. C. W. Coquillett as collected by Mr. Aug. Busck. Dr. C. H. Curran (1928-39) notes that he had "seen specimens labeled Porto Rico," and later identified many from Mayagüez and other localities in the AMC collection. It is indeed a very common Syrphid in malojillo meadows and pasture grass and weeds, identified by Prof. C. L. Metcalf as a *Toxomerus*, and thus reported as forming an item in the food of the lizard *Anolis pulchellus*.

Mesogramma minuta (Wiedemann), originally described as a *Syrphus* from Brasil, and reported also from Cuba, is listed by Dr. Gundlach as a *Mesograpta* "rara en Puerto Rico."

Mesogramma musicus (Fabricius) is listed from Puerto Rico by Dr. C. H. Curran (1928-39): a single specimen from Corozal.

Mesogramma picta (Macquart), originally described as a *Syrphus* from Guiana, and known also from Mexico, Cuba and Jamaica, was listed by Dr. C. H. Curran (1928-41) from Puerto Rico: Aibonito and Corozal, and specimens from Añasco and many other localities in the AMC collection were identified by him.

Mesogramma polita (Say), a common continental North American Syrphid fly, reported by C. V. Riley and L. O. Howard in "Insect Life" (1: 5-8. Washington, D. C., July 1888) as "The Corn-Feeding Syrphus Fly," its larvae feeding on pollen and tissues of corn, was first noted in Puerto Rico by Dr. Richard T. Cotton (1918-291), who found the adults "very abundant on corn and some of the native wild grasses. The yellowish colored grubs feed on pollen grains and on the saccharine cells in the axils of the leaves. The grubs pupate between the stalk and the leaf-sheath. Parasitic enemies are numerous." Dr. C. H. Curran (1928-38) notes occurrence in Puerto Rico, and identified specimens in the AMC collection from Mayagüez and many other localities in Puerto Rico. This Syrphid fly was found to be an item in the food of the crested lizard, *Anolis cristatellus*. It has clear wings, light colored thorax and light brownish crescents on several of the segments of a yellowish abdomen.

Mesogramma polygonastyla Metcalf, given this MS name by Prof. C. L. Metcalf "because of the peculiar shape of the styles of the male", was reared from numerous puparia on tobacco plants at Caguas, May 10, 1921. It is presumed that the larvae fed upon other insects which might become stuck to the tobacco leaves.

Mesogramma subannulata Loew, originally described from Cuba and found also in Jamaica and Mexico, was first collected in Puerto Rico by Mr. Aug. Busck, as reported by Mr. D. W. Coquillett (1900-253). Mr. Thos. H. Jones found the larvae feeding on the yellow aphid of sugar-cane, *Sipha flava* Forbes, and Dr. Richard T. Cotton observed females "depositing eggs around colonies of aphis (*Rhopalosiphum persicae* Sulzer) on pepper plants" at Río Piedras. The adults have been swept from grass at Caguas, Ciales and Mayagüez, and are common in at least the more humid sections of the Island.

Mesogramma verticalis, described by Dr. C. H. Curran (1927-6) from a single male at Cayey, has an "abdomen black, with four broadly interrupted yellow fasciae, the last three of which are broadened inwardly; length 5.0 mm."

Mesogramma violacea Curran, originally described from Jamaica, was identified by Dr. C. H. Curran (1928-39) from El Yunque and other localities in the mountains of Puerto Rico, as well as from Arecibo and Mayagüez.

Ornidia obesa (Fabricius), described as a *Syrphus* from the West Indies,

but more generally known as a *Volucella* with a wide distribution in South America, tropical Asia, the Sychelles and Madagascar, is by Dr. C. H. Curran in his "New Species of Volucellinae from America (Syrphidae, Diptera)" (American Museum Novitates Number 413, pp. 23, fig. 1. New York, March 24, 1930) re-established in the genus proposed by St. Fargeau et Serville, having "strong tubercles on the side of the face". This is a large, stout, iridescent green fly, commonly known locally under the name of "mosca cantárida." It was identified by Herr von Roeder for Drs. Stahl and Gundlach, the latter noting it as "sumamente común en los montes." Listed by Van Zwaluwenburg as P. R. 92, it was found by Dr. Stuart T. Danforth (1926-92, 122) to have been eaten by the tody and the northern water thrush at Cartagena Lagoon. Dr. Curran (1928-41) identified it from many localities in Puerto Rico in all parts of the Island, along the coast as well as in the mountains. It typically hovers in a sunny glade, a clearing in the woods or little traveled mountain road, and Mr. Thos. H. Jones collected a plump, grey puparium at the camp on El Duque, above Naguabo, November 4, 1914.

Volucella esuriens (Fabricius), originally described from the West Indies as a *Syrphus*, and since found in the southern United States, Mexico and northern South America, was identified by Herr Victor von Roeder from material collected in Puerto Rico by Dr. Gundlach.

Volucella horvathi Szilady, as determined by Mr. C. T. Greene, is a stout, black and yellow Syrphid fly with pictured wings, found in the Guánica Forest, at Boquerón, and by Dr. Luis F. Martorell on Mona Island.

Volucella pallens Wiedemann, identified for Drs. Stahl and Gundlach as the Cuban *Volucella sexpunctata* Loew by Herr Victor von Roeder, is listed as P. R. 1204 by Mr. R. H. Van Zwaluwenburg. Dr. C. H. Curran (1928-42) noted only specimens from El Yunque, but identified this species from many other Puerto Rican localities as represented in the AMC collection. Its name is most appropriate for it is a distinctly pallid yellow by comparison with more contrastingly marked Syrphids; in Dr. Curran's Key (1930-6) being characterized by "yellowish squamae." It has been repeatedly intercepted on the fruits of orange and grapefruit, and collected by Mr. Thos. H. Jones on flowers of "capá prieto" (*Cordia alliodora*).

Volucella pusilla Macquart, originally described from Cuba, was listed from Puerto Rico by Dr. Gundlach, having been identified by Herr von Roeder.

Volucella tricincta Bigot, as identified by Mr. C. T. Greene, has been intercepted at Mayagüez and Bayamón.

Volucella unipuncta, described by Dr. C. H. Curran (Ann. Ent. Soc. America, **19**: 63, 1926), the type from Desecheo Island and Ensenada,

Puerto Rico, has since been identified by him from Coamo: specimens in the AMC collection.

Eristalis albifrons Wiedemann was first collected in Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder. As *Eristalis albiceps* Macquart, Dr. Alex. Wetmore reports this Syrphid fly as having been eaten by the swallow, martin and redstart. Dr. Curran (1928-12) records it only from El Yunque, but it has been intercepted at Loíza and Pueblo Viejo.

Eristalis atrimanus Loew was first identified from Puerto Rico by Mr. C. T. Greene, from specimens swept from flowers on the beach at Pt. Cangrejos by Dr. Richard T. Cotton, but it had earlier been collected on flowers of "capá prieto" (*Cordia alliodora*) by Mr. Thos. H. Jones, and more recently noted resting on sugar-cane at Yauco. Dr. C. H. Curran (1928-43) records occurrence at Aibonito, and has identified many specimens in the AMC collection from many localities. Its thorax has two silvery bands, its scutellum is yellow and the first abdominal segment has two lateral yellow spots almost as large as the scutellum. When intensive search was being made on flowers of "botoncillo" (*Borreria verticillata*) for *Larra americana* along the north coast of Puerto Rico, this was one of the common Syrphids most often noted, collected at Laguna Tortuguero and Luquillo.

Eristalis cubensis Macquart is listed by Dr. C. H. Curran (1928–43): a single female from Manatí.

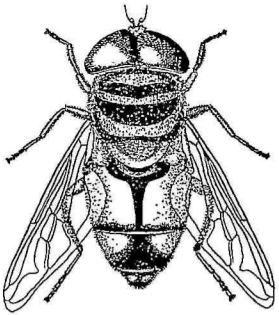
Eristalis hortorum (Fabricius), originally described as a *Syrphus* from the West Indies, and known from St. Thomas and Santo Domingo, was identified by Mr. C. T. Greene from interceptions made at Dorado, Ponce and Mayagüez.

Eristalis pusio Wiedemann, originally described from Brasil, was collected in Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder.

Eristalis vinetorum (Fabricius), originally described as a *Syrphus* from the West Indies and since reported from many neotropical islands and countries, being found as far north as Philadelphia and as far south as Argentina, was identified by Herr Victor von Roeder for Drs. Stahl and Gundlach. In Van Zwaluwenburg's list it is P. R. 96, and Dr. C. H. Curran (1928-42) reports it from many Puerto Rican localities, as well as from the Islands of St. Thomas, St. John and St. Croix. It is one of largest of the local Syrphids, being a much larger and somewhat paler *atrimanus* in appearance, found in the mountains as well as along the coast. Most collections of adults have been made from flowers: those of the yellow caltrop (*Tribulus cistoides*) in Puerta de Tierra early in the morning, and repeatedly from "botoncillo" (*Borreria verticillata*) between 11 AM and 2 PM. Large numbers of rat-tailed maggots found in well-rotted cachaza at Río Piedras

in November 1942 by Mr. Francisco Seín proved to be the immature larval stage of this fly. All of these species of *Eristalis* should be **Tubifera** if the genera of Meigen 1800 are recognized.

Meromacrus cinctus (Drury), described originally as a *Musca* from Jamaica and Santo Domingo, was identified by Herr Victor von Roeder for Puerto Rico from flies collected by Dr. Gundlach. This beautiful large Syrphid, with tufts of bright yellow hair at the base of its wings and behind the head, posteriorly banded across the black thorax, its scutellum and abdomen dull orange, in Van Zwaluwenburg's list is P. R. 616, and in the AMC collection was identified by Dr. C. H. Curran: specimens from Hormigueros, Río Piedras and Jayuya. It rarely occurs along the coast, but was collected by Mr. S. S. Crossman at Aibonito, intercepted at Adjuntas by Mr. R. G. Oakley, and has been repeatedly noted at El Yunque and at El Verde in the Luquillo Mountains.



The Syrphid fly, *Eristalis vinetorum* (Fabricius), four times natural size. (Drawn by Fritz Maximilien.)

Meromacrus pratorum (Fabricius), originally described as a *Syrphus* from the West Indies, was identified from Puerto Rico by Herr Victor von Roeder as collected by Dr. Gundlach, but no recent collection has been made here.

Xylota pachymera Loew, originally described from Cuba, was collected in Puerto Rico by Dr. Gundlach, as determined by Herr Victor von Roeder.

Conopidae: Thick-headed Flies

Conops pictus Fabricius, originally described from the West Indies, was collected in Puerto Rico by Dr. Gundlach, as identified by Victor von

Roeder. It was collected by Messrs R. G. Oakley and A. S. Mills at Isabela, June 26, 1948, as determined by Mr. C. W. Sabrosky. Mr. C. T. Greene identified as a species of *Conops* "near *xanthopareus* Williston" a Conopid fly intercepted at Bayamón.

Physocephala sp. is the determination by Mr. David G. Hall of the yellow and brown wasp-like flies which were found frequenting the flowers of "botoncillo" (*Borreria verticillata*), presumably awaiting opportunity to oviposit on some bee or wasp. A pair has been collected in coitu, resting on a citrus leaf at Isabela, others at Palo Seco, Ceiba and Yabucoa.

Zodion nanellum Loew was collected in Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder.

Dorilaidae (Pipunculidae): Big-headed Flies

Pipunculus regalis, described by Dr. C. H. Curran (1928-43) from a single female from Mayagüez, is "black; stigma brown; antennae black, the third segments yellowish brown, produced downwards into a long, tapering point; abdomen brownish pollinose above, grayish on the sides and base; legs black; length 2.25 mm."

Gasterophilidae: Horse Bots

Gasterophilus nasalis (Linnaeus), as determined by Mr. E. F. Knipling, was first found in Puerto Rico in the alimentary canal of a horse at Río Piedras by Dr. Francisco Menéndez Guillot, at that time official veterinarian for the racetracks, as noted by Dr. W. A. Hoffman, who himself found the bots in a horse from Coamo in 1934. Dr. H. L. Van Volkenberg (1935-23) reported infestations mild in native or acclimated horses, but in "An Annotated Check List of the Parasites of Animals in Puerto Rico" (Circular No. 22, P. R. Agr. Expt. Station, pp. 12, ref. 49. Washington, D. C., January 1939), on p. 4, stated that "the bots are found in about fifty percent of necropsies on the horse, but infestations are mild in character." This confirms Dr. Hoffman's opinion that the horse bot is definitely established in Puerto Rico, and not merely a temporary importation in racehorses from the States.

Hypoderma lineatum (De Villiers), the ox bot or ox warble fly, altho many times found in imported cattle, as first noted by Dr. Gerard Dikmans in the 1925 Report of the Mayagüez Station (1927-23), and repeatedly noted by importers and purchasers of Holstein-Fresian cattle, has not become established in Puerto Rico. This was stated by Dr. H. L. Van Volkenberg (1932-25, 1934-25 & 1935-23) in all his earlier accounts of the insect parasites of cattle in Puerto Rico, but is not mentioned in his Circular No. 22.

Larvaevoridae (Tachinidae): Tachinid Flies

Trichopoda pennipes (Fabricius) was first identified from Puerto Rico by Herr Victor von Roeder as the South American *Trichopoda pyrrhogaster* Wiedemann, and was listed under that name by Van Zwaluwenburg: P. R. 104. This is one of the most attractive and interesting of the Tachinid flies, but one of the least typical. In life the fly holds its posterior legs so that the brush of coarse hairs on the outside of each femora is conspicuous, and its abdomen and relatively enormous squamae are of bright chestnut or dull orange color; the wings dark except on posterior margin, its dark prothorax laterally margined and striped with gold. Mr. Charles E. Wilson, in discussing the "Truck-Crop Insect Pests in the Virgin Islands and Methods of Combating Them", (Virgin Islands Agr. Expt. Station Bulletin No. 4, pp. 35, fig. 24. Washington, D. C., June 21, 1923) noted that "an average of 24.17 percent of adult specimens of *Nezara viridula*, the southern green stink bug, collected at intervals of 14 days throughout the year, were parasitized by *Trichopoda pennipes*. The maximum number parasitized, 93 percent, occurred in January, and the minimum number, 12 percent, occurred in May. The pupal stage of the parasite under laboratory conditions at the station varied from 12 to 16 days. In no case was a parasite reared from nymphs taken in the field, nor were parasitic eggs found on the host in any nymphal stage. Of the various species of Hemiptera collected, only one other species, the stink-bug (*Thyanta perditor*), taken from Lima beans, showed the presence of parasitic eggs." Little wonder that Mr. Wilson considered this Tachinid fly to be the most important natural control for the southern green stink bug in the Virgin Islands, yet in Puerto Rico this fly is by no means abundant, and has been reared from this host only at Isabela. Dr. H. C. Dozier (1926-116) reared this fly from the sweet potato bug (*Corecoris fusca*), but all other records are of collection of adults: on flowers of "botoncillo" (*Borreria verticillata*) at Yabucoa, of coriander (*Coriandrum sativum*) at Isabela, and intercepted at Mayagüez, as determined by Mr. David G. Hall.

Trichopoda flava, described by Victor von Roeder (1885-343) from material collected by Dr. Gundlach in Puerto Rico, is considered by the latter "parece ser propia de la isla."

Trichopoda haitiensis Desvoidy was identified by Dr. C. H. Curran (1928-113) from the Islands of St. Croix and St. Thomas, as well as from Mayagüez, and he gave this name to specimens in the AMC collection from Mayagüez, San Germán, Utuado, Coamo and Río Piedras.

Ectophasiopsis arcuata (Bigot) and *Cylindromyia porteri* (Bréthes), Tachinid flies from Chile, known to be parasitic on Pentatomid bugs, introduced by the Mayagüez Station, as noted in the Report for 1941 (1942-

20), did not survive in Puerto Rico. The first species arrived in poor condition, and the latter, altho active and able to copulate and oviposit in the hosts supplied, did not in fact parasitize any of them.

Hyalomyia chilensis Macquart and *Acaulona peruviana* Townsend, known parasites of the Peruvian cotton stainer, *Dysdercus ruficollis* (L.), were imported by the Mayagüez Station, as noted in the Report for 1942 (1943-15), in the hope that they would parasitize the species of cotton stainer present in Puerto Rico. The first species did not oviposit in nymphs of the local species of *Dysdercus*, and the results of rearing the latter in the laboratory were most meagre. Searching in the field for their released descendents however, Mr. H. K. Plank found a native parasite, which Mr. C. W. Sabrosky (Jour. Washington Academy of Sciences 40 (11): 370. Washington, November 15, 1950) named **Acaulona erythropyga.**

Lydella stabulans var. *grisescens* Rond., an introduced parasite of the larva of the sugar-cane moth-borer, *Diatraea saccharalis*, was not recovered in Puerto Rico, according to the account in the Report of the Mayagüez Station for 1937 (1938-96).

Lydella incompleta Curran, as identified by Dr. J. M. Aldrich, was reared from guava fruits intercepted at Bayamón.

Rhodogyne fuliginosa (Desvoidy), identified as *Gymnosoma filiola* by Herr Victor von Roeder, is listed by Dr. Gundlach from Puerto Rico.

Comyopsis fumata Towsend, as determined by Dr. J. M. Aldrich, was intercepted at Mayagüez.

Acronarista mirabilis Townsend is identified by Dr. C. H. Curran (1928-113) from Puerto Rico: a single female from Orocovis.

Sciasma nebulosa Coquillett is identified by Dr. C. H. Curran (1928-114) from Puerto Rico: specimens from Caguas and Aibonito.

Erycia consistens, as described by Dr. C. H. Curran in his paper of "New West Indian Tachinidae" (American Museum Novitates Number 260, pp. 15, fig. 5. New York, March 19, 1927), on p. 10, from a single male from Coamo, is "related to *celer* Coquillett but the intermediate abdominal segments lack discals and their apices are very broadly shining; length 6.0 mm."

Spathidexia atypica, is described by Dr. C. H. Curran (1927-11) from female flies swept from grass and weeds at Adjuntas, Aibonito and Manatí: "black with whitish pollen, length 4.0 mm."

Spathidexia dunningi (Coquillett) is identified by Dr. C. H. Curran (1928-111) from males from Mayagüez and Manatí.

Clausicellana mitis, as described by Dr. C. H. Curran (1927-12) from a male from Aibonito, is "black with grayish pollen, length 3.0 mm."

Comatacta insularis is described by Dr. C. H. Curran (1927-12) from flies from San Juan and Manatí as being "black, the first two antennal

segments, knees very narrowly, palpi, halteres and obscure areas on the sides of the abdomen reddish; length 5.5 to 6.5 mm."

Prorhynchops errans is described by Dr. C. H. Curran (1927-13) from flies collected by sweeping at Manatí, Arecibo, Caguas and Adjuntas as being "black, with grayish pollen; apical section of proboscis longer than height of head (as illustrated); length 4.5 mm."

Hypostena vanderwulpi (Townsend) originally described as a *Myrothyria* from southern Florida, was collected in Puerto Rico by Mr. Aug. Busck, as reported by Mr. D. W. Coquillett (1900-254).

Tachinophyto floridensis Townsend occurs in Puerto Rico according to Dr. C. H. Curran (1928-111), three females having been collected at Adjuntas.

Plagiprospherysa occidentalis (Wiedemann) was identified by Dr. C. H. Curran (1928-111) from Aibonito.

Mericina ruficauda Curran (1927-6), described from a single male from Arecibo, has very long pteropleural bristles, general color "black; fourth abdominal segments reddish, length 7.5 mm."

Ricosia setigena Curran (1927-5), described from a single female from Aibonito, is "black, the palpi and first two and base of third antennal segment reddish; length 7.0 mm."

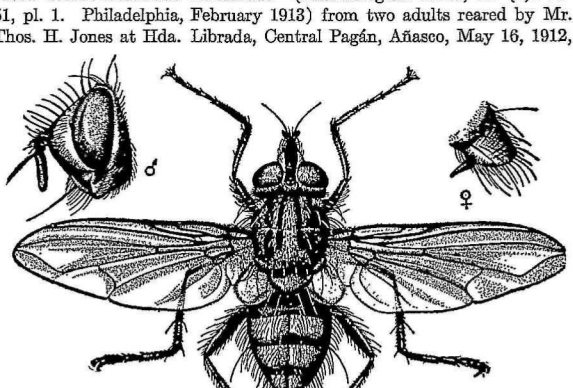
Eucelatoria armigera Coquillett, as determined by Dr. J. M. Aldrich, was found in string beans intercepted at Bayamón.

Eucelatoria australis Townsend, described originally from Peru, has as its synonym *Compsilura oppugnator* described by Mr. W. R. Walton as one of "Four New Species of Tachinidae from North America" (Proc. Ent. Soc. Washington, 16 (2): 93–5. Washington, D. C., June 1914), the type reared by Mr. Thos. H. Jones at Río Piedras from the caterpillar of *Cirphis latiuscula* H. S. feeding on the leaves of sugar-cane. It has since been intercepted in a mango grove at Mayagüez.

Cryptomeigenia aurifacies was described by Mr. W. R. Walton as "A New Species of Tachinidae from Porto Rico" (Proc. Ent. Soc. Washington, 14 (4): 198–200, pl. 1. Washington, D. C., January 10, 1912) from flies reared by Mr. D. L. Van Dine at Hacienda Librada, Central Pagán, Añasco, "from puparia found within the body shells of adult *Lachnosterna* at the roots of coffee," April 29, 1912. So important a parasite of the adults of white grubs did this appear to be that several attempts were made to establish it at Hda. Santa Rita, Guánica, but without apparent success. Indeed, it appears to be restricted to the moister portion of the Island, and later investigations by the British Entomologist, Mr. W. F. Jepson, indicated that hardly more than one percent of the beetles was attacked, even in environments most favorable to this Tachinid fly. Mr. E. G. Smyth (1917-56, 86 to 87, 151) noted that "the number of pupae found

within one dead adult host varies from two to nine, usually four to six. Infested beetles that have died are always found in their burrows in the ground." The adult flies have been collected at Río Piedras, Guaynabo, Pueblo Viejo and Cidra, usually in citrus groves or coffee groves, and not in open cane fields where maximum damage by white grubs occurs.

Eutrixoides jonesii was described by Mr. W. R. Walton as one of some "New North American Tachinidae" (Entomological News, 24 (2): 49-51, pl. 1. Philadelphia, February 1913) from two adults reared by Mr. Thos. H. Jones at Hda. Librada, Central Pagán, Añasco, May 16, 1912,



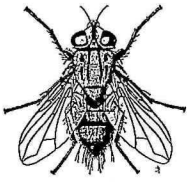
The endemic Tachinid (Larvaevorid) Parasite of May Beetles in Puerto Rico, *Cryptomeigenia aurifacies* Walton, ten times natural size. (Drawn by W. R. Walton.)

from pupae within dead May beetles. This is apparently the less common of these two Tachinid flies attacking May beetles, and altho occurring generally in the same humid environment, in 1933 was so scarce that it was not found at all by Mr. Walter F. Jepson at any point where he searched for it, either at Añasco, Isabela, Manatí or Cidra.

Lixophaga diatraeae (Townsend), the endemic Tachinid attacking the larvae of the sugar-cane moth-borer, *Diatraea saccharalis* (F.), was first reported from Puerto Rico by Mr. D. L. Van Dine (1912-17) as *Hypostena* sp., and (1913-29 and 1913-254) as *Tachinophyto* sp. *Eruzenilliopsis diatraeae* Townsend is the name given by Mr. Harold E. Box in his "Report

F. Martorell found that parasitism at Yabucoa was approximately 65 percent, but during the dry spring of 1948, only 18 percent, while on the dry south coast it reached a maximum of 12 percent in May 1930 at Hda. Potala.

Paratheresia claripalpis (Van der Wulp), the endemic parasite of the larvae of the sugar-cane moth-borer (*Diatraea saccharalis*) in South America, has been repeatedly introduced into Puerto Rico, in the hope that it might at least supplement *Lixophaga diatraeae* in the less humid environments. The work of Mr. S. M. Dohanian in "The Introduction of Parasites of the Sugarcane Borer into Puerto Rico" (Jour. Agr. Univ. P. R., 21 (2): 237–241. Río Piedras, July 1937) rearing the fly in Trinidad and later in Peru, was only the beginning of a series of shipments, as recorded in the Reports of the Mayagüez Station (1938-96, 1939-96, 1940-102, 1942-67), to establish this parasite in Puerto Rico. The latest development



The endemic Tachinid (Larvaevorid) fly, *Lixophaga diatraeae* TT, parasitic on the larvae of *Diatraea saccharalis* (F.), five times natural size. (Drawn by Harry Bradford. After Holloway, Haley & Loftin, Bureau of Entomology, U. S. D. A.)

upon a Trip to Porto Rico, April-July, 1924" (for private circulation) S. Davson & Company, Ltd., pp. 22. Berbice, British Guiana, November 1924). In his account of collections of pupae of the fly and parasitized *Diatraea* larvae from borer dead-hearts between Trujillo Alto and Río Piedras, and between Bayamón and San Patricio, he found a maximum parasitism of 23 percent near Bayamón during May, and not more than 5 percent on Vieques Island. His "Observations upon *Lixophaga diatraeae*, Townsend, a Tachinid Parasite of *Diatraea saccharalis*, in Porto Rico" (Bull. Ent. Research, 19 (1): 1–6, fig. 1, ref. 11. London, August 1928) give the known distribution, outside of Puerto Rico and Vieques, as Cuba and Santo Domingo. It is his opinion that "the efficiency of *Lixophaga* can not be artificially increased (in Puerto Rico) in any way, as it seems that this parasite has reached its maximum effectiveness." When introduced into the cane fields of Florida, however, it may be a very effective parasite, but unfortunately does not survive severe winters, thus fresh introductions must be made each spring. In the spring of 1946, Dr. Luis

was in the introduction of xerophytic races from Itaquaquecetuba, in the State of Sao Paulo, Brasil, such as *P. diatraeae* (Bréthes). This is at most an ecological sub-species, as is shown by Dr. F. I. van Emden (Rev. de Entomologia 20 (1–3): 499–508. Río de Janeiro, August 1949), discussing "The Scientific Name of the Common Tachinid Parasite of *Diatraea* spp. in Central and South America." From the second generation reared in Puerto Rico, releases were made in all parts of the Island of 981 flies, according to Dr. Kenneth A. Bartlett in the "Report of the Puerto Rico Experiment Station 1941" (1942-24).

Metagonistylum minense was described from specimens from Minas Geraes, Brasil and the Bolivian Chaco by Dr. C. H. T. Townsend, with no idea that this extremely curious fly, with immense antennae, might have any economic importance and deserve a name more easily pronounced by ordinary people. Dr. J. G. Myers writes of "The Discovery and Introduction of the Amazon Fly: A New Parasite for Cane-Borers (*Diatraea* spp.)" (Tropical Agriculture, 11 (8): 191-5. Port-of-Spain, 1934) with characteristic charm, relating a success story that meant practical control of the moth-borer in the cane fields of British Guiana. Its success in the swampy cane fields of Demerara, however, by no means ensured its adaptation to quite different environments in other countries, and the first attempt at introduction by Mr. S. M. Dohanian from Trinidad (1937-237) resulted in no recoveries in Puerto Rico. "The Second Introduction of the Amazon Fly from British Guiana into Puerto Rico" (Agr. Notes No. 86, pp. 4. Mayagüez, Nov. 14, 1938) by Dr. Kenneth A. Bartlett was more successful, and in March 1939 a xerophytic strain from Sao Paulo was introduced, reared in Puerto Rico, and up to July 30, 1940, a total of 41,177 flies was liberated at 19 different points in the cane fields of Puerto Rico. Dr. Bartlett, discussing "The Biology of *Metagonistylum minense* Tns., a Parasite of the Sugar-cane Borer" (Bulletin No. 40, P. R. Expt. Station, Mayagüez, pp. 20, fig. 10, ref. 19. Washington, D. C., December 1941), reports that "at the present time the Amazona strain of the fly is considered to be well established in the Añasco Valley region, the Mayagüez, the San Germán Valley region, and on the south coast about Santa Isabel. The highest parasitization found has been 46 percent at Mayagüez, 3 years after the original liberation was made. However, in many collections, the parasitization was 1 percent or less and in many cases it was negative." The latest status examination in the 1941 Report of the Mayaguez Station (1942-67) shows recoveries in cane fields at Cabo Rojo, Santa Isabel, Guayama and Fajardo, but with low parasitizm.

Euphasiopteryx australis Townsend, "A Tachinid Parasite of the Puerto Rican Changa" (Jour. Ec. Ent., 33 (1): 202. Menasha, June 1940), has

twice been introduced into Puerto Rico, but in such small numbers that it could not become established. The pupal stage lasts exactly ten days, giving ample time for airplane shipment, but during dry weather in the Amazon region parasitizm of changa adults is only one or two percent, and even during the rainy season was found not to be more than five percent, at least in nature. In the laboratory of Belém do Pará a maximum of 25 percent of changas was parasitized, but too late in the spring rainy season of 1945 for mass rearing. The puparium is characterized by two prominent knobs terminated by three black warts; the adult is a plump, light yellowish fly with reddish eyes, of nocturnal habits, hiding in the darkest part of the cage during the day but surprisingly active at night.

Epigrimyia townsendi was described by Dr. C. H. Curran (1931-22) from a single female from Isabela Substation as being "related to *robertsoni* Townsend, but with black legs, more broadly shining segmental apices and the third vein bristled as far as the anterior cross-vein; length 5.5 mm." This genus differs from *Stomatodexia* Brauer and Bergenstamm in that "the arista is not short plumose."

Stomatodexia diadema (Wiedemann), another parasite of the larvae of the sugar-cane moth-borer (*Diatraea saccharalis*) in Trinidad and British Guiana, but in environments quite different from those most suitable for the Amazon Fly, was also introduced by Mr. S. M. Dohanian (1937-239) from Demarara into Puerto Rico, but has not since been recovered.

Stomatodexia cothurnata (Wiedemann), listed by Mr. R. H. Van Zwaluwenburg as *Leskia analis* Say (P. R. 5055), reared from *Margaronia hyalinata* L., the cucumber caterpillar, was subsequently identified from Puerto Rico by Dr. C. H. Curran (1928-114): specimens from Mayagüez, Adjuntas and Aibonito.

Leskiopalpus flavipennis (Wiedemann), originally described as a *Dexia* from Brasil, was reared by Dr. Luis F. Martorell from a larva of *Lamprosema* (or *Blepharomastix*) *ebulialis* Guenée feeding on *Heterotrichum cymosum* on El Yunque, the determination of the fly being by Mr. David G. Hall. Flies intercepted at Mayagüez and resting on croton at Bayamón were identified by Dr. J. M. Aldrich as being a species of *Leskiopalpus*, those from a grapefruit grove at Añasco as a species of *Phaenopsis*, those found resting on sour orange at Mayagüez as a species of *Cyrtoneurina*.

Beskia aelops (Walker), described originally from Georgia as a *Tachina*, and since reported from other southern states, Mexico, Brasil, and St. Vincent and Santo Domingo in the West Indies, was first identified by Dr. J. M. Aldrich from material intercepted near San Juan, and Dr. C. H. Curran identified specimens from Río Piedras in the AMC collection as being this species.

Belvosia bifasciata (Fabricius), originally described as a *Musca* from

the West Indies, and known from Brasil and Mexico and the southern and eastern United States as far north as Philadelphia, where it has been reared from large Bombycid caterpillars, was collected in Puerto Rico by Drs. Stahl and Gundlach, as identified by Herr Victor von Roeder. In a devastating outbreak of the sweet potato sphinx caterpillar, *Herse cingulata* (Fabricius), between Arecibo and Aguadilla in December 1918, Messrs. E. G. Smyth and Edgar Nelson found many parasitized by this large black Tachinid fly, three larvae occurring in each large caterpillar. In 1930 specimens were collected at Mayagüez and Yabucoa which Dr. C. H. Curran identified as this species. Its third abdominal segment basally and all of the fourth are densely dull yellowish pollinose.

Belvosia insularis was described by Dr. C. H. Curran (1927-4) from a single female from Orocovis as being "black, the head yellowish, parafrontals darker; frontal vitta rusty reddish; occiput black; length 11.0 mm."

Belvosia luteola was described by Mr. D. W. Coquillett (1900-253) from a type collected by Mr. Aug. Busck on Vieques Island.

Belvosia piurana Townsend, as determined by Dr. C. H. Townsend, collected on flowers at Río Piedras by Mr. Thos. H. Jones, is practically indistinguishable from *B. bifasciata*.

Cylindromyia atra was described as an *Ocyptera* by Herr Victor von Roeder (1885–344) from material collected by Dr. Gundlach in Puerto Rico.

Cylindromyia minor, described by Herr Victor von Roeder (1885-344) as an *Ocyptera* from specimens collected by Dr. Gundlach in Puerto Rico, was identified by Dr. C. H. Curran (1928-114) from Coamo, and others from Boquerón in the AMC collection.

Nemorilla floralis (Fallen), identified by Dr. J. M. Aldrich from flies intercepted at Mayagüez by Mr. A. G. Harley, was reared by Mr. H. K. Plank (1945-27) from caterpillars of the bean leaf-webber, *Hydelepta* (or *Lamprosema*) *indicata* (F.), at Mayagüez.

Nemorilla maculosa Macquart, of which Dr. J. M. Aldrich considers *Exorista pyste* Walker a synonym, was reared from the pupa of the cucumber caterpillar *Margaronia* (or *Diaphania*) *hyalinata* (L.) at Río Piedras by Mr. E. G. Smyth, and from "butterfly nests" of *Tetralopha scabridella* Ragonot on *Inga vera* at Cayey. The general appearance of this little fly is mostly silvery due to extensive whitish pollination.

Euphorocera claripennis (Macquart), as identified by Mr. W. R. Walton, a common parasite of the caterpillars of butterflies in the United States, was reared by Mr. Thos. H. Jones from larvae of the cane looper, *Mocis* (or *Remigia*) *repanda* (F.), at Santa Isabel. As an *Ebenia* it has since been identified from interceptions at Mayagüez. Identified by Mr. C. W. Sabrosky as *Euphorocera tachinomoides* TT, it was reared from the larvae of *Melipotis famelica* (Guenée.) at Yauco in November 1923 by Mr. Francisco Seín.

Phorocera parviteres Aldrich, as identified by Dr. J. M. Aldrich, was reared in large numbers from caterpillars of the cabbage butterfly, *Ascia* (or *Pieris*) *monuste* (L.) at Yauco, and from Geometrid caterpillars, *Melanchroia cephise* Cramer, by Mr. Francisco Seín at Rio Piedras.

Phorocera divisa Aldrich & Webber, originally described from Puerto Rico (Proc. U. S. National Museum, 63 (17): 55. Washington, D. C., 1924), is recognized by Dr. C. H. Curran (1928-109) in a male from St. Croix.

Carcelia amplexa (Coquillett), determined by Dr. J. M. Aldrich as an *Exorista* reared from the larvae of *Ecpantheria icasia* (Cramer) at Río Piedras by Mr. E. G. Smyth, is mentioned by Mr. W. F. Sellers in "The Nearctic Species of Parasitic Flies belonging to *Zenilla* and allied Genera" (Proc. U. S. National Museum, 93 (3157): 1-108. Washington, D. C., 1943) on page 63.

Carcelia flavirostris (Van der Wulp), described originally as an *Exorista* from Mexico, and also found in the Southern United States, is identified by Mr. W. F. Sellers (1943-60) as the Tachinid fly reared by Mr. R. H. Van Zwaluwenburg from the "plumilla" caterpillar of *Megalopyge krugii* (Dewitz), and by Dr. C. W. Hooker from a larva, presumably of *Mesocondyla concordalis* (Hübner), feeding on the leaves of a calabash tree (*Crescentia cujete*) at Mayagüez. More recently, as identified by Mr. C. W. Sabrosky, it was reared from a mummied woolly-bear caterpillar of *Ecpantheria icasia* (Cramer) at Cidra, some of the puparia being parasitized by the Chalcid wasp, *Brachymeria incerta* (Cresson).

Exorista tessellata was described by Herr Victor von Roeder (1885-345) from material collected in Puerto Rico by Dr. Gundlach.

Achaetoneura aletiae (Riley), originally described as a *Tachina* reared from the cotton leafworm, and found thruout the United States and southern Canada, was identified by Dr. J. M. Aldrich from Puerto Rico: reared by Mr. Francisco Seín from a chrysalis which he found at Lares on *Inga laurina*. From the caterpillars of *Alabama argillacea* Hübner in Puerto Rico, no Tachinid fly has been reared to date.

Achaetoneura archippivora (Williston) has been reared from many kinds of butterfly larvae in the United States. In Puerto Rico, as identified by Mr. W. R. Walton, it has been reared from the caterpillars of the southern grassworm, *Laphygma frugiperda* (Abbot & Smith), was first reported by Mr. D. L. Van Dine (1913-31 and 1913-257), and subsequently by Mr. Thos. H. Jones (1913-235), from many rearings at Río Piedras, and others at Mameyes, Arecibo and Sabana Grande. In November 1937 it was reared from tobacco cutworms, *Feltia subterranea* (F.) attacking cotton seedlings at Boquerón, as identified by Mr. C. W. Sabrosky.

Achaetoneura bigeminata, described by Dr. C. H. Curran (1927-9) as a *Frontina* from three males from Adjuntas, is "elongate, fairly slender;

black, including the palpi; thorax cinereous pollinose, with four broad black vittae; length, 9.0 mm." and has recently been intercepted at Vega Alta.

Achaetoneura insularis Brauer & Bergenstamm, originally described as a *Frontina* from St. Thomas, was listed by Dr. C. H. Curran (1928-110) from Orocovis, and identified from Mayagüez and many localities in all parts of Puerto Rico: specimens in the AMC collection.

Achaetoneura rufifrons, described as a *Frontina* from Puerto Rico by Herr Victor Roeder (1885-346) was collected by Dr. Gundlach and listed by him.

Argyrophylax albincisa (Wiedemann), originally described as a *Tachina* from St. Thomas, was first reported from Puerto Rico as a *Sturmia* by Dr. Richard T. Cotton (1917-113), having been reared by him from the "pegapega" of tobacco: *Psara periusalis* (Walker). It attacks other kinds of Pyralid caterpillars, having been reared from *Zinckenia perspectalis* (Fabricius) on amaranthus by Mr. E. G. Smyth; from *Hydelepta indicata* (Fabricius) on cowpeas by Mr. Thos. H. Jones; from *Mesocondyla concordalis* (Hübner) on "roble" (*Tabebaia pallida*), first by Mr. Jones, and later by Dr. Luis F. Martorell (1940–19), all of these determinations of the fly being by Dr. J. M. Aldrich. It is really a very common insect, having been repeatedly intercepted from all parts of the Island, altho Dr. C. H. Curran (1928-110) lists only a single female from Mayagüez.

Sturmia cubaecola (Jaennicke), as identified by Dr. Maurice T. James, is listed by Mr. H. K. Plank in the 1944 Report of the Mayagüez Station (1945-27) as a parasite on the bean leaf-webber, *Hydelepta indicata* (Fabricius), attacking soybeans. This material has been re-determined by Mr. C. W. Sabrosky as *Argyrophylax albincisa*.

Zygosturmia sp. was the identification by Dr. J. M. Aldrich of the Tachinid flies reared by Mr. Thos. H. Jones from a sphinx caterpillar on *Cordia*, many maggots emerging from a single caterpillar's body.

Anacamptomyia americana, as described by Dr. C. H. Curran (1937-8), "is black, the palpi, scutellum mostly and the halteres reddish; thorax yellowish gray pollinose, with five black vittae, the median and lateral ones broad, the others slender; length 7.0 mm.," the type a single female from Mayagüez, of which an illustration of the profile of the head is given.

Ormia punctata Desvoidy was first identified by Herr Victor von Roeder from Puerto Rico, and thus listed by Dr. Gunlach as a Muscid fly. Dr. J. M. Aldrich identified specimens from Pt. Cangrejos, and another from Aibonitó collected by Dr. Richard T. Cotton. Dr. C. H. Curran (1931-23) gives the name *dominicana* Townsend to a single female collected by Prof. W. T. M. Forbes at Coamo, but admits that "it is possible that the specimen before me is not *dominicana*." These flies are "all rusty yellow-

ish in color (quite similar in general appearance to the changa parasite of Brasil, *Euphasiopteryx australis* TT.), rarely with darker markings; readily recognized by the greatly swollen medianly sulcate prosternum."

Linnaemyia fulvicauda was described by Mr. W. R. Walton (1914-93) from material reared by Mr. Thos. H. Jones from larvae of the sugar-cane looper caterpillar, *Mocis* (or *Remigia*) *repanda* (Fabricius), of which additional specimens were obtained in the same year (1912) at Cayey, and by Mr. S. S. Crossman at Aibonito. Dr. C. H. Curran (1928-108) also recognised this fly: a single male from Aibonito.

Leschenaultia juriniodes (Townsend) originally described from Jamaica, was identified by Dr. J. M. Aldrich from unlabeled specimens presumably collected in Puerto Rico. These flies have extremely hairy black abdomens, but the thorax is grey with whitish pollinose.

Leschenaultia leucophrys (Wiedemann), originally described as a *Tachina* from Brasil, and reported from the greater Antilles, Central America, Mexico and the eastern United States as far north as Franconia, New Hampshire, is first listed from Puerto Rico by Dr. Gundlach. Dr. J. M. Aldrich identifies as this species unlabeled specimens which may be what Mr. E. G. Smyth reared from a dead mouse at Río Piedras, and from which heavy **Parachaeta bicolar** Macquart was also reared.

Winthemia okefenokeensis Smith is listed by Dr. C. H. Curran (1928-108) from Cuba and Jamaica, and from Manatí and Caguas, Puerto Rico.

Winthemia quadripustulata (Fabricius), originally described from Europe as a *Tachina*, and known thruout the United States east of the Rocky Mountains, was identified by Dr. J. M. Aldrich from material reared by Mr. Thos. H. Jones from the pupa of a Noctuid, possibly *Cirphis latiuscula* (H. S.), on sugar-cane at Ponce.

Winthemia sexualis was described by Dr. C. H. Curran (1927-7) from males from Arecibo and Adjuntas as being "rather similar to *okefinokensis* Smith but the abdominal pollen is much thinner and leaves wide, shining segmental fasciae, and the front tarsi are simple; it bears a large ventral sexual patch on the third tergite composed of dense brownish black hair; length 7 to 8 mm."

Voria ruralis (Fallen), as identified by Dr. Maurice T. James, is listed by Mr. H. K. Plank in the 1944 Report of the Mayaguez Station (1945-27) as a parasite of the velvetbean caterpillar, *Anticarsia gemmatilis* (Hübner), on soybeans. From the same host at Río Piedras, Mr. Thos. H. Jones reared flies which Dr. J. M. Aldrich identified as a species of **Gonia**.

Gonia crassicornis (Fabricius), originally described as a *Musca* from the West Indies, was identified by Dr. J. M. Aldrich for Mr. D. L. Van Dine (1913-31 and 1913-257) as a parasite on the southern grassworm, *Laphygma frugiperda* (Abbot & Smith), and was listed by Mr. Thos. H.

Jones (1913-235 and 1922-47). It has also been reared from a cocoon of *Xylomiges eridania* (Cramer) intercepted on potato at Cidra, and occurs in all parts of the Island, adults having been intercepted at Mayagüez and Guánica, and, as identified by Mr. C. W. Sabrosky, taken from flowers of *Borreria verticillata* at Vega Baja. As *Gonia angusta* Macquart, this fly is listed by Van Zwaluwenburg as P. R. 103: from *Lachnosterna* spp., presumably reared from dead May beetles, and not a parasite. *Gonia texensis* Reinhard, as identified by Dr. C. H. Curran (1928-107) from Jamaica, and from Manatí and Coamo in Puerto Rico, is considered a synonym by Mr. C. W. Sabrosky.

Gonia pallens Wiedemann, originally described from Brasil, was reported from Puerto Rico by Herr Victor von Roeder, but listed by Dr. Gundlach as *Gonia chilensis* Macquart. This fly occurs as far south as Patagonia, and is reported in all of the Greater Antilles and in Mexico. Mr. E. G. Smyth reared this "large grey and red-brown Tachinid" from the pupa of *Xylomiges sunia* (Guenée), at Río Piedras, the fly having been determined by Dr. J. M. Aldrich.

Peleteria robusta (Wiedemann), originally described as a *Tachina* from South America, and occurring as far north as Canada, was first collected in Puerto Rico by Dr. Gundlach and reported by him and Herr Victor von Roeder as a *Echinomyia*.

Archytas analis (Fabricius), originally described as a *Tachina* from South America, and definitely reported from St. Vincent, Santo Domingo and Jamaica, as well as widely distributed in the United States and Canada, was identified from Puerto Rico by Dr. J. M. Aldrich for Mr. Thos. H. Jones, who reared it from a cutworm on tobacco, presumably *Prodenia ornithogalli* (Guenée), at Aibonito.

Archytas antillicola was described by Dr. C. H. Curran (1927-2) from an extensive series of flies from all parts of Puerto Rico, as well as others from Jamaica and British Guiana. It is "black, antennae partly and the palpi apically, reddish; face and cheeks yellow, length 11.5 to 13.0 mm.," and of it Dr. Curran identifies numerous specimens in AMC collection: from Yabucoa, Río Piedras, Coamo, Hormigueros and Mayagüez. It has also been intercepted on El Yunque.

Archytas basifulva (Walker), originally described as an *Echinomyia* from Jamaica, was first collected in Puerto Rico by Mr. Aug. Busck, as reported by Mr. D. W. Coquillett (1900-253), and is in Van Zwaluwenburg's list as P. R. 97. Dr. C. H. Curran (1928-106) identified this fly from Coamo, and in the AMC collection, specimens from Mayagüez, Hormigueros, Tortuguero Lagoon and Yabucoa. Mr. David G. Hall identified as this species the flies which Dr. Luis F. Martorell reared from the southern armyworm, *Laphygma frugiperda* (Abbot & Smith), feeding on alfalfa at Tallaboa in November 1940.

Archytas piliventris (Van der Wulp), originally described as an *Echinomyia* from the Argentine and Mexico, was first identified from Puerto Rico by Mr. W. R. Walton as a parasite of the southern grassworm, *Laphygma frugiperda* (Abbot & Smith), feeding on malojillo and sugarcane at Río Piedras, as reported by Mr. D. L. Van Dine (1913-31, 1913-257) and Mr. Thos. H. Jones (1913-235, 1922-47). Dr. C. H. Curran (1928-107) identified this fly from St. Thomas, and from Coamo and Mayagüez in Puerto Rico, as well as specimens in the AMC collection from many other localities in all parts of the Island. As identified by Mr. C. W. Sabrosky, it was noted by Dr. Luis F. Martorell feeding at flowers of *Borreria verticillata* at Guajataca Reservoir.

Archytas seminigra (Wiedemann), originally described as a *Tachina* from Brasil, was reported as *Jurinia analis* Macquart from Puerto Rico by Herr Victor von Roeder, and thus listed by Dr. Gundlach.

Archytas incerta (Macquart), as identified by Dr. J. M. Aldrich, has been reared from caterpillars intercepted on beets at Vega Baja and on peas at Cidra.

Antillicolla auriceps was described by Dr. C. H. Curran (1927-1) from a single female from Adjuntas as being "black, the face, palpi, antennae and apex of the abdomen, reddish; head golden pollinose; wing veins bordered with brown; length, 7.0 mm.," accompanying the description with an illustration of the profile of the head.

Dinera sp. nov. was the determination by Dr. J. M. Aldrich of a fly intercepted in an orange grove at Mayagüez by Mr. A. G. Harley.

Opsodexia cruciata Reinhard, as identified by Dr. J. M. Aldrich, was intercepted in a mango grove at Mayagüez by Mr. A. G. Harley.

Rhynchodexia sororia Williston, originally described from St. Vincent, is recognized by Dr. C. H. Curran (1928-113) from Puerto Rico in an abundance of specimens from San Juan and Santurce to Maricao. He (1931-23) suggests "that this name should be replaced by *rufianalis* van der Wulp."

Rhynchodexia rufianalis van der Wulp was first collected in Puerto Rico by Mr. Aug. Busck, as reported by Mr. D. W. Coquillett (1900-254). Adults identified by Dr. J. M. Aldrich have since been collected in Isabela Grove, Pt. Salinas, and by Dr. Richard T. Cotton swept from flowers at Pt. Cangrejos.

Dexia strenua (Desvoidy), originally described from Santo Domingo as a *Zelia*, was identified from Puerto Rico by Herr Victor von Roeder, and listed by Dr. Gundlach.

Sarcophagidae: Flesh Flies

Sarcophaga lambens Wiedemann was originally described from the West Indies, and first collected in Puerto Rico by Dr. Gundlach, who listed it

under this name as identified by Herr Victor von Roeder. It was collected by Mr. Aug. Busck, as reported by Mr. D. W. Coquillett (1900-254), but most later records are under the name *Sarcophaga sternodontis* Townsend, given by Dr. J. M. Aldrich in his book "Sarcophaga and Allies in North America" (Thomas Say Foundation, pp. 342, pl. 16. Lafayette, Indiana, 1916) on page 267. *Sarcodexia sternodontis* was described by Dr. C. H. T. Townsend from Jamaica, reared from a dead Cerambycid beetle, and from a dead scorpion. As a *Sarcophaga* in Puerto Rico it was reported reared from the pupae of the cotton leaf caterpillar, *Alabama argillacea* (Hübner), at Hatillo (Wolcott 1924-56), and from white grubs and the pupae of the sugar-cane looper caterpillar, *Mocis* (or *Remigia*) *repanda* (Fabricius), by Jones & Wolcott (1922-49). The long list of localities noted by Dr. C. H. Curran (1928-99) gives some indication of the abundance of this particular Scarcophagid fly, as in the collection at Río Piedras reared adults are more numerous than all other members of the family. In addition to the hosts mentioned it has been reared from dead May beetles, from dead spiders, from dead tobacco hornworms and other sphinx caterpillars and moths, from southern grassworm pupae; from dead changa, from dead grasshoppers and from dead cockroach. Altho it is possible that the pupae of the cotton leafworm and of the southern grassworm were still alive when attacked by this fly, it is much more probable that they were already dead, for the normal habit of the ovipositing female is to lay her eggs only on dead invertebrates. Many of the rearing records are accidental, so far as the entomologist is concerned, for if his large insects are not placed in a screened cage for drying, the female fly will discover his carelessness, and a few days later maggots will drop from the body of the insect, having devoured all the soft parts within its horny skeleton, and left the specimen in really much better shape for the collection than if it contained all its internal organs. Growth and development of the maggots are necessarily very rapid, for their food supply is limited in amount and decaying rapidly. The adult flies have four silvery white pollinose stripes on the thorax, and interrupted and less dense pollinose bands on the abdomen, and in size may be somewhat smaller or considerably larger than houseflies, depending upon the nourishment available to the maggots. In San Juan maggots have been intercepted feeding on yeast, and reared to adult on this medium alone. Dr. Maurice T. James, discussing this representative of "The Flies that cause Myiasis in Man" (U. S. D. A. Misc. Publication No. 631, pp. 175, fig. 98, ref. 160. Washington, D. C., 1947), on page 52 states that "the larvae breed in various substances, including carrion and excrement; they have been found to be parasitic on a large number of insects." On the basis of our experience in Puerto Rico the latter statement can hardly be considered correct and

should read that they are scavengers on dead insects. As indicated by Dr. James, the distribution of this fly includes the southeastern United States, the neotropical region with specific records for many of the Lesser Antilles extending to Paraguay and Agrentina in South America.

Sarcophaga amoena Aldrich, originally described from Dominica, B. W. I., has been reared from an injured snail from Lares, and adults collected from malojillo or resting on corn leaves at Río Piedras, as identified by Dr. J. M. Aldrich. The male is 9 mm. long; the female 6.5 mm.

Sarcophaga alcedo Aldrich, as determined by Mr. David C. Hall, was found by Dr. Kenneth A. Bartlett occurring in the shipping cages in which adults of *Canthon pilularius* (L.) were sent from Texas. Reporting on "The Dung Rolling Beetle as a Host of a Sarcophagid Parasite" (Jour. Ec. Ent., **32** (1): 150. Menasha, February 1939), he found that "the adult flies deposit living larvae," which "are able to penetrate the integument of the (living) beetle at any point, but the majority enter through the thinner chitinized portions of the abdomen," attaining full size in from three to seven days. *Copris incertus* Say was also successfully parasitized.

Sarcophaga australis Aldrich, as identified by its describer, has been intercepted in Isabela Grove, Palo Seco.

Sarcophaga bakeri Aldrich, originally described from Cuba, was first identified from Puerto Rico by its describer from material collected by Mr. R. H. Van Zwaluwenburg at Mayagüez, as listed in "Insectae Portoricensis" (1923-224), and subsequently has been intercepted at Loíza, San Juan and Barceloneta. Dr. C. H. Curran (1928-99) identifies many specimens from Puerto Rico, from El Yunque to Ensenada, as well as from Mona Island and St. Thomas.

Sarcophaga capitata was described by Dr. J. M. Aldrich (1916-209), the types from Mayagüez and Arecibo, as "like *amoena*, but has head-pollen and beard quite deep yellow, length of male 15 mm.; of female 11 mm.," and quite the largest of any Puerto Rican Sarcophagid. Dr. C. H. Curran (1928-98) identifies this fly from additional localities and in the AMC collection as far east as San Juan and Río Piedras.

Sarcophaga culminata was described by Dr. J. M. Aldrich (1916-289), the type from Mayagüez: a single male. It is by no means rare in Puerto Rico, however, for it has since been intercepted on El Yunque, and Dr. C. H. Curran (1928-99) identifies specimens from there, Naguabo, San Juan, Adjuntas and Jayuya.

Sarcophaga currani Hall, as determined by Mr. D. G. Hall, was found in Viejo Lirio cave, on Mona Island by Dr. Luis F. Martorell. It was originally described from Cuba.

Sarcophaga globulus Aldrich, originally described from Cuba, is listed

from Mona Island and Puerto Rico by Dr. C. H. Curran (1928-100) as in the sub-genus *Helicobia*, with specimens from Naguabo, Manatí, Aibonito, Adjuntas and Orocovis.

Sarcophaga latisetosa (Parker) was identified from Puerto Rico by Dr. C. H. Curran (1928-100) at many localities from San Juan to Ensenada, and in the mountains at Aibonito.

Sarcophaga morionella Aldrich, as determined by its describer, has been intercepted at Bayamón, and repeatedly in orange or mango groves at Mayagüez, and in a coffee grove at Maricao.

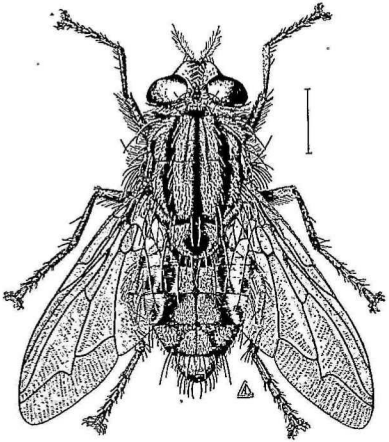
Sarcophaga peltata was described by Dr. J. M. Aldrich (1916-216), the type from Mayagüez, (R. H. Van Zwaluwenburg) and Naguabo, others from Cuba, Florida and the Bahamas. It is very common in Puerto Rico, Dr. C. H. Curran (1928-98) identifying it from many other localities and in the AMC collection from Las Marías and Maricao to Ponce, Yauco and Cabo Rojo. It has repeatedly been collected or intercepted in grapefruit groves, intercepted in decaying cucumbers at Bayamón, and found in trees of "jobo" (*Spondias mombin*) at Río Piedras when the fruit is so ripe as to be falling from the tree.

Sarcophaga plinthopyga Wiedemann was originally described from St. Thomas, but it has a very extensive distribution from Nova Scotia in Canada, thruout the western United States and in the neotropics as far south as Sao Paulo and west as the Galapagos. It was identified from Puerto Rico by Herr Victor von Roeder, and listed by him and Dr. Gundlach, and collected by Mr. August Busck as indicated by Mr. D. W. Coquillett, but apparently is not very common, for Dr. J. M. Aldrich (1916-268) as *Sarcophaga robusta* Aldrich, notes but a single specimen from Mayagüez, and Dr. C. H. Curran (1931-22) a single male from Vieques. The AMC collection contains numerous specimens from Mayaguez and a few from Añasco, Utuado, Río Piedras and Yabucoa. Dr. Luis F. Martorell collected it on flowers of "botoncillo" (*Borreria verticellata*) at Isabela, as identified by Mr. David G. Hall. Dr. Maurice T. James (1947-51) reproduces an illustration of this fly, noting that its "larvae differ in their feeding habits and are commonly found on carcases or as parasities in the bodies of insects. However, they frequently attack old and festered sores in man and animals, or invade diseased body opening." In Puerto Rico these flies do not show the "notorious myiasis-producing" habits reported from Trinidad and British Guiana.

Sarcophaga (Helicobia) quadrisetosa Coquillett is listed by Dr. Ralph R. Parker in his "Sarcophagidae of New England" (Proc. Boston Soc. Natural History, 35 (1)- 1-77, pl. 8. Boston, 1914) on page 60 as occurring in Puerto Rico.

Sarcophaga (Helicobia) surrubea Van der Wulp, described originally from Mexico, is identified by Dr. C. H. Curran (1928-101) from the Virgin Islands of St. Croix, St. John and St. Thomas, as well as from numerous localities in Puerto Rico from El Yunque to Ensenada.

Sarcophaga (Helicobia) rapax Walker, as identified by Dr. M. T. James, was reared from a dead rhinoceros beetle, *Strataegus barbigerus* Chapin, from Mona Island. As *Sarcophaga helicis* Townsend, "one of the commonest North American species" according to Dr. Aldrich (1916-159), it was collected in Puerto Rico by Mr. August Busck, as reported by Mr. D. W.



Adult male of *Sarcophaga plinthopyga* Wiedemann, ten to fifteen times natural size. (Drawn by Arthur D. Cushman. After James, U. S. D. A.)

Coquillett (1900-255), and is reported from numerous Puerto Rican localities by Dr. C. H. Curran (1928-101), as well as from Mona Island. Mr. Thos. H. Jones (and Wolcott 1922-49) reared this fly from a caterpillar of the sugar-cane looper, *Mocis* (or *Remigia*) *repanda* (Fabricius), feeding on grass at La Plata in February 1912, and apparently it is a true parasite.

Sarcophaga taurus Aldrich, originally described from Naguabo, has since been intercepted at San Juan. The male is 14.0 mm. long, or almost as large as *Sarcophaga capitata*.

Sarcophagula occidua (Fabricius), originally described as a *Musca* from the West Indies, was first collected in Puerto Rico by Mr. August Busck, as reported by Mr. D. W. Coquillett (1900-254), and is listed by Dr. C. H. Curran (1928-101) from the Virgin Islands of St. Croix, St. John and St. Thomas, from numerous Puerto Rican localities from Naguabo and Fajardo to Adjuntas and Mayagüez, and from Mona Island. It has been repeatedly intercepted in all parts of the Island, resting on non-significant hosts varying from the hedge of "café de la India" (*Chalcas exotica*) around the Post Office Building in San Juan to rotten cucumbers at Bayamón. Mr. Thos. H. Jones collected fourteen of these little grey flies on cattle dung at Río Piedras, which were identified by Mr. F. Knab as *Sarcophagula imbecilla* Van der Wulp (P. R. Acc. No. 745-14).

Sarcofahrtia capitata was described by Dr. C. H. Curran (1928-96) from male flies from Mayagüez, distinguishable only by the figured genitalia.

Johnsonia bivittata was described by Dr. C. H. Curran (1928-95) from a single male from Aibonito, "having the fourth abdominal segment black on apical third or more; length 3.75 mm."

Harpagopyga diversipes, originally described as a *Sarcophaga* by Mr. D. W. Coquillett (1900-255) from a single male collected in Puerto Rico by Mr. August Busck, was identified by Dr. C. H. Curran (1928-101) from Mona Island, in addition to a specimen from Coamo. Dr. J. W. Aldrich has identified as a new species of *Harpagopyga* a fly intercepted at Arecibo.

Sarothromyia femoralis (Schiner), described originally as a *Sarcophila* from Brasil, and previously known from the Bahamas and Florida, was identified by Dr. C. H. Curran (1928-101) from Santurce and Arecibo. Dr. Luis F. Martorell collected one of these flies at light on Mona Island, as determined by Mr. David G. Hall.

Sarcophagina candida, described by Dr. C. H. Curran (1928-102) from a single female from Santurce and illustrated by a profile of the head, is "8.5 mm. long; blackish; grayish-white pollinose, the pollen with a strong golden yellow tinge in some views; mesonotum with three darker vittae."

Pachyophthalmus floridensis (Townsend), originally described as a *Sarcomacronychia,* and previously known from the southern United States, is identified by Dr. C. H. Curran (1928-103) from Haiti and Jamaica, and from San Juan, Puerto Rico.

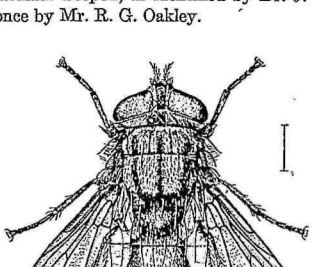
Senotainia rubriventris Macquart, originally described from Texas, but occurring thruout the United States, is identified by Dr. C. H. Curran (1928-103) from Mona Island, and from Ensenada, Mayagüez, Coamo and Caguas in Puerto Rico.

Scenetes cardini are described by Mr. J. R. Malloch as "A New Genus and Species of Muscidae from Puerto Rico" (Proc. Ent. Soc. Washington,

38 (1): 9-10. Washington, D. C., January 1936), the type from Cuba, others reared from guava at Mayagüez by Mr. A. G. Harley and Dr. K. A. Bartlett. Mr. Francisco Seín noted the creamy white maggots with two black dots on the hind end in rotten oranges at Mayagüez in December 1925, and reared adults which were determined by Mr. C. W. Sabrosky.

Graphomya stipata Walker, as identified by Dr. J. M. Aldrich, was intercepted on mango blossoms at Mayagüez.

Graphomya maculata Scopoli, as identified by Dr. J. M. Aldrich, was intercepted at Ponce by Mr. R. G. Oakley.



Adult female of the Primary Screwworm, *Callitroga americana* (Cushing & Patton), eight times natural size. (Drawn by Arthur D. Cushman. After James, U. S. D. A.)

Calliphoridae: Blow Flies

The book entitled "The Blowflies of North America" (pp. 477, pl. 46, Volume 4 of the Thomas Say Foundation. Baltimore, January 1948) by Mr. David G. Hall is a systematic account of the Calliphoridae, giving extensive data on life-history and habits, descriptions, bibliography and up-to-date synonymy, with distribution records for the species found in the West Indies and often referring more particularly to Puerto Rico.

Callitroga americana (Cushing and Patton), the primary screwworm, was not recognized as distinct from *Callitroga macellaria* (Fabricius), the secondary or common screwworm fly, until 1933, and it is quite possible that the early records of the latter by Dr. H. L. Van Volkenberg (1932–25) refer to the former species. What was originally described as *Cochliomyia americana* Cushing and Patton is a bluish or bluish-green fly, with "black hair on the lower as well as on the upper part of the parafrontalia," according to

Dr. M. T. James (1947-63). Under this name, Dr. H. L. Van Volkenberg in his paper on the "Parasites and Parasitic Diseases of Cattle in Puerto Rico" (P. R. Expt. Station Bulletin No. 36, fig. 4. Washington, D. C., October 1934) gives the life-history and control notes, and in his "Annotated Check List of the Parasites of Animals in Puerto Rico" (P. R. Expt. Station Circular No. 22 pp. 12, ref. 49. Washington, D. C., January 1939) states that "the fly, as determined by Mr. Emory C. Cushing is common and widespread, but owing to prompt treatments of wounds, it does not cause much damage to livestock." Dr. H. L. Dozier reared this fly from maggots in wounds in ox at Mayagüez and Guánica in 1935.

Callitroga aldrichi (Del Ponte), as *Cochliomyia laniaria* Aldrich was identified by Dr. C. H. Curran (1928-92) from the Virgin Islands of St. John and St. Thomas, from Naguabo and Jayuya in Puerto Rico, and from Mona Island. It has since been found on Mona Island by Dr. Luis F. Martorell, who collected it, as determined by Mr. David G. Hall, on the flowers of "abejuelo" (*Colubrina ferruginosa*). It was intercepted by Mayagüez by Mr. A. G. Harley.

Callitroga macellaria (Fabricius) the secondary or common screwworm, is a greenbodied fly, according to Dr. M. T. James (1947-65), "with a predominantly orange head; the hair of the lower half of the parafrontals yellow and of fine texture." All except one of the specimens in the Río Piedras collection, as confirmed by Mr. C. W. Sabrosky, appear to be this species. According to the records it was this species, called a *Chrysomyia*, which was listed from Puerto Rico by Dr. Gundlach, Herr Victor von Roeder, Mr. D. W. Coquillett, and Mr. R. H. Van Zwaluwenburg. As a *Cochliomyia* it is recorded by Mr. J. A. Stevenson (1918–150) and by Miss Vera K. Charles (1941–720) as host of the fungus *Cordyceps dipterigena* Berk. & Br., and identified by Dr. C. H. Curran (1928–92) from the Virgin Islands of St. Croix, St. John and St. Thomas, from numerous localities in Puerto Rico, and from Mona Island. Before fish were iced on Mona Island the fishermen claimed that this fly was so abundant and troublesome as to prevent their being dried on the beach. Dr. Richard T. Cotton reports these flies "attracted in huge swarms to a tank of gasoline that was being pumped out" at Río Piedras in November 1917, and individuals have repeatedly been collected resting on corn leaves or in grapefruit groves. According to Dr. James (1947–65), it is "primarily a scavenger and may be very abundant in carrion; the adult feeds on a variety of food, from garbage refuse to the nectar of flowers."

Callitroga minima (Shannon) was described as a *Cochliomyia* from the Dominican Republic, and, as identified by Mr. C. W. Sabrosky, was collected at Aibonito, Puerto Rico by Mr. S. S. Crossman, July 1, 1913.

Phaenicia purpurescens (Walker) has been identified by Mr. C. W. Sabrosky from Puerto Rico.

Phaenicia cluvia (Walker) was found by Mr. Raymond C. Shannon in his "Synopsis of American Calliphoridae" (Proc. Ent. Soc. Washington, 28 (6): 115–139. Washington, D. C., June 1926) to have as a synonym *Lucilia pilatei* Hough, which he had recorded from Fajardo, Puerto Rico in his redescription in "Nearctic Calliphorida, Lucilini" (Insecutor Inscitiae Menstruus, 12 (4–6): 67–81. Washington, D. C., April–June, 1924). It is "a bright green species with post margin of second tergite dark blue, without much trace of silvery pollenosity; size variable."

Phaenicia eximia (Wiedemann) as identified by Mr. David G. Hall, was collected on Mona Island by Dr. Luis F. Martorell. According to Mr. Hall (1948–239), this "blue-green species with the abdomen highly polished" is what Herr Victor von Roeder (1885–347) re-described from material collected by Dr. Gundlach in Puerto Rico under the name of *Lucilia ruficornis* Macquart. It was also listed from Puerto Rico by Mr. D. W. Coquillett, and is known to occur in St. Vincent as well as in the southeastern United States as indicated by Mr. Shannon. *Lucilia hirtiforceps* Shannon, originally described from Panama, Costa Rica and Mexico, identified by Dr. C. H. Curran (1928–93) from Desecheo Island and Mayagüez, Puerto Rico, is aother synonym for *eximia*, according to Mr. Hall. Still another synonym is the *Musca ochricornis* Wiedemann, originally described from Brasil and known also from Cuba. Under this name Herr Victor von Roeder identified material collected by Drs. Stahl and Gundlach in Puerto Rico. As a *Pyrellia* it was noted by Mr. D. W. Coquillett as having been collected in Puerto Rico by Mr. Aug. Busck, and Dr. C. H. Curran (1928–91), altho admtting only having "seen it from adjacent islands," subsequently identified many specimens in the AMC collection from all parts of Puerto Rico. Dr. Richard T. Cotton collected specimens, identified by Dr. Aldrich as *Pyrellia ochricornis* Wd., from near dung at Río Piedras, and in a citrus grove at Vega Alta, but the largest number he saw was "in a tub half full of water and decaying vegetation in which large white maggots were wiggling vigorously. Some of the adults that had emerged had been unable to get out of the water and were drowned."

Phaenicia rica (Shannon) is "a medium-sized greenish-blue species with the habitus of *eximia*" according to Mr. Hall (1948–257). Originally described as a *Lucilia* from Antigua, B. W. I., it was identified by Dr. C. H. Curran (1928–93) from specimens collected at Mayagüez, Arecibo and Naranjito, Puerto Rico. It is probable that the *Somomyia semiviolacae* described by J. Bigot from Puerto Rico in "Dipteres noveaux ou peu connus" (Annales Ent. Soc. France, No. 5, pt. 7, p. 46. Paris, 1877) is a syno-

nym, but the type is in too poor a state of preservation for accurate determination.

The record of *Lucilia caesar* (Linnaeus) given by Mr. Coquillett is presumably in error, for this common European green bottle fly does not occur in North America or the West Indies.

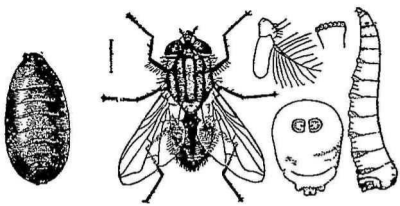
Muscidae: House Flies or "Muscids."

Morellia scapulata (Bigot), originally described as *Pyrellia* from Haiti and Mexico, and thus identified by Dr. J. M. Aldrich, was first noted in abundance in Puerto Rico in August 1921 at Río Piedras, when many of these blue bottle flies were noted on corn leaves and resting on the under side of coffee leaves in the coffee grove at that time opposite Central Vannina. Four species of aerial lizards found them sufficiently abundant and easy to catch as to form a considerable item in their food, and indeed they are reasonably abundant at all times in at least the more humid sections of the Island, as is indicated by numerous interceptions on various non-significant hosts. When trees of "jobo" (*Spondias mombin*) mature fruit, these blue bottle flies are more in evidence than the fruitflies whose maggots develop in the fruits, altho they have been observed only feeding on the exuding juice. Dr. C. H. Curran (1928–91) notes that they are separable from the other species of *Morellia* by having "humeri yellow," and lists collections in the Virgin Islands of St. Croix, St. John and St. Thomas, as well as in numerous localities in Puerto Rico, of which the most xerophytic are Coamo and Mayagüez.

Morellia violacea (Fabricius) is distinctively iridescent or metallic purplish in body color, in addition to having "humeri metallic" noted by Dr. C. H. Curran (1928–91). Altho not especially abundant, this purple bottle fly was collected by Dr. Gundlach, and is listed by him, as identified by Herr Victor von Roeder, as *Pyrellia centralis* Loew. Dr. Alex. Wetmore found it eaten by the wood pewee, and it is possibly most often to be found in the mountains, when numerous interceptions have been made in orange or coffee groves.

Musca domestica Linnaeus, the common house fly, was listed by Drs. Stahl and Gundlach, by von Roeder and Coquillett, and is number 1717 in Van Zwaluwenburg's list. Dr. C. H. Curran (1928–91) lists it from San Juan and Santurce, and identified it in the AMC collection from many other insular localities. It has been determined from Mona Island by Mr. David G. Hall, and noted in airplanes between Puerto Rico and Mona, and between Puerto Rico and Vieques Island. Despite the numerous records it is not nearly as abundant at the present time, when automobiles supply the bulk of the transportation, as when all or most of the transportation requirements of the Island depended on horses or mules. This is especially notice-

able in Río Piedras, where a livery stable opposite the first stop after leaving "entrada del trolley" invariably filled the street-car with flies. Piles of fresh "cachaza" or filter press cake are the only other major breeding-places for the flies, the heat of its decomposition being essential for the mass development of fly maggots however, so that spreading the cachaza in the fields promptly abates the plague. Flies identified by Dr. J. M. Aldrich have developed from maggots in the trunk of a rotten palm tree at Añasco, and from others intercepted in rotten pumpkins at Arroyo. In the artificial rearing of fruitfly parasites the immature stages of the house fly have proved most useful because of abundance and ready availability at all times of year, having been used by Dr. K. A. Bartlett (1939–6) for *Spalangia philippinensis* Fullaway, *Dirhinus giffardi* Silvestri and *Muscidifurax raptor* Girault & Sanders.



The common House Fly, *Musca domestica* Linnaeus: puparium at left, adult center, larva and enlarged parts at right. (After Howard, U. S. D. A.)

Synthesiomyia nudiseta Van der Wulp, of which S. *brasiliana* Brauer and Bergenstamm is a synonym, has been identified by Dr. J. M. Aldrich: flies collected at Río Piedras of which the presence of the silvery pollenosity on their thorax appears to change with the angle at which it is observed.

Stomoxys calcitrans (Linnaeus), originally described as a *Conops* from Sweden, is by now an international pest of livestock, having been present in Puerto Rico at least as far back as when Dr. Gundlach made the first collection here. This stablefly, or biting housefly, was noted on Vieques Island by Mr. Aug. Busck, but has not been recorded from Mona Island, presumably because the only large domestic animals there are cows, pigs and goats, and this fly prefers horses to bite and horse manure in which to lay its eggs. Dr. F. M. Root (1922–405) notes it "feeding on cattle, horses and goats." Dr. H. L. Van Volkenberg (1939–4) concludes that it is "common but not very abundant."

Siphona irritans (Linnaeus), the horn fly, or "mosca del ganado," is a

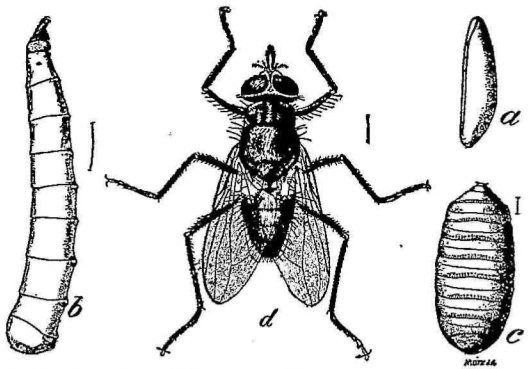
comparatively recent arrival in Puerto Rico, for it was not collected by Dr. Gundlach or Mr. Aug. Busck, and the first local record is in Van Zwaluwenburg's list, where it is called *Lyperosia irritans* L. It is presumed that the horn fly was brought to Puerto Rico in importations of livestock from the southern states sometime after the American occupation: the adults on cattle and mules, and the immature stages in their excrement. If not first established in the southwestern corner of the Island, the horn fly is certainly most abundant there now, and indeed has been ever since it was first noted. Mr. G. B. Merrill was stationed at Hda. Santa Rita, Guánica, and upon observations made on the life-history, bionomics, parasites, predators and comensals in this region is based his "Progress Report on Investigations relative to the Horn-Fly" (*in* Third Report, Board of Commissioners of

The common Stablefly, *Stomoxys calcitrans* (Linnaeus), six times natural size. (After Howard, U. S. D. A.)

Agr. P. R., 1913–14, pp. 53–54. San Juan, 1915), in which the name used is *Haematobia serrata* Desvoidy. Despite the brevity of this report, later writers on the horn fly in Puerto Rico have added surprisingly little to what Mr. Merrill recorded, until Dr. Kenneth A. Bartlett's account of "The Introduction into Puerto Rico of Beneficial Insects to aid in the Control of the Horn Fly of Cattle" (Agr. Notes No. 88, pp. 6, P. R. Expt. Station, Mayagüez, March 31, 1939). Desirable as biologic control may be theoretically, the possibility of using DDT for spraying the cattle in the regions where the horn fly is most abundant for a time made other methods academic. Because of the development of DDT-resistant strains of flies however, methoxychlor, toxaphene or other chlorinated hydrocarbon is now to be preferred. Dr. H. L. Van Volkenberg (1939-4) considers the horn fly "common and widespread but not very abundant except in the dry southern coastal plain," and it has not been noted at all in the mountain,

and but rarely in the more humid sections of Puerto Rico. Dr. M. D. Leonard (1933–130) records it from Vieques Island, but it has not been found on Mona.

Neomuscina tripunctata (Van der Wulp), of which Dr. J. M. Aldrich considers *N. cavicola* Townsend a synonym, was collected in Puerto Rico by Mr. Aug. Busck, as identified by Mr. D. W. Coquillett.



The Horn Fly of Cattle, *Siphona irritans* (Linnaeus): *a*, egg, *b*, larva, *c*, puparium *d*, adult, ten times natural size. (After Howard, U. S. D. A.)

Anthomyiidae: Root Maggots

Atherigona excisa Thomson, of which Dr. J. M. Aldrich gives as synonyms *A. orientalis* Schiner and *A. pulvinata* Grimshaw, was determined by him for Dr. Richard T. Cotton, who first in Puerto Rico reared these slender grey flies with broadly oval wings from decaying eggplant. Subsequently it has been repeatedly intercepted as maggots from decaying oranges at Barceloneta and Mayagüez, from kernels of corn, in decaying string beans at Isabela, in decaying tomatoes at Aguadilla and Isabela, from roots of dasheen and from the fruit of cashew or "pajuíl" (*Anacardium occidentale*) at Bayamón.

Ophyra aenescens (Wiedemann), originally described as an *Anthomyia* from New Orleans and the West Indies, was collected in Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder, and has since been intercepted at Mayagüez by Mr. A. G. Harley.

Limnophora arcuata Stein, listed by Mr. D. W. Coquillett (1900–256) as

occurring in Puerto Rico, having been collected in 1899 by Mr. Aug. Busck, is identified by Dr. C. H. Curran (1928–91) from Naguabo and Mayagüez. It has since been intercepted at Naguabo, San Juan and Arecibo.

Limnophora narona (Walker), originally described as an *Anthomyia* from Florida, was intercepted resting on melon leaves at Caguas, as identified by Dr. J. M. Aldrich. Another species of *Limnophora* is also present in Puerto Rico according to Dr. C. H. Curran (1928–91).

Myospila obsoleta (Brauer and Bergenstamm) has been identified by Dr. C. H. Curran (1928–90) from Cuba, Jamaica and Haiti, besides Arecibo, Adjuntas and Jayuya in the mountains of Puerto Rico.

Coenosia flavipes Williston, originally described from St. Vincent, is identified from St. Thomas by Dr. C. H. Curran (1928–89) who states that "Coquillett has reported this species from Porto Rico." Dr. Curran finds another species of *Coenosia* from Puerto Rico, "having the femora mostly and the tarsi wholly blackish."

Bithoracochaeta despecta Walker, as identified by Dr. J. M. Aldrich, was swept from grass at Corozal.

Bithoracochaeta leucoprocta (Wiedemann), originally described as an *Anthomyia* from the West Indies, was identified by Dr. C. H. Curran (1928–87) from Jamaica, Cuba, and Orocovis in Puerto Rico, with "legs mostly yellow."

Bithoracochaeta varicornis (Coquillett), originally described (1900–256) as a *Coenosia* from Puerto Rico, collected by Mr. Aug. Busck, Dr. C. H. Curran (1928–88) found very common, with specimens from all parts of the Island, with "legs mostly black."

Leucomelina corvina Giglio-Tos, as identified by Dr. J. M. Aldrich, swept from weeds at Río Piedras, intercepted on orange flowers at Adjuntas and on grapefruit leaf at Barceloneta, was previously known from Mexico. Dr. Aldrich identifies a *Leucomelina* intercepted on El Yunque as being a new species.

Lispe rufitibialis Macquart, originally described from South America, was identified by Mr. D. W. Coquillett (1900–256) as having been collected by Mr. Aug. Busck at Fajardo and on Culebra Island.

Philornis obscura Van der Wulp was identified by Mr. C. T. Greene from a fly intercepted at Ponce by Mr. R. G. Oakley.

Philornis pica Macquart was identified by Mr. David G. Hall for Dr. H. L. Van Volkenberg (1939–4) who reports "the warble-like larvae are common in the grackle or mozambique, *Holoquiscalus níger brachypterus*, at Mayagüez."

Fannia femoralis (Stein) was identified by Dr. C. H. Curran (1928–89) from Hispaniola, St. Thomas and Santurce, Mayagüez and Ensenada in Puerto Rico.

Fannia pusio Wiedemann was identified by Dr. J. M. Aldrich from San Juan, Puerto Rico; a fly resting on the hedge of "café de la India" (*Chalcas exotica*) around the postoffice building.

Calythea crenata (Bigot), originally described as a *Trichophthicus* from Mexico, was identified with "some doubt" by Dr. C. H. Curran (1928–89) from St. Thomas, and Cayey, Aibonito and Mayagüez in Puerto Rico. He also indicates flies from San Juan as being of the genus *Tetramerinx*.

Neodexiopsis rex, described by Dr. C. H. Curran (1928–88) from a single male from 1,500 feet up on El Yunque, is 4.5 mm. in length, "head, thorax, apical two abdominal segments and the tarsi blackish, elsewhere reddish-yellow."

Fucellia maritima Haliday is cited by Dr. L. O. Howard as *Fucellia fucorum* Fallen in his "A Contribution to the Study of the Fauna of Human Excrement" (Washington Academy of Sciences, **2**: 541–604, illus. Washington, D. C., December 28, 1900) as occurring on Culebra Island having been collected by Mr. Aug. Busck. In his card catalog which is on file in the U. S. National Museum, Dr. J. M. Aldrich wrote "mistake." "This species," according to Dr. Aldrich (1905–564) "is common on seaweeds and other refuse," but can hardly be present in Puerto Rico as it has not since been found here, and most of the records are from Greenland, Alaska and northern Europe.

Scopeumatidae (Cordyluridae or Scatophagidae): Dung Flies

Scopeuma exotica (Wiedemann) was listed by Mr. D. W. Coquillett (1900–257) as *Scatophaga*, collected by Mr. Aug. Busck on Culebra Island. It is not known from Vieques, Puerto Rico or Mona, but the cosmopolitan *Scopeuma stercorarium* (L.) is very common on fresh dung at the higher elevations in Hispaniola. Dr. E. O. Essig (1926–600) describes it as "a slender, pilose, tawny or yellowish brown fly, the males with long pile, very common on cow dung in which the larvae breed. The adults are predaceous on the blow fly and house fly, (being) common in the west."

Sphaeroceridae (Borboridae)

Leptocera angulata (Thomson) was identified by Dr. C. H. Curran (1928–69) from many Puerto Rican localities, from El Yunque to Ensenada, being common in all parts of the Island.

Leptocera discalis (Malloch) occurs in St. Croix, and in many Puerto Rico localities, according to Dr. C. H. Curran (1928–69).

Leptocera fontinalis (Fallén), a European and North American species, was recorded from Puerto Rico by Mr. D. W. Coquillett, having been collected by Mr. Aug. Busck.

Leptocera lugubrina was described by Mr. J. R. Malloch as a *Limosina*

from Puerto Rico in his "Descriptions of New Species of American Flies of the Family Borboridae" (Proc. U. S. National Museum, 44 (1958): 361–372. Washington, D. C., February 20, 1913).

Leptocera sublugubrina Malloch (1912), for *L. ligubris* (Williston) preoccupied, originally described as a *Limosina* from St. Vincent, was collected in Puerto Rico by Mr. Aug. Busck.

Leptocera niveipennis (Malloch) was described as a *Limosina* (1913-361), the type from Peurto Rico.

Leptocera perparva (Williston), described from St. Vincent, occurs in Puerto Rico according to Mr D. W. Coquillett (1900-269).

Leptocera pumilla (Williston) was identified from Puerto Rico by Dr. C. H. Curran (1928-69): specimens from Aibonito and Naguabo.

Leptocera rotundipennis (Malloch) was described (1913–361) as a *Limosina* from Puerto Rico.

Leptocera venalicia (Osten Sacken), supposed to have been introduced from Africa into Cuba by the slave trade, known also from St. Vincent and Brasil, was collected in Puerto Rico by Mr. Aug. Busck, according to Mr. D. W. Coquillett (1900–269), and has since been intercepted at Mayagüez.

Sciomyzidae (Tetanoceridae)

Sepedon caeruleus Mel., as identified by Dr. J. M. Aldrich, occurs in all parts of Puerto Rico, the AMC collection containing specimens from El Yunque, Orocovis, Mayagüez, San Germán and Cartagena Lagoon.

Sepedon macropus Walker, a reddish-yellow fly, its wings clouded with brown, was originally described from Jamaica and occurs also in Cuba. Dr. Gundlach first collected it in Puerto Rico, as identified by Herr Victor von Roeder. Dr. C. H. Curran (1928–86) identified specimens from Caguas, Cayey and Coamo, and in the AMC collection from Río Piedras, Mayagüez and the Cartagena Lagoon.

Lonchaeidae

Lonchaea chalybea Wiedemann, originally described from South America, was first reported from Puerto Rico by Mr. O. W. Barrett (*in* Annual Report P. R. Expt. Station for 1903, pp. 429–450, Office of Experiment Stations, Washington, D. C., 1904) on page 447, as a pest of *Manihot utilissima* and *M. palmata*, and in the following year (1905–396) he mentions the larva as "a serious pest in the tips of cassava canes." For control, handpicking and tobacco dust are recommended. Locally, and in Cuba, this is called "centella de la yuca." Mr. Policarpo González Rios gives an economic account as "El Gusano del Cogollo de la Yuca" (Rev. Agr. P. R., 10 (4): 45–6. San Juan, 1923) of the attack by the maggots of this common, and at times, serious pest. It occurs in all parts of the Island where yuca is planted but is possibly most abundant in the sandy areas. The adults are

little blue-black iridescent flies, with clear wings, sometimes to be seen on the host of the larva, but much less conspicuous than the stunted, gum-exuding, and withering tips which the feeding of the latter cause.

Lonchaea bruneri Malloch, as determined by Mr. C. T. Greene, was originally described from Cuba, reared by Mr. S. C. Bruner from maggots attacking the tips of lima bean vines. This insect is known in Puerto Rico only from material collected by Mr. Pedro Osuna from the same host at La Muda, between Río Piedras and Caguas.

Lonchaea glaberrima Wiedemann was originally described from the West Indies and reported from southern Florida. This name was given by Mr. R. H. Van Zwaluwenburg to specimens he had reared from pods of *Inga vera*, and are P.R. 1664 in his list. They have recently been re-determined by Mr. C. W. Sabrosky as a species of **Carpolo chaea.**

Lonchaea longicornis Williston, originally described from St. Vincent, is reported from Puerto Rico by Mr. D. W. Coquillett (1900–258), having been collected by Mr. Aug. Busck.

Lonchaea nigrocoerulea Malloch was identified by Dr. C. H. Curran from Mayagüez and Tallaboa, Puerto Rico (1928–85), and for Dr. W. A. Hoffman, who collected specimens at light at San Juan. Flies repeatedly intercepted at Mayagüez were identified by Dr. J. M. Aldrich as a new species of *Lonchaea*.

Carpolonchaea pendula Bezzi, as identified by Mr. C. T. Greene, has been repeatedly intercepted in Puerto Rico: reared from orange fruit at San Juan and Mayagüez, reared from lima beans at Isabela and reared from fruit of *Inga laurina* at Jayuya. As identified by Mr. David G. Hall, adults have been collected on Mona Island along the beach by Dr. Luis F. Martorell.

Lauxaniida

Camptoprosopella cincta (Loew), described originally from Cuba as a *Sapromyza*, was first collected in Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder. This "shining rusty reddish" fly, 3.0 mm. long, "wings not infuscated; only two pairs of dorso-central bristles," was redescribed by Dr. C. H. Curran (1926–13) as *C. diversa*, from material from Coamo and Arecibo in Puerto Rico, Mona Island and from Fond Parisién and other localities in Haiti. He later (1931–18) recognized its synonymy. Flies intercepted in a grapefruit grove near Añasco are considered by Dr. J. M. Aldrich to be a new species of *Camptoprosopella*.

Physogenua ferruginea (Schiner), originally described as a *Griphoneura* from Costa Rica and known to occur in Mexico, was identified by Dr. J. M. Aldrich from flies swept from grass at Ciales, and later from flies in coffee grove at Lares and intercepted at Loiza.

Physogenua vittata Macquart, originally described from Brasil and known from others of the West Indies, was listed by Drs. Stahl and Gund-

lach as *Lauxania variegata* Loew, as identified by Herr Victor von Roeder. Dr. C. H. Curran (1928–81) identifies this fly from several localities in western Puerto Rico and from specimens in the AMC collection from Matrullas, but it is not localized in distribution, for interceptions have been made at San Juan, and in Isabela Grove at Palo Seco.

Neogriphoneura sordida (Wiedemann), originally described from the West Indies as a *Sapromyza*, and recorded by Mr. D. W. Coquillett from Puerto Rico and the southeastern United States, was identified by Dr. C. H. Curran (1928–82) from the Island of St. Croix of the Virgin Islands, from several localities in Puerto Rico, and from Mona Island. Numerous specimens in the AMC collection from Ponce, Hormigueros, Mayagüez and Río Piedras he also identified as this species.

Pseudogriphoneura albovittata (Loew), originally described as a *Lauxania* from Cuba, and thus identified by Herr Victor von Roeder from the collections made by Dr. Gundlach in Puerto Rico, is recognized by Dr. C. H. Curran (1928–82) by having the "thorax opaque black, with two ashy vittae connected behind by the ashy scutellar margin," specimens from Mayagüez. Others are from Cidra, and these flies have been repeatedly intercepted in grapefruit groves at Mayagüez and Arecibo.

Pseudogriphoneura octopunctata (Wiedemann), described originally as a *Sapromyza* from the West Indies, was thus identified by Herr Victor von Roeder from the material collected by Dr. Gundlach in Puerto Rico. What Dr. C. H. Curran (1931–19) thinks may be this fly was what he described (1926–13) as *Deceia anomala:* "length 2.5 mm.; rusty yellowish, shining, the three or four apical abdominal segments each with a black spot on either side; thorax usually pale yellow, with a black spot on the upper anterior part of the sternopleura; scutellum with a black spot on either side between the marginal bristles."

Pseudogriphoneura vittifacies was described by Dr. C. H. Curran (1931–20), the type from Aibonito, other from Adjuntas, similar to what he had previously reported (1928–83) as *Lauxania cineracea* Coquillett, "but at once distinguished by the presence of two or four shining vittae on the face, and the reddish, more extensively brown-pollinose mesonotum and scutellum; length 4.0 mm." Dr. J. M. Aldrich considers flies intercepted at Cidra as representing a new species of *Pseudogriphoneura*, which may be what Dr. C. H. Curran identified in the AMC collection from Matrullas.

Caliope lutea (Coquillett) is identified with considerable doubt by Dr. C. H. Curran (1928–83); specimens from Arecibo and Aibonito, Puerto Rico. This fly was described from specimens collected in southern Florida as a *Lauxania*.

Caliope scutellata was described by Dr. C. H. Curran (1926–14) from a single specimen from Naguabo, so badly damaged that its sex could not be determined; "similar to *lutea* Coquillett," but "the scutellum bears a large, transverse, apical brownish spot."

Minettia aibonito was described by Dr. C. H. Curran (1926–14): "length 2.0 mm.; pale rusty yellow, the abdomen with three series of small, round brown spots; head and thorax conspicuously cinereous pollinose, the abdomen thinly so." A fly answering to its description has been intercepted at Guayama.

Minettia mona was described by Dr. C. H. Curran (1926–13) from a number of specimens from Mona Island, others from Naguabo and Aibonito, Puerto Rico. It is 3.5 mm. long, "rusty reddish yellow, the head and thorax grayish pollinose; scutellum and abdomen shining; abdomen with three to five series of black spots." The most intensive collecting by Prof. J. A. Ramos did not discover any additional specimens of this fly on Mona Island.

Minettia macula (Loew), described originally from Texas, and thought by Prof. S. W. Williston to be a possible synonym for *Sapromyza octopunctata* Wiedemann, was identified from Puerto Rico (in synonymy with *S. valida* Walker) by Dr. J. M. Aldrich: specimens collected by Mr. E. G. Smyth at Río Piedras in October 1916. Others of "this little brown fly with striped thorax" have been intercepted at Mayagüez, and swept from malojillo at Bayamón.

Minettia picticornis (Coquillett) was identified by Dr. C. H. Curran (1931–20) from two specimens collected by Dr. W. A. Hoffman at Dorado. It is a little yellowish fly, banded and spotted with brown, or, as phrased by Dr. Curran, "the mesonotum bears four black vittae and the abdomen a median row of roundish spots and lateral rows of transverse ones." It has been intercepted in a grapefruit grove at Arecibo, as identified by Dr. J. M. Aldrich, and most recently collected at Río Piedras, resting on concrete column, as identified by Mr. C. W. Sabrosky.

Minettia slossonae (Coquillett), originally described as a *Sapromyza* from Biscayne Bay, Florida, is apparently one of the most abundant of these flies in Puerto Rico, Dr. C. H. Curran (1928–84) identifying it from the Virgin Islands of St. Croix and St. Thomas, from various localities in Puerto Rico and from Mona Island. He states that "Malloch considers this to be only a variety of *octopuncta* Wiedemann (*octopunctata* auct.)." Specimens identified as this species by Dr. J. M. Aldrich have been intercepted at Mayagüez, swept from malojillo at Bayamón and in an orange grove at Pueblo Viejo.

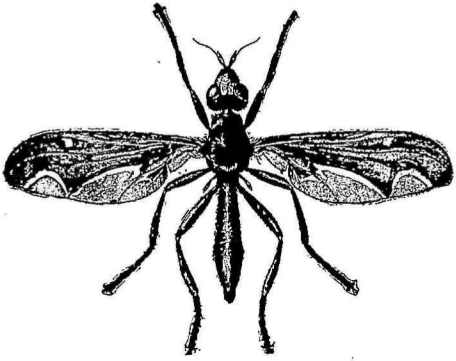
Minettia sororia (Williston), originally described as a *Sapromyza* from St. Vincent, was identified by Dr. C. H. Curran (1928–85) from Puerto Rico: a single specimen from Aibonito.

Trigonmetopus angustipennis Knab was the identification by Dr. J. M. Aldrich of flies intercepted by Mr. R. G. Oakley, resting on pomarrosa at Cidra, and in the mountains back of Yauco. To specimens previously

submitted which had been collected in abandoned coffee groves at Indiera, he had given the identification of "sp. nov." in this genus. *T. rotundicornis* Williston was described from St. Vincent. Dr. C. H. Curran identifies flies in the AMC collection from Matrullas as **Trigonmetopus vittatus** Loew, a species originally described from Georgia.

Otitidae (Ortalidae)

"*Pyrgota undata* Wiedemann is a fly of extraordinary appearance and habits, the females of which lay eggs in (May) beetles, attacking them when



Pyrgota undata Wiedemann, a continental Otitid fly which is parasitic on May Beetles, three times natural size. (After Davis.)

they are flying by night, and the ovipositor can be inserted though the unprotected tender skin of the upper part of the abdomen." As related in an early account of "Insect Parasite Introduction in Porto Rico" (Jour. Dept. Agr. P. R., 6 (1): 5–20, fig. 7. San Juan, October 1922), "in some years, large numbers of *Lachnosterna* beetles in Illinois are parasitized, but during the summers of 1913 and 1914, when many beetles were collected, this fly was comparatively rare, and only an occasional parasitized beetle was found. Several fly puparia inside dead beetles were collected in plowed fields and sent to Puerto Rico, but no adults emerged."

Xanthacrona bipustulata Van der Wulp, originally described from Mexico, was identified by Dr. C. H. Curran (1928–77) from Jamaica, and from Puerto Rico a single specimen from Coamo.

Acrosticta apicalis (Williston), originally described as an *Euxesta* from St. Vincent, was listed by Mr. D. W. Coquillett (1900–258) from Puerto Rico, specimens having been collected by Mr. Aug. Busck. It is an iridescent blue-black fly, with clear wings except for the front margin and apex, repeatedly collected since, as identified by Dr. J. M. Aldrich, in the more humid parts of the Island: attracted to rotting fruit, such as grapefruit and over-ripe hog-plums or "jobo" (*Spondias mombin*), and to the exuding juices on corn leaves.

Acrosticta foeveolata Loew is identified by Dr. C. H. Curran (1928–77) from many localities in the more humid section of Puerto Rico, and from the Island of St. Thomas.

Acrosticta pallipes Grims., as determined by Mr. C. T. Greene, was quite abundant in the Isabela ginnery in August 1945, and numerous dead flies were collected from the window-sills and floor after it has been sprayed with DDT.

Euxesta abdominalis Loew, originally described from Cuba, is one of the most common of this genus in Puerto Rico, if one may judge by the number of north coast localities from which Dr. C. H. Curran (1928–79) identified specimens, including Mona Island. The "base of the abdomen (is) usually reddish" in this otherwise blue-black iridescent fly.

Euxesta annonae (Fabricius), originally described as a *Musca* from the West Indies, was first reported from the collections of Dr. Gundlach in Puerto Rico by Herr Victor von Roeder, and Mr. F. Knab identified specimens collected at Mayagüez for Mr. R. H. Van Zwaluwenburg. Dr. C. H. Curran (1928–79) lists specimens from the Virgin Islands of St. Croix and St. Thomas, from many mountainous localities in Puerto Rico as well as San Juan, Arecibo, Mayagüez and Ensenada, and from Mona Island. On Vieques Island, Dr. M. D. Leonard and Prof. Wm. T. M. Forbes collected this fly, as identified by Dr. Curran (1931–17).

Euxesta costalis (Fabricius), originally described as a *Musca* from the West Indies, was first collected in Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder. Dr. C. H. Curran (1928–78) reports it only from the Virgin Islands of St. John and St. Thomas.

Euxesta eluta Loew, originally described from Cuba, is identified by Dr. C. H. Curran (1928–78) for specimens from Naguabo to Ensenada, and intermediate points in Puerto Rico. It has been reared from maggots intercepted in silk of sweet corn at Mayagüez.

Euxesta mitis was described by Dr. C. H. Curran (1931–17) from two females collected by Prof. W. T. M. Forbes on Vieques Island. It is "a very small species, 2.25 to 2.4 mm. long, with three brownish-black spots on the wings (as illustrated), and a very prominent clypeus."

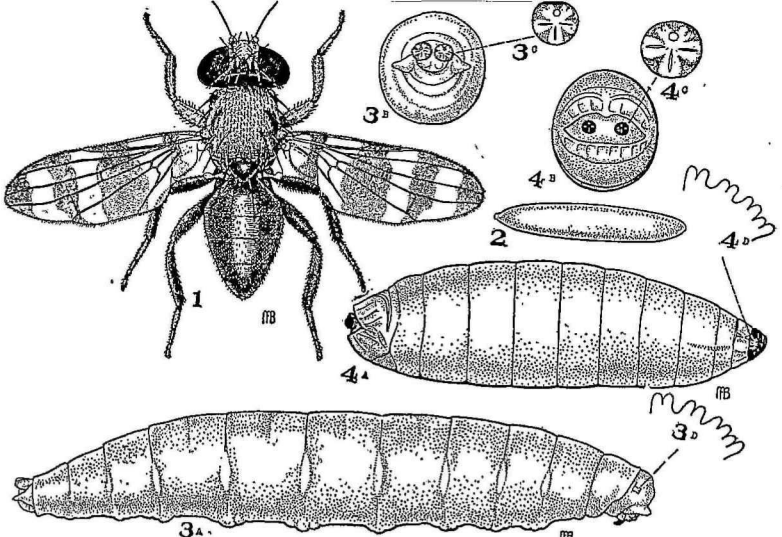
Euxesta notata (Wiedemann), originally described as an *Ortalis* from

Savannah, Georgia and New York, occurs thruout the eastern United States, the larvae having been found in sumac fruit in Virginia, cotton bolls in Alabama, onions in New Jersey and the pulp of Osage orange (*Maclura* or *Toxylon pomifera*). On February 1, 1926, Mr. Francisco Sein collected ten of these flies "running over half rotten oranges dumped out doors in Mayagüez. The flies laid eggs on the sides of the moist vial in which they were kept. The eggs hatched in three days, and the larvae (cream-colored with two dots on the hind end) were fed on pieces of orange placed inside the vial. Some continued their development on the orange tissues after they had rotted. They pupated in soil placed in the tubes and on the cloth which closed the opening. Flies emerged twenty-three days after the eggs hatched, or 26 days from egg to adult. (Later) this fly was observed walking over fruits at a picnic in a coconut grove at Loiza." These flies have also been intercepted on over-ripe fruits of "jobo" (*Spondias mombin*) in the metropolitan area and at Dorado. Messrs. Richard Faxon and C. P. Trotter, discussing their experiences with the "Plant Quarantine Service in Porto Rico" (Jour. Ec. Ent., 25 (3): 435–447. Geneva, June 1932), state that "the spotted root fly, *Euxesta notata* Wied., has been taken many times from oranges and less frequently from grapefruit. It has not been proved how this insect gains entrance to the fruit, but it seems probable that the infestation is secondary."

Euxesta spoliata Loew, originally described from Cuba, was first collected in Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder, and was listed by Mr. D. W. Coquillett (1900–258) as having been collected by Mr. Aug. Busck. Dr. C. H. Curran (1928–78) has identified it from the Island of St. Croix and from several localities in Puerto Rico, and it has been intercepted in an orange grove at Mayagüez.

Euxesta stigmatias Loew, originally described from Cuba and Brasil, was first collected in Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder. Dr. C. H. Curran determined specimens from the Island of St. Croix (1928–78), from several localities in Puerto Rico, and from Mona Island. It had been repeatedly intercepted, and once reared from rotten corn before Mr. B. A. App reported on the habits of the maggots of "*Euxesta stigmatias* Loew, an Otitid fly infesting ear corn in Puerto Rico" (Jour. Agr. Univ. P. R., 22 (2): 181–188. Río Piedras, May 1938). He found it a serious pest of sweet corn being grown experimentally. In the Annual Reports of the Experiment Station at Mayagüez for 1939 to 1941 the practical means of control by spraying with pyrethrum, or treating with mineral oil as for corn earworm, are discussed.

Euxesta thomae Loew, originally described from St. Thomas, and listed from Puerto Rico by Mr. D. W. Coquillett (1900–257) as collected by Mr. Aug. Busck, is not recognized by Dr. C. H. Curran. It has been repeatedly



The Corn Ear Otitid Fly, *Euxesta stigmatias* Loew: 1, adult, about twelve times natural size, 2, egg, 3A, lateral aspect of larva, 3B posterior aspect of larva, 3C, posterior spiracle, 3D, anterior spiracle, 4A, lateral aspect of puparium, 4B, posterior aspect of puparium, 4C, posterior spiracle, 4D, anterior spiracle. (Drawn by Mrs. Mary Foley Benson.)

identified by Dr. J. M. Aldrich, and presumably is one of the most common of the genus, being especially abundant in cane fields, around cane cars, attracted to chewed cane on the ground, and to human feces. It is eaten by the little grass lizard (*Anolis pulchellus*), but is not an important item in the diet of lizards, for it is not easy to catch, being wary and taking flight with exceptional rapidity, altho promptly returning to a desirable bit of chewed-up cane when no danger threatens, and flirting its wings derisively at the foiled lizard. It occurs in all parts of the Island, being quite as abundant in the cane fields of the south coast as in those of the more humid regions. It has been repeatedly intercepted resting on various non-significant objects, as well as on ripe or rotting oranges at Mayagüez, on juice-exuding fruit of "jobo" (*Spondias mombin*) and on rotting papayas at Isabela. Mr. Francisco Seín records the collection by Mr. E. Muños at Camuy of larvae and pupae of this fly in tunnels in the trunk of dead coconut palms made by *Xyleborus* beetles.

Tetanops sp. is listed by Dr. Alex. Wetmore (1916–66) as having been eaten by the tody, *Todus mexicanus*. Flies identified as *Stenops* sp., and others as "near *Neoacanthoneura* sp." have been found in fruitfly traps at Mayagüez. Dr. Stahl lists *Ortalis quadrivittata* Macquart.

Notogramma stigma (Fabricius), originally described as a *Musca* from the West Indies, and known to occur in Cuba, was recognized by Dr. C. H. Curran (1928–79) from Adjuntas and Ensenada in Puerto Rico, and from Desecheo and Mona Islands.

Chaetopsis fulvifrons (Macquart) is recorded from Puerto Rico by Dr. C. H. Curran (1928–80): three specimens from San Juan.

Chaetopsis quadrifasciata is described by Dr. C. H. Curran (1928–80) from a type from Orocovis, Puerto Rico; others from San Juan and Miami, Florida. It is 4.0 to 5.0 mm. long, having "wings with four blackish-brown crossbands, the apical two connected along the costa."

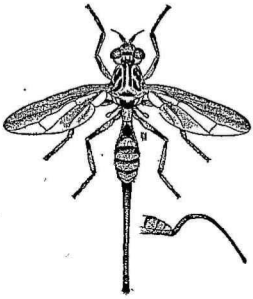
Setellia amabilis (Williston), originally described as an *Epiplatea* from St. Vincent, is identified by Dr. C. H. Curran (1931–17): specimens from El Yunque collected by Prof. W. T. M. Forbes.

Epiplatea erosa Loew, originally described from Cuba, was intercepted at Mayagüez by Mr. A. G. Harley, as determined by Dr. J. M. Aldrich.

Macrostenomyia guerini (Bigot), originally described as a *Sepsis* from Cuba, was first collected in Puerto Rico by Dr. Gundlach, and identified as a *Stenomacra* by Herr Victor von Roeder. Dr. C. H. Curran (1931–17) identified as this species a pair collected by Dr. M. D. Leonard at Cidra, and another pair collected by Prof. W. T. M. Forbes at Coamo. As identified by Dr. J. M. Aldrich it has been intercepted in an orange grove at Ponce by Mr. R. G. Oakley, in fruitfly trap at Mayagüez, and at Maricao.

Tephritidae (Trypetidae): Fruitflies

Toxotrypana curvicauda Gerstaecker, originally described from the "Island of St. Jean of the Danish West Indies," now called St. John of the U. S. Virgin Islands, is known also from tropical South and Central America, Yucatan in Mexico, southern Florida, Cuba, Hispaniola and the Bahama Islands. It was first reported from Puerto Rico by Dr. C. W. Hooker (*in* Ann. Rpt. P. R. Expt. Station for 1912, pp. 34-38. Washington, D. C., July 26, 1913) as "abundant at Mayagüez. The eggs are laid well below the surface of the green fruit of papaya (*Carica papaya*); 2 to 15 or more larvae within the fruit, and when it drops, pupate 1 or 2 inches below the surface of the ground below the fruit. Adults emerge in 17 to 21 days, and eggs for another brood are soon laid." The "Papaya Fruit Fly'

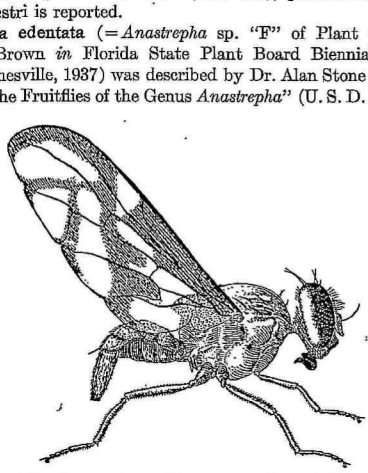


Female of the Papaya Fruitfly, *Toxotrypana curvicauda* Gerstaecker, two and a half times natural size. Lateral view of ovipositor below. (Drawn by L. Pierre-Noël.)

(Jour. Agr. Research, 11 (6): 447–457, pl. 2. Washington, D. C., September 21, 1914) was intensively studied by Messrs. Frederick Knab and W. W. Yothers in Florida, who observed "that fruit with very thick meat escapes infestation. While the papaya fruit fly attempts to oviposit on such fruit, the thickness of the meat prevents the tip of the ovipositor from reaching the seed cavity, and in the meat itself the larvae cannot live." Instances have been noted in Puerto Rico, however, of a thick-fruited variety, of which the seed was reported to have come from Africa, heavily infested at Cupey, above Río Piedras. Thin-fleshed fruit has also been found infested at Bayamón and at Guayama, but heaviest infestations have invariably been in the western end of the Island, primarily at Mayagüez,

as noted by Mr. W. V. Tower and in Van Zwaluwenburg's list (1243), and at Isabela, to which Dr. M. D. Leonard & Mr. Francisco Seín, writing of "The Papaya Fruit Fly in Puerto Rico," (Jour. Ec. Ent, 24 (1): 331–2. Geneva, February 1931) add Lares, and Messrs. Richard Faxon and C. P. Trotter (1932–446) add Ponce. At Mayagüez also, in the 1938 Report of the P. R. Experiment Station (1939–100), parasitizm by *Dirhinus giffardi* Silvestri is reported.

Anastrepha edentata (=*Anastrepha* sp. "F" of Plant Commissioner Arthur C. Brown *in* Florida State Plant Board Biennial Report, 11: 20–21. Gainesville, 1937) was described by Dr. Alan Stone as one of new species of "The Fruitflies of the Genus *Anastrepha*" (U. S. D. A. Misc. Pub-



The Jobo Fruitfly, *Anastrepha mombinpraeoptans* Seín, eight times natural size. (Drawn by Fritz Maximilien.)

lication No. 439, pp. 112, pl. 23, fig. 22, ref 10. Washington, D. C., January 1942), "small and yellow brown," the type from Key Largo, Florida; others from Mayagüez, P. R., collected in trap, "taken every month in the year on the Florida Keys, but the host has not been discovered."

Anastrepha mombinpraeoptans was described by Mr. Francisco Seín as a variety of *A. fraterculus* Wiedemann in his study of "*Anastrepha* (Trypetidae, Diptera) Fruit Flies in Puerto Rico" (Jour. Agr. P. R., 17 (3): 183–196, pl. 5, ref. 11. San Juan, November 14, 1933), the type from Rio Piedras, reared from fruit of "jobo" (*Spondias mombin*), others from fruit of "ciruela" (*Spondias ciruella* and *S. purpurea*), the fruit of some varieties of mango (*Mangifera indica*), rarely in fruit of "jobo de la India"

(*Spondias dulcis*), occasionally in fruit of guava (*Psidium guajava*) or "pomarrosa" (*Eugenia jambos*). "The egg is inserted in the fruit up to the shoulder, the head and neck protruding outside the cuticle" of the fruit. This is the common frutifly of the West Indies, first reported from Puerto Rico by Dr. Gundlach as *Acrotoxa fraterculus* Wiedemann, as determined by Herr Victor von Roeder. Mentioned by Mr. D. L. Van Dine as one of the important "Mango Insects in Porto Rico" (First Ann. Rpt. P. R. Hort. Soc. for 1912, pp. 20–22. San Juan, 1912), it was more extensively discussed by Mr. W. V. Tower (1912–34 to 35) as *A. acidusa* Walker, attacking the fruit of imported mangoes, especially the Cambodiana variety. Mr. C. F. Kinman, writing of "The Mango in Porto Rico" (P. R. Expt. Station, Bulletin No. 24, pp. 30, pl. 11. Washington, D. C., 1918) recommended enclosing ripening fruits in individual paper bags to prevent infestation. Dr. C. W. Hooker (1913–36) using the name *Anastrepha fraterculus* Wiedemann, "closely related to *A. acidusa*" as determined by Mario Bezzi, notes that this jobo fruitfly may also attack one native variety of mango: mango de puerco, and that the maggots in jobo fruits are parasitized by *Opius* (*Utetes*) *anastrephae* sp. nov. Viereck and *Ganaspis* sp. nov., which Mr. J. C. Crawford later described as *hookeri*.

The hearing held by the Federal Horticultural Board to consider the advisability of restricting or prohibiting the entry from Porto Rico of fruits and vegetables into the United States (Jour. Dept. Agr. P. R., 8 (1): 5–46, pl. 1. San Juan, August 1925) was, to a very considerable extent, due to this fruitfly, and the uncertainty as to its exact distribution and status. It was shortly thereafter that Mr. Francisco Sein commenced his investigations which eventually indicated morphological and physiological differences separating it from what he described as *Anastrepha unipuncta*, maggots of which had been found in ripe grapefruit and other citrus fruits. "Heat Sterilization of Mangoes and Guavas for Fruit Flies" (Jour. Agr. Univ. P. R., 19 (2): 105–115, ref. 3. Río Piedras, September 1935) "at a temperature of 43°C. for eight hours (with a minimum of four hours for complete effectiveness) in a circulating atmosphere saturated with moisture kills the eggs, maggots and pupae of the fruit flies that infest mangoes and guavas in Puerto Rico without unfavorably affecting the flavor, appearance or keeping qualities of the fruit if it is afterwards placed in refrigeration" was shown by his experiments. "A Revision of the Genus *Anastrepha* based on a Study of the Wings and on the Length of the Ovipositor Sheath (Diptera: Trypetidae)" (Proc. Ent. Soc. Washington, 36 (6): 127–179, pl. 5, ref. 36. Washington, D. C., July 9, 1934) by Mr. C. T. Greene, showed, however, that besides occurring in all of the Greater Antilles, many of the Lesser Antilles, Canal Zone, Central America and Mexico, this species also occurred in south Texas and at Key West, Florida. Dr. A. da Costa

Lima in "Moscas de Frutas do Genero *Anastrepha* Schiner 1868 (Diptera: Trypetidae)" (Instituto Oswaldo Cruz Mem. 28, pp. 487–575, illus. Río de Janeiro, 1934) extends the distribution of "The West Indian Fruit Fly" to include Río de Janeiro, and Dr. Alan Stone (1942–68) by synonymy to include Trinidad, Venezuela and Ecuador, stating that it "occurs only rarely in *Citrus*, a few infestations having been found in grapefruit in Puerto Rico." Indeed, "A Study of the Adult Populations of the West Indian Fruitfly in Citrus Plantings in Puerto Rico" (P. R. Expt. Station Bulletin No. 41, pp. 16, ref. 9, fig. 1. Washington, D. C., December 1941) by Mr. L. C. McAlister Jr., Dr. W. A. McCubbin and Messrs. G. A. Pfaffman, W. T. Owrey, H. G. Taylor and I. W. Berryhill, indicated that "*Anastrepha mombinpraeoptans* has not been a citrus-breeding fruitfly under normal conditions in Puerto Rico."

Anastrepha suspensa (Loew), originally described from Cuba as an *Acrotoxa*, was re-described by Mr. Francisco Sein under the name *Anastrepha unipuncta*, the type from Río Piedras (1933–190), reared from maggots infesting guava (*Psidium guajava*), others from "pomarrosa" (*Eugenia jambos*) and the husks of "almendra" (*Terminalia catappa*); the fruits of "caimito" (*Chrysophyllum cainito*), "nispero" (*Sapota achras*), and "corazon" (*Annona reticulata*); more rarely, the fruit of kumquat (*Fortunella margarita*), sour orange, native and Valencia orange and grapefruit sporadically in the late spring and early summer. He differentiates it from *mombinpraeoptans* "by the dark spot on the suture between the metathorax (mesonotum) and the scutellum. The egg has no neck and is deposited entirely underneath the cuticle of the fruit." When the studies by Mr. C. T. Greene (1934–132) made identification certain, it was found that specimens in the U. S. National Museum had been collected in southern Florida. Dr. Alan Stone (1942–74) records occurrence in Hispaniola, and considers the *Anastrepha longimaculata* described by Mr. Greene (1934–146) from Jamaica a synonym, or at most a local race, of *Anastrepha suspensa*. Normally in Puerto Rico the females of this fruitfly oviposit in the fruits of guava and pomarrosa, and to a lesser extent in the husks of the tropical almond. Presumably it was this fly which is reported by Mr. R. H. Van Zwaluwenburg (1918–34) under the name of *Anastrepha fraterculus* in pomarrosa fruits at Maricao in July 1917. Its attack on economic hosts developed at a time when citrus fruit from the Río Grande valley in south Texas first began to come on the continental market in competition with grapefruit from Puerto Rico. The most unexpected low prices for early fruit caused practically all growers to attempt to keep their fruit on the trees as long as possible, rather than pick it while still green and ship to an expectant New York market in which previously they had experienced no competition. Such an unusual and enormous amount of dead-ripe

grapefruit presented an opportunity for infestation by this fruitfly which resulted in some fruit being attacked, with appreciable commercial injury in some few groves bordered by mango or pomarrosa trees. "Although *Anastrepha suspensa* has not been known to breed in mango fruits in Puerto Rico," it has "a peculiar habit of migrating over large areas into various trees, including mango and citrus," according to Mr. L. C. McAlister, Jr., Dr. W. A. McCubbin and others (1941–10). They conclude that "the quantity or number of citrus fruits with larval infestation has been entirely negligible from the commercial viewpoint." As this species of fruitfly also occurs in southern Florida, from the quarantine standpoint it could not legitmately be considered a menace to the citrus industry in other parts of the United States, to which it undoubtedly would have spread long ago had conditions there been suitable for its continued existence.

Xanthaciura insecta (Loew), originally described as a *Trypeta* from Cuba, and known to occur in the other Greater Antilles, was first collected in Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder. In cane fields on the north and west coasts it is often noted resting on the leaves of young ratoons: conspicuous, despite its small size, because of the brownish pictured wings, out of which narrow, clear triangular areas appear to be cut. Dr. C. H. Curran (1928–71) records it as an *Aciura* from San Juan to Mayagüez, and the mountains at Orocovis. Interceptions have been made at Naguabo. Prof. James G. Needham found it a common and important member of "An Insect Community which Lives in Flower Heads" of shepherd's needles (*Bidens pilosa*) in Florida (National Geographic Magazine, 90 (3): 340–356. Washington, D. C., September 1946), naming it the Bandwing. "This dainty little black-backed fly has big green eyes, drooping yellow antennae, and a row of stiff white bristles set across the rear of its head like a back comb. Its under parts and legs are clear yellow. Gleaming, resplendent wings are like banners, black from base to tip, with large transparent triangles of glassy clearness cut out of both front and rear margins. This fly behaves as if quite conscious of the elegance of its dress. It struts this way and that, making little vacillating turns, then stands momentarily flirting its wings, turning each like a fan, in a manner that recalls the actions of a girl model displaying the latest styles in a fashion show." The eggs are laid in the flowers, the maggots develop in the green seeds, sometimes four or five in a single head, the pupae being formed in the cavity left by the feeding of the larvae, and adults emerging seven days later.

Xanthaciura phoenicura (Loew), originally described as an *Aciura* from Brasil, and recorded from St. Vincent, was identified by Dr. J. M. Aldrich from interceptions in the metropolitan area, and resting on grass at Añasco.

Ensina humilis (Loew), originally described as a *Trypeta* from Cuba,

and known to occur in Jamaica, southern Florida and Mexico, was first identified from Puerto Rico by Herr Victor von Roeder: material collected by Dr. Gundlach. A little, light brown fly, with rounded clear areas in its pictured wings, it is not so common on the leaves of young ratoon cane along the north coast as it is in the lower hills of the interior, as at Corozal, Ciales and San Sebastián, where it is so abundant as to form an item in the food of the little grass lizard, *Anolis pulchellus*. It was intercepted in a grapefruit grove at Mayagüez by Mr. A. G. Harley. Dr. C. H. Curran (1928–70) lists it from many mountain localities under the name of *Ensina picciola* (Bigot), and Dr. Alan Stone now calls it **Paroxyna picciola** (Bigot).

Ensina peregrina Loew, described originally from Brasil, was listed from Puerto Rico as a *Tephritis* by Mr. D. W. Coquillett (1900–258), having been collected here by Mr. Aug. Busck.

Acrotænia testudinea Loew, originally described from Cuba, has been repeatedly intercepted in Puerto Rico, as identified by Mr. C. T. Greene, from Trujillo Alto, Bayamón, Orocovis, Arecibo and Rincón.

Trupanea dacetoptera Phillips, listed by Dr. C. H. Curran (1928–71) from the Island of St. Croix, was identified by him from Boquerón, specimens in the AMC collection. The same specimens, or others collected at Boquerón at the same time, were identified by Dr. J. M. Aldrich as *Trypanea daphne* Wiedemann, and others from Mayagüez. At Orlando, Florida, larvae mining in *Gnaphthalium obtusifolium* proved to be the immature stages of this fly.

Trupanea mevarna (Walker), originally described as a *Trypeta* from Florida, but occurring widely in the United States and Mexico, is listed by Dr. C. H. Curran only from Adjuntas. It is really quite common, Dr. J. M. Aldrich identifying as *Urellia solaris* Loew numerous specimens swept from malojillo at Pt. Cangrejos and found resting on young ratoon cane at San Sebastián. It is a little grey fly, with a single large brown blotch on the wing, from which splashes radiate to the edges. In Florida, the larvae of this fly have been found feeding in the flowers and tender tips of *Chrysopsis*.

Dyseuaresta melanogaster (Loew), described originally from Cuba as an *Euaresta*, was thus identified from Dr. Gundlach's collections in Puerto Rico by Herr Victor von Roeder. Dr. C. H. Curran (1928–73) lists "very many specimens from numerous localities in Porto Rico and adjacent islands," but it was subsequently intercepted only once in an orange grove at Maricao. It is a little grey fly with most of its wing brown, the "marginal cell with three hyaline spots," found most often on grass or low vegetation in grapefruit, orange or coffee groves back from the coast, in the lower hills of the interior.

Dyseuaresta mexicana (Wiedemann), listed as an *Euaresta* by Van Zwaluwenburg (P. R. 106), was "not seen" by Dr. C. H. Curran (1931–15), nor has it since been collected in Puerto Rico.

Dyseuaresta plesia was described by Dr. C. H. Curran (1928–71) as an *Euaresta* from a single headless female from Coamo, with wings of which the "marginal cell (has but) two hyaline spots," as shown by his accompanying illustration. Dr. Alan Stone considers this and *melanogaster* synonyms of *mexicana*.

Tetreuaresta obscuriventris (Loew) was identified by Dr. C. H. Curran (1928–73) from several Puerto Rican localities, and in the AMC collection from Cidra, Maricao and Las Marias. As identified by Mr. C. T. Greene, it has been collected by Dr. Luis F. Martorell on Mona Island.

Plagiotoma pura was described by Dr. C. H. Curran (1931–16) from a single male collected by Dr. W. A. Hoffman at Jájome Alto, "similar to *discolor* Loew (of Cuba) except that the abdomen is shining rusty-reddish with black lateral spots; length 4.0 mm." Dr. Stone places it in the genus **Tomoplagia**.

Blepharoneura fulvicollis Van der Wulp, described originally from Mexico, has been intercepted at Ponce by Mr. R. G. Oakley, as identified by Mr. C. T. Greene.

Tylidae (Micropezidae or Calobatidae)

Nerius cinereus was described by Herr Victor von Roeder (1885–348) from material collected in Puerto Rico by Dr. Gundlach, but has not since been found.

Micropeza limbata was described by Herr Victor von Roeder (1885–347) from flies collected by Dr. Gundlach in Puerto Rico, presumably at or near Mayagüez. Dr. C. H. Curran (1928–85) lists specimens, identified by Mr. E. T. Cresson, Jr., from Mayagüez to Adjuntas, and later determined others (1931–21) from Cidra and Maricao, and in the AMC collection from Las Marias. This fly was intercepted on flowers of orange at Adjuntas by Mr. R. G. Oakley.

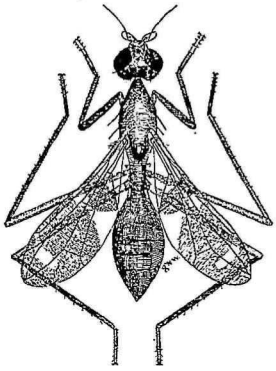
Systellapha scurra Enderlein has a chestnut-red head and thorax, black abdomen, wings clear except for distal angle and medio-distal quarter, and is often to be found in coffee groves in the mountains, as noted in "Insectae Portoricensis" (1923–230). Indeed, it is sufficiently common to form an item in the food of the crested lizard, *Anolis cristatellus*. Dr. C. H. Curran (1928–85) identifies it from Mayagüez and from other localities in the mountains, and (1931–21) from El Yunque, where it was collected by Prof. Wm. T. M. Forbes. It has also been intercepted on El Yunque, on orange flowers at Adjuntas and at Mayagüez.

Hoplocheiloma fasciata (Fabricius), to use the new name suggested by Mr. E. T. Cresson, Jr. (Trans. Amer. Ent. Soc., 52 (3): 249–274 (see p. 272). Philadelphia, 1926) for what was originally described as a *Musca* from the West Indies, was recorded from Puerto Rico by Mr. D. W. Coquillett (1900–257), having been collected by Mr. Aug. Busck, "on human excrement" as noted by Dr. L. O. Howard. Under the name *Calobata*,

as identified by Herr Victor von Roeder, Dr. Gundlach lists this fly as "común," and Dr. Stahl in his list calls it a *Taeniptera*. Dr. C. H. Curran (1928–85) identified a single specimen from Fajardo, and in the AMC collection, specimens from Mayagüez.

Calobata munda Van der Wulp, as identified by Mr. C. T. Greene, was intercepted resting on a grapefruit leaf at Añasco.

Taeniaptera lasciva (Fabricius), originally described as a *Musca* from Cayenne (French Guiana), repeatedly noted from Cuba as a *Calobata*, and found as far north as Philadelphia and southern New Jersey, was first



The Calobatid fly, *Taeniaptera lasciva* (Fabricius), six times natural size. (Drawn by G. N. Wolcott.)

recorded from Puerto Rico by Dr. Gundlach, as identified by Herr Victor von Roeder as a *Calobata*. Dr. Stahl lists it as a *Taeniaptera*, and this is the generic name used by Dr. C. H. Curran (1928–85) for his determinations, from Fajardo to Mayagüez. It is a common and very conspicuous fly in fields of young cane, with its long legs, white front feet and pictured wings. Larvae found in decayed cane cuttings and in dead, dry cane stalks, have been reared to adult. Despite the rapidity with which adults take flight when alarmed, they have been caught by the crested lizard, *Anolis cristallevs*, and form a minor item in its food. Sometimes adults are seen on cane leaves which do not take flight, and upon examinition it will be found that they have been killed by a fungus disease, and are so fragile

that insufficient material for identification of the fungus can not be collected even with the greatest of care. The flies have been intercepted on numerous other non-significant hosts than sugar-cane leaves, from numerous north coast points, and in smaller numbers are to be found on the south coast, as at Guayanilla. Indeed, one epidemic of the fungus disease occurred at Guayanilla in December 1938, the only other observed being at Canovanas in November 1936.

Clusiidae

Sobarocephala bivittata Melander and Argo, originally described from Costa Rica, has been identified by Dr. C. H. Curran (1931–22) from a pair collected by Dr. W. A. Hoffman at Dorado, both of which have the "scutellum wholly yellowish."

Sepsidae

Sepsis armata Schiner is identified by Dr. C. H. Curran (1928–74) from Aibonito, Adjuntas and Mayagüez. It, and the more abundant *S. pusio*, have been intercepted on cotton plants at Río Piedras.

Sepsis armillata Melander and Spuler is identified by Dr. C. H. Curran (1928–76) from many localities in Puerto Rico from Naguabo to Mayagüez.

Sepsis discolor Bigot, originally described from Cuba, was identified by Herr Victor von Roeder from material collected in Puerto Rico by Dr. Gundlach.

Sepsis furcata Melander and Spuler is doubtfully identified by Dr. C. H. Curran (1928–75) from Mayagüez and Arecibo.

Sepsis haemorrhoidalis Schiner is identified by Dr. C. H. Curran (1928–74) from localities in Puerto Rico from Naguabo to Mayaguez.

Sepsis pusio Schiner, first reported from Puerto Rico by Mr. D. W. Coquillett (1900–259) as *Sepsis insularis* Williston, is apparently the most "common and widely distributed species" of the genus, being identified by Dr. C. H. Curran (1928–76) from the U. S. Virgin Islands of St. Croix and St. Thomas, from many localities in Puerto Rico, and from Mona Island.

Sepsis simplex was described by Dr. C. H. Curran (1928–75) from a pair from Adjuntas, others from Arecibo and Naguabo (around horse manure).

Ephydridae

Ephydra gracilis Packard, as determined by Mr. David G. Hall, is one of "Two Insects New to Puerto Rico" (Jour. Agr. Univ. P. R., 21 (4): 535–8. Río Piedras, November 1937) now occurring in great abundance at the margins of the salt lagoons from Faro de Cabo Rojo to Parguera and Guánica, with larvae and pupae present in the concentrated salt water.

According to Mr. C. F. W. Muesebeck, "minor differences in color between the Puerto Rican specimens and those from the continent have been noted by Mr. Hall, but he found the male genitalia to match exactly, and believes that only a single species is involved." Dr. Stuart T. Danforth collected this fly as far back as 1926, but Dr. Aldrich and Dr. Curran identified his specimens only to genus. It was not noted by Mr. R. H. Van Zwaluwenburg at the time he was Entomologist at the Mayagüez Station, "and the great swarms of flies are so noticeable that it is hardly likely they would have escaped his observation if present here at that time." Dr. E. O. Essig (1926–608) notes that the fly is "2.3 to 3.5 mm. long, opaque grey, paler beneath and a slight green tinge above, and bright green legs marked with yellow. The larvae are somewhat transparent white, have eight pairs of long prolegs, and live suspended everywhere in the open water of Great Salt Lake, Utah, and Salton Sea, in salt water at San Francisco and adjacent to the Pacific Ocean at Laguna Beach, California. The fly was introduced from Great Salt Lake into San Francisco Bay by railroad trains after the building of the cut-off at the Lake, as described by Dr. J. M. Aldrich (Psyche, **25**: 30, 1918)." How the fly was carried from California to Puerto Rico in sufficient numbers to become established here is an unsolved problem. It has recently been noted by Mr. Otto H. Swezey as one of the "Insect Invaders in Hawaii during and since World War II" (Journal of Economic Entomology, 41 (5): 669–672. Menasha, October 1948), having been "first collected in a light-trap in the Pearl Harbor area in April, 1946. On July 23, it was found breeding in millions in salt-water ponds near the Moanalua Gardens in a suburban area between Honolulu and Pearl Harbor."

Notiphila erythrocera Loew, originally described from Cuba, was identified by Herr Victor von Roeder from Puerto Rico from material collected by Dr. Gundlach.

Notiphila furcata (Coquillett), originally described as a *Dichaeta* from Biscayne Bay, Florida, was identified by Mr. E. T. Cresson, Jr., (*in* Curran 1928–59) from San Juan, Puerto Rico and from Ensenada.

Notiphila virgata, described by Mr. D. W. Coquillett (1900–259) from Puerto Rico, was identified by Mr. E. T. Cresson, Jr., (*in* Curran 1928–59) from San Juan, Naguabo, Corozal and Adjuntas, and Dr. Curran identified specimens from Tortuguero Lagoon.

Discomyza dubia Williston, originally described from St. Vincent, was identified by Dr. C. H. Curran (1928–62) from the U. S. Virgin Islands of St. Croix and St. Thomas, and from Manatí in Puerto Rico.

Discomyza maculipennis Wiedemann, as identified by Dr. J. M. Aldrich, was intercepted on the hedge of "café de la India" (*Chalcas exotica*) around the Post Office building in San Juan, and on the SS "Catherine" in San Juan harbor.

Paralimna ciliata Cresson was identified by Mr. E. T. Cresson, Jr. (*in* Curran 1928–60) from San Juan, Aibonito and Coamo.

Paralimna decipiens Loew is recorded from Puerto Rico by Mr. D. W. Coquillett (1900–259), and from Georgia and Florida.

Paralimna obscura Williston, originally described from St. Vincent, is listed from Puerto Rico by Mr. Coquillett.

Paralimna plumbiceps Cresson was identified by Mr. E. T. Cresson, Jr. (*in* Curran 1928–60) from Adjuntas and Coamo.

Ptilomyia enigma was described by Mr. D. W. Coquillett (1900–261) from Puerto Rico, the type collected by Mr. Aug. Busck.

Hydrellia calverti Cresson was identified by Mr. E. T. Cresson, Jr. (*in* Curran 1928–60) from Naguabo, Arecibo, Adjuntas and Aibonito.

Hydrellia gilvipes was described by Mr. D. W. Coquillett (1900–261) from Puerto Rico, the type collected by Mr. Aug. Busck.

Pseudohecamede abdominalis (Williston), originally described as a *Hecamede* from St. Vincent and Brasil, was identified by Mr. D. W. Coquillett (1900–260) from Puerto Rico.

Psilopa skinneri Cresson was identified by Mr. E. T. Cresson, Jr. (*in* Curran 1928–60) from Naguabo, San Juan, Cayey, Jayuya and Mayagüez.

Psilopa unica Cresson was identified by its describer (*in* Curran 1928–60) from Adjuntas and Mayagüez, now by Dr. Wirth placed in synonymy with **pulchripes** Loew.

Ilythea fenestralis Cresson was identified by its describer (*in* Curran 1928–60), a single specimen from Aibonito.

Zero flavipes (Williston), originally described from St. Vincent, and also recorded from Brasil, was identified by Mr. D. W. Coquillett from Puerto Rico, and also **Ilythea oscitans** (Walker) as a distinct and valid species.

Athyroglossa nitida Williston, originally described from St. Vincent, is listed by Mr. D. W. Coquillett from Puerto Rico. It has been intercepted at Naguabo.

Hydrochamasa leucoprocta (Loew) was identified by Mr. D. W. Coquillett from Puerto Rico, and he described *Discocerina incisa* (Jour. N. Y. Ent. Soc., **10**: 182. New York, 1902) from type material collected here by Mr. Aug. Busck. Mr. E. T. Cresson, Jr. (Trans. Amer. Ent. Soc., **44**: 58. Philadelphia, 1918) considers the latter a subspecies of the former, and under the name **Discocerina leucoprocta** subspecies **incisa** Coquillett (*in* Curran 1928–62) lists flies collected at San Juan, Manatí, Coamo and Mayagüez.

Discocerina obscura Williston, originally described from St. Vincent, is identified from Puerto Rico by Mr. E. T. Cresson, Jr. (*in* Curran 1928–63): specimens from Naguabo, Cayey and Mayagüez. Dr. Wirth puts it in the subgenus (**Lamproclasiopa**).

Discocerina obscurella (Fallén), first identified from Puerto Rico by Mr.

D. W. Coquillett (1900–261) as *D. parva* Loew, is listed by Mr. E. T. Cresson, Jr. (*in* Curran 1928–63) from Mayagüez and Mona Island. Dr. Wirth considers it the subspecies **nitidiventris** Hendel.

Ceropsilopa adjuncta was described by Mr. E. T. Cresson, Jr. (Entomological News, **36** (6): 165. Philadelphia, 1925), the type from Adjuntas, others from Manatí, Arecibo and Naguabo, as noted in Cresson (1928–61).

Ceropsilopa coquilletti was described by Mr. E. T. Cresson, Jr. (Entomological News, **33:** 136. Philadelphia, 1922) from a single specimen collected on Mona Island by Dr. Frank E. Lutz, as noted in Curran (1928–61).

Ceropsilopa mellipes was described by Mr. D. W. Coquillett (1900–260) as a *Psilopa* from Puerto Rico, the type collected by Mr. Aug. Busck. This fly was later identified by Mr. E. T. Cresson, Jr. (*in* Curran 1928–61) from Naguabo, Adjuntas and Arecibo.

Typopsilopa flavitarsis Cresson, originally described from Bill Williams Fork, Arizona, is recognized by its describer (*in* Curran 1928–61) from Mayagüez and Arecibo.

Leptopsilopa nigrimana (Williston), originally described as *Psilopa nigrimana* Williston from St. Vincent and Brasil, is recognized by Mr. E. T. Cresson, Jr. (*in* Curran 1928–61) from many Puerto Rican localities and from Desecheo Island. It has been intercepted at Bayamón.

Plagiopsis aciculata (Loew), originally described as a *Psilopa* from Cuba, and recorded from St. Vincent and Brasil, was listed by Mr. D. W. Coquillett (1900–260) from Puerto Rico, and was recognized by Mr. E. T. Cresson, Jr. (*in* Curran 1928–62) from many Puerto Rican localities and from Mona Island.

Parathyroglossa centralis (Cresson) is recognized by its describer (*in* Curran 1928–63) from Mayagüez and San Juan.

Anthyroglossa laevis (Cresson) is recognized by its describer (*in* Curran 1928–63) from many Puerto Rican localities.

Chloropidae or Oscinidae: Frit Flies, "Mimis."

The elongate, brownish-green, scale-like larvae of some species of Chloropid fly of which the adult has not been reared, is sometimes to be found on the leaves of young sugar-cane, specimens collected at Guánica having been identified by Mr. C. T. Greene as "near *Meromyza.*" They have been noted in all parts of the Island, but never in abundance.

Chloropisca atra was described by Dr. C. H. Curran (1926–3) from a single female from Arecibo, 2.6 mm. long, with "largely pale colored legs."

Chlorops trivittata Williston, originally described from St. Vincent, was listed by Mr. D. W. Coquillett from Puerto Rico.

Cadrema pallida (Loew), originally described as an *Hippelates* from Cuba, is identified by Dr. C. H. Curran (1928–45) from a single specimen collected by Dr. Frank E. Lutz on Mona Island.

Hippelates apicata, described from Puerto Rico by Mr. J. R. Malloch in "The Genera of Flies of the Subfamily Botanodiinae with hind tibial Spur" (Proc. U. S. National Museum, 46 (2024), pp. 242–55. Washington, D. C., December 6, 1913) on p. 248, is recognized by Dr. C. H. Curran (1928–50) from Mona Island.

Hippelates bicolor Coquillett, originally described from Lake Worth, Florida, is identified by Dr. C. H. Curran (1928–49) from St. Thomas, Manatí in Puerto Rico, and from Mona Island.

Hippelates convexus Loew, originally described from Cuba, is first reported from Puerto Rico by Mr. D. W. Coquillett (1900–265), who (Bulletin No. 10, new series, Division of Entomology, pp. 70–79. Washington, D. C., 1898) notes that the larvae of this little fly occur in burrows in sugar-cane in Florida. Its occurrence in Puerto Rico is recorded by Mr. J. R. Malloch (1913–249), and Dr. C. H. Curran (1928–48) lists it from St. Thomas, from many localities in Puerto Rico, and from Mona Island.

Hippelates collusor was described by Dr. D. H. Curran (1926–4) from a single female from St. Thomas, others from Manatí, Puerto Rico, and from Mona Island. It is 1.5 to 2.0 mm. long, "allied to *bicolor* Coquillett (which) has a much longer vertical triangle."

Hippelates dorsatus Williston, originally described from St. Vincent, is recognized by Dr. C. H. Curran (1928–46) from Mona Island: three specimens collected by Dr. Frank E. Lutz.

Hippelates flavipes Loew, originally described from Cuba, was first identified from Puerto Rico by Mr. D. W. Coquillett (1900–265), and listed by Mr. R. H. Van Zwaluwenburg as number 1712. Dr. C. H. Curran (1928–49) identifies it from the Island of St. Thomas, from San Juan, Arecibo and Orocovis in Puerto Rico, and from Mona Island, and (1931–11) from Vieques Island. He also identified as *H. partitus* Becker, which is the male of *H. flavipes* Loew, a single specimen from Aibonito (1928–48), and subsequently (1931–11) a male from Vieques Island collected by Prof. Wm. T. M. Forbes. It has been intercepted in San Juan, resting on the hedge of "café de la India" (*Chalcas exotica*) around the Post Office building. *Hippelates nudifrons*, described by Mr. J. R. Malloch (1913–242), the type from Puerto Rico and from Vieques Island, is another synonym.

Hippelates ilicis was described by Dr. C. H. Curran (1926–4) from a male from Arecibo, Puerto Rico, others from Manatí, and additional specimens from St. Thomas. It is 1.5 to 2.0 mm. long, "colored as in *apicata* Malloch (of which Mr. Sabrosky considers it a synonym), but the mesonotum is less hairy."

Hippelates incipens was described by Dr. C. H. Curran (1926–5) from a female from Naguabo, another from Coamo Springs, Puerto Rico.

Hippelates impressus Becker was identified by Dr. C. H. Curran (1928–

47) from fourteen specimens collected on the Island of Desecheo, February 18–20, 1914, by Dr. Frank E. Lutz.

Hippelates lutzi was described by Dr. C. H. Curran (1926–5) in honor of its collector, Dr. Frank E. Lutz; the types from Mona Island, February 21–26, 1914. It may be "readily recognized by the entirely pale yellow abdomen and legs, face, cheeks and front reddish-yellow; thorax and scutellum shining black; legs and abdomen wholly pale yellow; wings hyaline, veins yellow."

Hippelates nigricoxa Malloch was identified by Dr. C. H. Curran (1928–48) from St. Thomas, and from many localities in Puerto Rico.

Hippelates nobilis Loew, a continental species, was identified by Dr. C. H. Curran (1928–48) from Arecibo, Aibonito and Adjuntas.

Hippelates pallipes Loew, as determined by Dr. J. M. Aldrich, together with **Hippelates pusio** Lew, also determined by Dr. Aldrich, are reported by Dr. H. L. Van Volkenberg. (1939–4) as "common on cattle and other animals. Apparently these two species are the most common of the *Hippelates* attracted to cattle and other livestock," altho only a single collection, recorded as Bishopp No. 18780, was made on which to base this statement. Previous identification by Dr. Aldrich of material collected at Guánica, from dogs, horses and man, was *Hippelates texanus* Malloch, but even this may not include all the species lumped together under the term "mimi" to designate the tiresome and annoying little black flies which tend to swarm at every body opening of the larger mammals, at wounds and sores, and even often coming to rest on any part of the body of a sweaty horse or its rider. Not entirely absent in the more humid parts of the Island or in the mountains, they become very numerous in the more xerophytic areas, and most active during the hottest and brightest part of the day. They even enter houses, and may be excluded only when the shutters are kept closed (incidentally also cutting out the breeze), so that the inhabitants live in semi-darkeness when the sun is shining most brightly outside. At Haina, Santo Domingo, mimis, identified by Dr. J. M. Aldrich as *Hippelates flavipes* Loew, entered the room within a few minutes after the sun rose, and were excluded by closing the shutters and keeping them closed until a few minutes before sunset. Mr. C. W. Sabrasky states that *H. pallipes* does not occur in Puerto Rico and all records under that name are probably **Hippelates flavipes** Loew. *Hippeoates texanus* is a synonym of *H. dissidens* (Tucker), but he doubts the occurrence of this species in Puerto Rico.

Hippelates pusio Loew, originally described from Texas, but noted by Mr. D. W. Coquillett (1900–265) as occurring "as far north as New Bedford, Mass." as well as in Puerto Rico, is listed by Dr. C. H. Curran (1928–49) as having been collected only at Arecibo, Adjuntas, Ensenada and on

Mona Island. This species and *Hippelates flavipes* Loew are cited by Dr. E. A. Schwarz in "The Hippelates Plague in Florida" (Insect Life, VII, p. 374–9, illus. Washington, D. C., July 1895) as most annoying to people and dogs.

Hippelates peruanus Becker is first recorded from Puerto Rico by Mr. J. R. Malloch (1913–244). Dr. C. H. Curran (1928–49) recognizes it from St. Croix, in Puerto Rico from San Juan, Arecibo, Jayuya and Adjuntas, and (1931–11) from Vieques Island.

Hippelates scutellaris Williston, originally described from St. Vincent, is represented in the collections examined by Dr. C. H. Curran (1928–47) by a single specimen from Adjuntas.

Hippelates tener was described from Puerto Rico by Mr. D. W. Coquillett (1900–265), and was noted by Mr. J. R. Malloch (1913–255). Dr. C. H. Curran (1928–47) lists but a single specimen from Arecibo, and one from Mona Island.

Eugaurax insularis was described by Mr. J. R. Malloch (Insecutor.Inscitiae Menstruus, **1**: 61. 1913) from specimens from Puerto Rico previously reported by Dr. D. W. Coquillett as *Oscinis qudrilineata* Williston, according to Mr. C. W. Sabrosky (Jour. Washington Academy of Sciences, **40** (6): 188. June 15, 1950).

Pseudogaurax lancifer was described by Mr. D. W. Coquillett (1900–265) as a *Gaurax* from Puerto Rico and the Island of Montserrat, reared from the egg-sacs of spiders. Those of *Gasteracanthia cancriformis* covered with greenish silk served as host at Pt. Cangrejos and Río Piedrás, and possibly may have been the species from which the type was reared. These little yellow flies, with enormous scuttelum, have brown eyes and abdomen, and median stripe from base of thorax. One was intercepted resting on a guava leaf at Barceloneta.

Pseudogaurax misceomaculata was described by Mr. David G. Hall as one of "The North and Central American spider parasites of the genus *Pseudogaurax* (Diptera: Chloropidae)" (Jour. Washington Academy Sciences, **27** (6): 255–261, fig. 7. Washington, D. C., June 15, 1937) from a single specimen intercepted at Bayamón by Mr. C. G. Anderson, January 28, 1934, on leaves of flamboyán. It has a broad median band on thorax extending to apex.

Elachiptera flavida Williston, described originally from St. Vincent, was recognized by Dr. C. H. Curran (1928–50) from Puerto Rico: a single female from Cayey.

Madiza mattea was described by Dr. C. H. Curran (1926–5) from a single male from Adjuntas, 1.25 mm. long, of which "the vertical triangle reaches the anterior margin of the front and the tibiae are pale."

Madiza quinquilineata (Adams) is recognized, with some doubt, by Dr.

C. H. Curran (1928–50) from St. Thomas, and Manatí and Coamo in Puerto Rico.

Siphunculina signata (Wollaston) as determined by Dr. J. M. Aldrich, was intercepted in the metropolitan area of San Juan.

Oscinella anonyma (Williston), originally described as an *Oscinis* from St. Vincent, was listed from Puerto Rico by Mr. D. W. Coquillett from various localities, and Dr. C. H. Curran (1928–54) doubtfully identifies it from Naguabo, Cayey, Manatí and Arecibo.

Oscinella anonyma var. pura was described by Dr. C. H. Curran (1926–7) as a *Botanobia* from a single male from San Juan, and another from Roseau, Dominica, B. W. I., with (1928–52 and 54) the head and wing illustrated.

Oscinella confusa (Malloch) is recognized and re-described by Dr. C. H. Curran (1928–55) from females from Cayey and Mayaguez, as a *Botanobia.*

Oscinella diversipes is described as a *Botanobia* by Dr. C. H. Curran (1926–7) from a male and others from Arecibo, 1.75 mm. long, with "wholly yellow anterior femora."

Oscinella forbesi was described by Dr. C. H. Curran (1931–12) and named in honor of the collector: Prof. Wm. T. M. Forbes, from a pair and many others from Vieques Island, besides others from the Island of St. Thomas, and many from the humid areas of Puerto Rico. This fly is distinct from *O. coxendix* Fitch, recorded from Puerto Rico by Mr. D. W. Coquillett (1900–266) and "from New Hampshire to Florida and westward to Colorado." According to Dr. Curran it "does not occur on the Islands." *O. forbesi* is 1.1 to 1.5 mm. long, "black, the head and legs largely yellowish; mesonotum wholly pollinose, ocellar triangle pollinose."

Oscinella limitata Becker, originally described from Haiti, is recognized by Dr. C. H. Curran (1928–53) from the Island of St. Thomas, from many localities in the more humid and mountainous parts of Puerto Rico, and from Mona Island.

Oscinella lutzi was described as a *Botanobia* by Dr. C. H. Curran (1926–6) from a single male from Arecibo, and others from there and Adjuntas.

Oscinella mars was described by Dr. C. H. Curran as a *Botanobia* (1926–10) from flies collected at Naguabo, others from Mona Island. The head is illustrated (1928–53) and the wing (1928–57), with no record of additional collections.

Oscinella mona was described as a *Botanobia* by Dr. C. H. Curran (1926–9) from 23 specimens collected by Dr. Frank E. Lutz on Mona Island, and to date found nowhere else, the subsequent notice (1928–56) being accompanied only by figures of the head and wing.

Oscinella magnipalpoides was described as a *Botanobia* by Dr. C. H.

Curran (1926–11) from a pair from Arecibo, others from San Juan, his later notice (1928–57) merely accompanying figures of head and wing.

Oscinella nana (Williston), described as an *Oscinis* from St. Vincent, is identified from Puerto Rico by Mr. D. W. Coquillett (1900–267).

Oscinella obscura (Coquillett), described (1900–266) from Puerto Rico, the type collected by Mr. Aug. Busck, is recognized by Dr. C. H. Curran (1928–56) from Naguabo, San Juan and Manatí, having black palpi, "wholly yellow anterior four tibiae."

Oscinella palliata was described as a *Botanobia* by Dr. C. H. Curran (1926–8) from eight specimens from Adjuntas, 2.5 to 3.0 mm. long, the legs reddish, "wings with a slightly brownish tinge."

Oscinella plesia was described by Dr. C. H. Curran (1926–11) as a *Botanobia* from a single female from Arecibo, 1.6 mm. long.

Oscinella sicatrix was described as a *Botanobia* by Dr. C. H. Curran (1926-8) from seventeen reddish-brown flies from Mona Island collected by Dr. Frank E. Lutz, which, on the posterior tibiae "bear an unusually conspicuous, elongate sensory area." Later mention (1928–56) is accompanied by figures of head and wing.

Oscinella tripunctata was described as a *Botanobia* by Dr. C. H. Curran (1926-10) from three flies collected by Dr. Frank E. Lutz on Mona Island. His later record (1928-56) accompanies figures of head and wing.

Oscinella umbrosa (Loew), a continental species reared from wheat, and reported from Puerto Rico by Mr. D. W. Coquillett (1900–267), and *Oscinella virgata* (Coquillett), originally described as an *Oscinis* from Colorado, also recognized by the describer from Puerto Rico, may presumably be referred to some of the numerous endemic species since described by Dr. Curran.

Oscinella varipalpus was described by Dr. C. H. Curran (1926-12) as a *Botanobia* from three black flies, 1.75 mm. long, from Mona Island, and one from San Juan, Puerto Rico. His later record (1928–28) is accompanied by figures of wing and head.

Asteiidae

Crepidohamma bicolor (Loew), originally described as a *Sigaloëssa* from Cuba and thus listed from Puerto Rico by Mr. D. W. Coquillett (1900–267), has been intercepted resting on banana at Bayamón. Its mesonotum and front are wholly shining black.

Crepidohamma rica (Curran) (= *Sigaloëssa insularis* Curran 1931, not Malloch 1930) was described from a single female collected by Prof. Wm. T. M. Forbes on Vieques Island, 1.5 mm. long, "brownish red or pale ferrugineous and yellow."

Drosophilidae: Pomace Flies

Drosophila ananassas de Meijere was identified by Dr. J. T. Patterson for Dr. G. A. Lebedeff, who collected this material from banana fruit. Dr. Lebedeff, previous to his employment in the Division of Genetics, Agricultural Experiment Station at Río Piedras, had worked extensively in the genetics of Drosophilid flies, and upon arrival in Puerto Rico, collected material for identification. This is the only new record for Puerto Rico of what he submitted for determination.

Drosophila ampelophila Loew, described originally from Cuba, but found in Europe, north Africa and in the United States, where it is called by Prof. John R. Comstock "the vine-loving pommace fly," the larvae developing in apple pommace or decaying applies, has been repeatedly intercepted in Puerto Rico, as identified by Mr. C. T. Green, on banana at Maricao, on guava at Arecibo, and on non-significant hosts in the metropolitan area. It has been reared from ripe fruit of "jobo" or hog-plum (*Spondias mombin*) at Río Piedras. Dr. Wirth places it in synonymy with **melanogaster** Meigen.

Drosophila funebris (Fabricius), originally described as a *Musca* from Europe, was recorded by Mr. D. W. Coquillett (1900-264) from Puerto Rico and "over the greater portion of the United States."

Drosophila fusca was described by Mr. D. W. Coquillett (1900-264) from material collected in Puerto Rico by Mr. Aug. Busck. It is probably **lutzii.**

Drosophila lutzi Sturtevant was identified by Dr. C. H. Curran (1928-64) from Puerto Rico, the material he examined containing more than thirty specimens from the Luquillo National Forest.

Drosophila melanica Sturtevant, as identified with some doubt by Mr. C. T. Greene, was intercepted by Mr. R. G. Oakley at Adjuntas.

Drosophila melanogaster Meigen was first listed from Puerto Rico by Mr. H. H. Van Zwaluwenburg as P. R. 110. Dr. Richard T. Cotton reared these flies from fallen and decaying oranges at Río Piedras, as identified by Dr. J. M. Aldrich, and Dr. J. A. Patterson identified as this species the material submitted by Dr. G. A. Lebedeff, collected on banana fruit.

Drosophila repleta Wollaston, identified by Mr. C. T. Greene, as *D. punctulata* Loew, has been intercepted in the metropolitan area, reared from ripe and rotting fruit of "jobo" or hog-plum (*Spondias mombin*).

Drosophila repleta Wollaston was first identified from Puerto Rico by Dr. C. H. Curran (1928-64): two specimens from Santurce: later, others in the AMC collection from Mayagüez, Coamo and Río Piedras It has

been intercepted in grapefruit groves at Palo Seco and Añasco, and reared from a ripe fruit on the tree in a grove at Barceloneta.

Drosophila similis Williston is one of the many of this genus described from St. Vincent which occurs in Puerto Rico, Dr. C. H. Curran identifying specimens from Mayagüez in the AMC collection.

Dr. J. M. Aldrich identified only to "sp. nov." the *Drosophila* reared from the ovary of the flower of "tibéy" (*Isotoma longiflora*), at Río Piedras and intercepted at Vega Baja.

Scaptomyza vittata (Coquillett), described as a *Drosophila* from Charlotte Harbor, Florida, was recognized by the describer as present in Puerto Rico (1900-264), and has since been intercepted at Vega Baja, resting on squash.

Cladochaeta nebulosa was described from Puerto Rico by Mr. D. W. Coquillett (1900-263), the type collected by Mr. Aug. Busck.

Leucophenga frontalis (Williston), described originally as a *Drosophila* from St. Vincent, was identified by Dr. C. H. Curran from Puerto Rico: specimens in the AMC collection from Coamo Springs, Río Piedras and Mayaguez.

Leucophenga varia (Walker), a continental species originally described as a *Drosophila* from Georgia, was identified from Puerto Rico by Mr. C. T. Greene, resting on a leaf of young sugar-cane at Coloso.

Geomyzidae

Anthomyza nigrimanus was described by Mr. D. W. Coquillett (1900-264) from Puerto Rican material collected by Mr. Aug. Busck. Dr. J. M. Aldrich identified as a new species of *Tethina* a fly intercepted at San Juan.

Stenomicra angustata was described by Mr. D. W. Coquillett (1900-262) from material collected by Mr. Aug. Busck in Puerto Rico, but has not since been noted.

Agromyzidae: Leaf-Mining Flies

Agromyza caerulea Malloch is presumed by Dr. J. M. Aldrich to be the *Agromyza aeneiventris* Fallén reported from Puerto Rico by Mr. D. W. Coquillett (1900-268). *Agromyza aeneiventris* Fallén is the doubtful determination by Mr. C. T. Greene of flies very persistent in resting on the leaves of "cucubano" (*Coccoloba laurifolia*) on Mona Island. It has since been intercepted in the common "margarita" or shepherd's needles (*Bidens pilosa*) from Guayama, and reared from the stem of *Eupatorium odoratum* and from seeds of morning glory by Dr. Richard T. Cotton. Messers. W. K. Bailey and H. K. Plank report it as "An Agromyzid Fly Infesting Sweet Potato Seed in Puerto Rico" (Jour. Ec. Ent., 33 (4): 704–5. Menasha,

August 1940), attacking the true botanical seed; not slips or small tubers, and so rarely (less than 2% infestation) as hardly to be of economic importance even to the plant breeder.

Agromyza ipomaeae was described by Prof. S. W. Frost as one of "New Species of West Indian Agromyzidae (Diptera)" (Entomological News, 43 (3): 72-6. Philadelphia, March 1931), the type from Puerto Rico: the larva a miner in the leaves of sweet potatoes. Dr. M. D. Leonard (1931-119, 1932-137, 1933-123) noted the presence of this leaf-miner in all fields of sweet potatoes examined, but not in sufficient abundance to be of economic importance.

Agromyza inaequalis was described by Mr. J. R. Malloch (Proc. Ent. Soc. Washington, 16 (2): 89–90, fig. 1. Washington, D. C., June 1914) from material reared by Mr. Thos. H. Jones from leaves of beans (*Vigna repens*) at Río Piedras. This leaf-miner also attacks the leaves of lima beans and Dr. M. D. Leonard (1932-124) reports a leaf-miner, probably this species, as fairly common on cabbage plants grown at Río Piedras in April.

Agromyza insularis Malloch, as determined by Dr. J. M. Aldrich, was reared by Dr. Richard T. Cotton from seed pods of Chinese mustard.

Agromyza jucunda Van der Wulp, a common continental leaf-miner, was listed by Mr. D. W. Coquillett from numerous hosts in the United States, and without host record from St. Vincent and Puerto Rico. It was identified by Mr. J. R. Malloch for Mr. Thos. H. Jones from adults reared from mined leaves of *Eupatorium odoratum*, and from leaves of wild morning glory intercepted at Vega Alta. Adults have been found resting on the hedge of "café de la India" (*Chalcas exotica*) around the Post Office in San Juan, and intercepted at Guayama, and at Mayagüez in a grapefruit grove.

Agromyza maculosa Malloch was identified by Dr. C. H. Curran (1928-65) from numerous localities in Puerto Rico from Cayey to Ensenada, and specimens from Mayagüez in the AMC collection. Young aster plants, grown from imported seed by Mr. Francisco Seín, had their small leaves almost entirely destroyed by the mines of this species, as determined by Dr. J. M. Aldrich: a record mentioned by Prof. S. W. Frost (1931-76). More recently the leaves of sunflower, *Helianthus annus*, at La Plata, have been found attacked by it.

Agromyza melampyga Loew, a common continental species, was identified by Dr. C. H. Curran (1928-65) from Naguabo and Arecibo.

Agromyza minima was described by Mr. J. R. Malloch in his "Revision of Species of Agromyza" (Ann. Ent. Soc. America, 6 (3): 329. Columbus, 1913), the type from Puerto Rico.

Agromyza neptis Loew was listed from Puerto Rico by Mr. D. W. Coquillett.

Agromyza parvicornis Loew was determined by Mr. W. R. Walton for Mr. Thos. H. Jones, who had reared the adults from mines in the leaves of corn: a record that is noted by Prof. S. W. Frost (1931-36). Dr. C. H. Curran (1928-66) identified a single adult collected at Adjuntas.

Agromyza platyptera Thomson, described originally from California, was identified by Dr. C. H. Curran (1928-65) from Naguabo and Jayuya.

Agromyza plumiseta was described from Puerto Rico by Mr. J. R. Malloch (1913-324).

Agromyza pusilla Meigen was listed from Puerto Rico by Mr. D. W. Coquillet as *Agromyza diminuta* Walker, and has since been repeatedly intercepted: reared at Cidra from larvae mining in pea leaves; at Humacao from larvae in leaf of "cohitre" (*Commelina longicaulis*); at Guayama from flower heads of "margarita" (*Bidens pilosa*). In the Island of St. Croix and St. Thomas, and in Haiti, this leaf-miner is a common pest of onions, making a tunnel that appears light-colored or yellowish part way around the stalk and then irregularly up or down, but not causing irreparable injury unless several or many maggots are present in the single central stalk. Much more severe injury occurs in Chinese cabbage or Chinese mustard, in some instances the entire under surface of the larger outer leaves being destroyed by mass infestations. Mr. Charles E. Wilson, from his experience with the "Truck-Crop Insect Pests in the Virgin Islands and Methods for Combating Them" (Bulletin No. 4, Virgin Islands Agr. Exp. Station, pp. 35, fig. 23. Washington, D. C., 1923), named this the "Mustard Leaf-Miner," and records that "on January 31, 1921, 2,128 larvae were taken from one leaf of elephant-ear mustard. The full-grown worm is of pale yellow color, very active, and when ready to pupate, drops to the ground from the leaf in which it has been feeding. The pupa is small and of light yellowish-brown color." He found the only method of satisfactory control was to pick and destroy such mass-infested leaves. Surprisingly enough, no injury of any of these economic hosts has been noted by this Agromyzid fly in Puerto Rico.

Agromyza setosa Loew is listed from Puerto Rico by Mr. D. W. Coquillett.

Agromyza virens Loew is identified by Dr. C. H. Curran (1928-65) from many Puerto Rican localities from Naguabo to Mayagüez, and from the Virgin Islands of St. Thomas and St. Croix. It has repeatedly been intercepted at Mayagüez.

Agromyza viridula was described from Puerto Rico by Mr. D. W. Coquillett as one of "New Acalyptrate Diptera from North America" (Jour. N.

Y. Ent. Soc., **10**: 190. New York, December 1902). It was recognized by Dr. C. H. Curran (1928-66) from the U. S. Virgin Islands of St. Croix and St. Thomas, and from numerous localities in Puerto Rico. It has been intercepted at Guayama, and at numerous localities in the mountains and on the north coast of Puerto Rico.

Agromyza xanthophora Schimer, as determined by Dr. J. M. Aldrich, has been intercepted in an orange grove at Mayagüez by Mr. A. G. Harley.

Cerodontha dorsalis (Loew), originally described as an *Odontoera* in the United States, a miner in wheat and timothy, was listed from Puerto Rico as a *Ceratomyza* by Mr. D. W. Coquillett (1900-269), and subsequently identified by Mr. J. R. Malloch for Dr. Richard T. Cotton, who had reared adults from mines in the leaves of corn. Altho quite common it is of negligible importance as an economic pest, presumably being heavily parasitized as are the other Agromyzid flies.

"*Cryptochaetum iceryae* (Williston) was one of the natural enemies of *Icerya purchasi* Maskell introduced by F. S. Crawford and Albert Koeble from Australia into California in 1888–9. The adults are 1.5 mm. long, the head and thorax metallic dark blue, and the abdomen iridescent green. They are rather slow in movement, crawling slowly over the cottony cushion scale, inserting one to several minute, oblong, oval, smooth, pearly white eggs preferably in the half grown hosts," according to Dr. E. O. Essig (1926-615). An unsuccessful attempt at introduction of this parasite of the cottony cushion scale into Puerto Rico was made shortly after the hurricane of San Ciprián, its failure being ascribed to the scarcity of the host at this time. Another sending by airmail from Riverside, California, October 31, 1933, was received in good condition at Río Piedras on November 7th, from which adults were released as they emerged, in the Condado. No recovery was obtained from subsequent weekly collections of the host. From a shipment made March 25, 1940 from Whittier, California, received in Río Piedras on the 28th, and taken to Mona Island on the 29th, releases were made daily until April 5th, and all adults emerging subsequently were released at Río Piedras. From numerous collections of *Icerya purchasi* at Río Piedras and in other parts of Puerto Rico, and from Mona Island, no adult of this introduced parasite has been reared.

Chamaemyiidae (Ochthiphilidae)

Leucopis bella Loew, originally described from Cuba, but with an extensive distribution in the United States and southern Canada, was listed by Mr. D. W. Coquillett (1900-269) from Puerto Rico, reared by Mr. Aug. Busck from larvae feeding on the mealybugs *Dactylopius citri*. Mr. D. L. Van Dine reared several of these small grey flies from *Pulvinaria psidii* Maskell, a mealybug on "jobo" (*Spondias mombin*) at Arroyo, in February

1912. A single fly was collected by Prof. Wm. T. M. Forbes on Vieques Island, as identified by Dr. C. H. Curran (1931-13), who notes that the larvae are predaceous on aphids and mealybugs, and may be recognized by their triangular shape.

Acrometopia maculata Coquillett, originally described from Cuba, was identified by Dr. C. H. Curran (1928-66): seven specimens collected by Dr. Frank E. Lutz on Mona Island.

Milichiidae

Eccoptomma montanum Becker, originally described from Perú, is identified by Dr. C. H. Curran (1928-66) from Puerto Rico: a single male from Mayagüez. It is 2.5 mm. long, "black; abdomen argenteous except the base and apex."

Milichiella arcuata (Loew), originally described as a *Milichia* from Long Island, New York, was identified by Dr. C. H. Curran from a single male, collected by Dr. Frank E. Lutz on Desecheo Island.

Milichiella cinerea was described as an *Ophthalmomyia* from Puerto Rico by Mr. D. W. Coquillett (1900-268), the type material having been collected by Mr. Aug. Busck.

Milichiella lacteipennis (Loew), originally described as a *Lobioptera* from Cuba, and listed as an *Ophthalmomyia* from St. Vincent and by Mr. D. W. Coquillett (1900-267) from Puerto Rico, is considered by Dr. C. H. Curran (1928-67) to "agree perfectly with Coquillett's description of *Desmometopa halteralis* (1900-267)," and of it he recognizes specimens from San Juan, Manatí, Adjuntas and Mayagüez in Puerto Rico, and from Desecheo and Mona Islands collected by Dr. Frank E. Lutz. Prof. Wm. T. M. Forbes collected this fly on Vieques Island, as identified by Dr. Curran (1931-14), and it has been intercepted resting on eggplant at Loíza, and on the hedge of "café de la India" (*Chalcas exotica*) around the Post Office building in San Juan.

Desmometopa M-nigrum (Zetterstedt), originally described as an *Agromyza*, was identified by Dr. C. H. Curran (1928-68): a single specimen from Jayuya. It has been intercepted on leaves or flowers of grapefruit at Mayagüez and Arecibo, and also found resting on the hedge of "café de la India (*Chalcas exotica*) around the Post Office building at San Juan. As identified by Mr. C. T. Greene, it was found dead on the window-sill of the cotton gimmery at Isabela after its interior had been sprayed with DDT.

Desmometopa tarsalis Loew, described originally from Cuba, was recognized by Dr. C. H. Curran (1928-68): a single specimen collected by Dr. Frank E. Lutz on Desecheo Island.

Pholeomyia indecora (Loew), originally described as a *Lobioptera* from

Cuba and listed as a *Milichia* by Mr. D. W. Coquillett (1900-263) from Puerto Rico and the United States "ranging from New Hampshire to Georgia," is recognized by Dr. C. H. Curran (1928-68): a single female from Mayagüez and a single female from Mona Island.

Hippoboscidae: Birdflies or Louseflies

Melophagus ovinus (Linnaeus), originally described as a *Hippobosca* from domestic sheep in Europe, was P. R. 91 in Van Zwaluwenburg's list, presumably having been collected on a recently imported sheep. It has not been noted since, but there can be little doubt as to the authenticity of the original record.

Ornithoctona erythrocephala (Leach), originally described as an *Ornithomyia* from Brasil, without host record, is listed by Dr. Stahl as *Ornithomyia cryptocephala* Leach, and by Dr. Gundlach as *Ornithomyia erthrocephala* Leach, as identified by Herr Victor von Roeder, noting that "se encuentra en aves de diferentes familias". It was collected on sparrow hawk by Mr. Aug. Busck at Adjuntas, and on Culebra Island, as noted by Mr. D. W. Coquillett (1900-269). Dr. C. W. Johnson (Psyche, **29**: 84 Cambridge, 1922) also reports it on this host from Puerto Rico. In the AMC collection, as identified by Dr. C. H. Curran, are specimens from Lajas, and from W. I. red-tailed hawk at Las Marías. Dr. J. E. Bequaert in his "Notes on Hippoboscidae. 17. The Hippoboscidae of the Antilles" (Memorias de la Sociedad Cubana de Historia Natural, **14** (4): 305–327. Habana, December 31, 1940), on page 316 gives additional records: at Adjuntas from *Otus nudipes nudipes* (H. E. Anthony); at Parguera from *Asio flammeus portoricensis* (M. Agraït), and at El Yunque, from *Buteo platypterus cubanensis*.

Olfersia aenescens C. G. Thomson, originally described without host record from the Keeling Island in the Indian Ocean, was first identified from Puerto Rico by Dr. J. M. Aldrich as *Olfersia diomedeae* Coquillett, taken from a booby from Desecheo Island on May 1927, by Dr. Stuart T. Danforth. It was subsequently listed by Dr. J. Bequaert (Psyche, 40: 103. Cambridge, 1933) as *Olfersia erythropsis* Bigot, and correctly (1940-320), with the note that it is "almost cosmopolitan in tropical seas, found on various marine birds, particularly albatross, tropic bird, booby, petrel, noddy and tern."

Olfersia fossulata Macquart, originally described from Brasil without host record, was found by Dr. Stuart T. Danforth on booby (*Sula leucogaster*) on Desecheo Island, as recorded by Dr. J. E. Bequaert (1933-105 and 1940-321).

Olfersia spinifera (Leach), originally described as a *Feronia*, was collected by Prof. J. A. Ramos from man-o'war bird (*Fregata magnificens*

rothschildi) at Mayagüez and on Mona Island, the flies being identified by Dr. Alan Stone. According to Dr. Bequaert (1940-320), "this species is found throughout most tropical seas, the normal host being man-o'war birds, although occasionally it strays onto other marine birds."

Lynchia albipennis (Say), originally described as a *Olfersia*, was collected by Dr. Alex Wetmore at Río Piedras, December 22, 1916, the host not recorded. According to Dr. Bequaert (1940-323), it is "common and widely distributed in the New World, from Massachusetts to Brasil and the Galapagos; the usual parasite of many wading birds, accidentally found also on duck and gulls."

Pseudolynchia canariensis (Macquart) was identified from Puerto Rico by Dr. J. M. Aldrich as *Lynchia maura* Bigot, the flies taken from domestic pigeons in 1921. "Originally an Old World fly," according to Dr. Bequaert (1940-324), it "has been spread by man with domestic pigeons to most tropical and warm temperate regions." In Puerto Rico, it has been found on pigeons at Yabucoa, Río Piedras, Coamo, San Germán and Mayagüez.

Streblidae: Batflies

Trichobius dugesii Townsend, described originally from Mexico, was identified by Herr Victor von Roeder as *Strebla vespertilionis* Fallén for Dr. Gundlach, who noted that it "vive sobre los murciélagos, y se le conoce en Cuba y otras Antillas." Mr. D. W. Coquillett lists it from Puerto Rico, as well as from Jamaica and Arizona, and this specimen, collected by Mr. Aug. Busck at Bayamón has been re-examined by Dr. J. E. Bequaert, who confirms the original determination. Dr. J. W. Jobling (Parasitology **30** (3): 383. Baltimore, 1938) records collection in Puerto Rico from *Artibeus jamaicensis*. Dr. H. L. Van Volkenberg (1939-4) records, as identified by Dr. Alan Stone, the collection of this fly from bat by Dr. H. D. Tate at Boquerón.

Trichobius pseudotruncatus Jobling (= *T. kesselae* Jobling), as identified by the describer, was taken from *Artibeus jamaicensis* in Puerto Rico.

Trichobius truncatus Kessel, as identified by Dr. J. W. Jobling, was taken from *Artibeus jamaicensis* in Puerto Rico.

Aspidoptera busckii was described by Mr. D. W. Coquillett as one of "New Genera and Species of Nycteribidae and Hippoboscidae" (Canadian Entomologist, **31** (11): 333–6. London, November 1899), named in honor of the collector who found it on bats (*Artibeus* sp.) at Bayamón.

Pterellipsis aranea was described by Mr. D. W. Coquillett (1899–334) from material collected on bats at Bayamón by Mr. Aug. Busck, and additional specimens from Jamaica and Montserrat. It has since been collected on bats from a cave near Boquerón by Dr. H. D. Tate, as noted by Dr. H. L. Van Volkenberg (1939-4). From a host, *Brachyphylla cavernarum*,

it has been identified by Dr. J. E. Bequaert, as noted by Dr. H. E. Anthony on page 39 of his "Mammals of Porto Rico, Living and Extinct" (Scientific Survey of Porto Rico and the Virgin Islands, 9 (1): 1–238, pl. 54. New York, 1925).

Paradyschira dubia Rudow was identified from Puerto Rico as *P. fusca* Speiser by Dr. J. C. Bequaert, as noted by Dr. Anthony (1925-18), taken from *Noctilio leporinus mastivus* from a cave (Piedra de la Cueva) at Loíza Aldea.

SIPHONAPTERA

Fleas

Pulicidae: Common Fleas

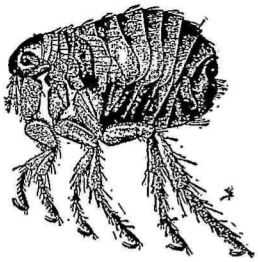
Xenopsylla cheopis (Rothschild), the tropical rat flea, originally described as *Pulex* from Egypt, is by far the most abundant flea in Puerto Rico, not mentioned by Dr. Gundlach, but number 1714 "on rat" in Van Zwaluwenburg's list. In the preliminary, third and final reports on "A Rat-Flea Survey of the City of San Juan, Porto Rico" (P. R. Review (or Journal) of Public Health and Tropical Medicine, **3** (2): 131–145, August 1927; **4** (2): 84–92, San Juan, August 1928; **5** (2): 158–166, San Juan, August 1929, *and* Public Health Reports, **43** (11): 611–616, Washington, D. C., March 16, 1928 and **47** (4): 193–201, Washington, D. C., January 22, 1932) conducted by Drs. O. H. Cox, A. L. Carrion and Carroll Fox, this one flea was found to constitute 99.5 to 98.5 percent of the total flea population of rats. The comparable rat-flea survey of Santurce now being made by Dr. Irving Fox is yielding comparable results as to the abundance of this species and the scarcity of others, to date having added no new records to the known flea population of the Island. Mr. Jenaro Maldonado Capriles has summarized all the known data on "The Fleas of Puerto Rico" (P. R. Journal of Public Health and Tropical Medicine, **21** (2): 173–183 and in Spanish 184–192, fig. 8. San Juan, December 1945), emphasizing the importance of this species in its role as vector of bubonic plague. In continental United States the distribution of this flea is confined to seaport cities and to islands of infestation in the interior, as related by Drs. H. E. Ewing and Irving Fox in discussing "The Fleas of North America" (U. S. D. A. Miscellaneous Publication No. 500, pp. 142, fig. 13, ref. 91. Washington, D. C. February 1943). No information is available as to the rat-flea population of the interior of Puerto Rico, or away from towns in the mountains, as on El Yunque, where rats were extremely abundant when much construction and road building was in progress there.

Ctenocephalides canis (Curtis), given as No. 1708 in Van Zwaluwenburg's list "on dog," was shown in the Cox-Carrion-Fox rat-flea survey to be very scarce on rats. Dr. H. L. Van Volkenberg (1932-26) lists this species as a *Ctenocephalus* as the only one found on mongoose, and (1939-3), without indicating who identified the material, as "very common on dog, also collected from cat and mongoose." "*Ctenocephalides felis* and *C. canis* are almost cosmopolitan," according to Drs. Ewing and Fox (1943-109), "both species having followed man into many parts of the

world. However, in certain regions one species may occur to the exclusion of the other," and Dr. Fox hesitates in asserting that the dog flea is present in Puerto Rico, the typical flea locally present on dogs being *C. felis.*

Ctenocephalides felis (Bouché) is number 1817 in Van Zwaluwenburg's list, "on rat." The Cox-Carrion-Fox rat-flea survey showed it and or the dog flea to be very scarce on rats in Puerto Rico.. Dr. M. A. Stewart identified this flea from dog, and from confined calves for Dr. H. L. Von Volkenberg, but he (1939-4) lists it as "common on cat."

Pulex irritans irritans Linnaeus, originally described from material collected on man, in Sweden, is now thought by Drs. Ewing & Fox to have originated in the New World. It was first listed from Puerto Rico by Dr. Stahl, and was identified by Dr. F. C. Bishopp from material collected on



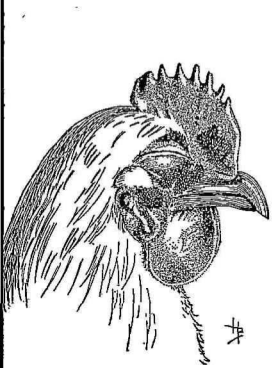
Pulex irritans Linnaeus, greatly enlarged. (After Bishopp, U. S. D. A.)

man at Pt. Cangrejos. Out of over a thousand rats examined in the Cox-Carrion-Fox rat-flea survey, only four fleas of this species were collected. It was not listed from Mayagüez by Mr. R. H. Van Zwaluwenburg, but material from man at Mayagüez was identified by Dr. H. E. Ewing for Dr. H. L. Van Valkenberg, who notes it (1939-3) as "infrequent on dog and rat." The quite general replacement of wooden floors by tile or concrete has greatly reduced the abundance of this flea, for the larvae breeding in the dust-filled cracks of wooden floors, or underneath houses with wooden floors, are now automatically eliminated. Mopping wooden floors with emulsion of kerosene or crude carbolic acid ("creso") was only temporarily effective in rendering them free from fleas, and the early movies, especially the one at Borinquen Park in the Condado and the Tapia Theater in San Juan, were never effectively cleaned of these pests. For persons especially susceptible to infestation by fleas, the performance must be especially

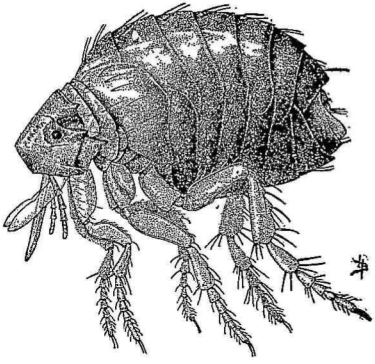
attractive to counterbalance the discomfort to be expected from the fleas that invariably would be picked up. Air-conditioning has also reduced the activities of fleas somewhat, and mechanical cleaners, but the major factor has been the elimination of the dust-filled cracks of wooden floors.

Hectopsyllidae (Echidonophagidae): Burrowing or Sticktight Fleas

Echidnophaga gallinacea (Westwood), originally described as a *Sarcopsyllus* from domestic fowl in Ceylon, has probably been carried with the specific host to most of the tropical and subtropical regions of the world, and presumably has long been present in Puerto Rico, altho not



Head of Rooster infested with Sticktight Fleas. (After Bishopp, U. S. D. A.)



The Sticktight Flea, *Echidnophaga gallinacea* (Westwood), greatly enlarged. (After Bishopp, U. S. D. A.)

listed by either Dr. Stahl or Dr. Gundlach. Indeed, the first record is in Van Zwaluwenburg's list, where it is No. 1719 "on rat and fowls;" an infestation on baby chicks being noted by the parasitologist Dr. G. Dikmans, in the P. R. (Mayagüez) Expt. Station report for 1926 (1927-30) more than a decade later. The Cox-Carrion-Fox rat-flea survey showed that 93 individuals of the sticktight flea had been found on over a thousand rats. Later identifications have been made by Dr. F. C. Bishopp and Mr. H. S. Peters. Dr. H. L. Van Volkenburg (1939-3) lists it as "common on chickens; occasionally serious infestations occur on young birds." The standard remedy for killing the fleas on small chickens is the application of

carbolated vaseline to the infested areas. Its efficiency may be increased by the addition of derris or pyrethrum.

Tunga penetrans (Linnaeus) is listed from Puerto Rico by Herr C. Moritz (1836–377) and Dr. Stahl under its original name, *Pulex penetrans* Linnaeus, the type host being man, from "America." The sand flea or "nigua," common enough in Puerto Rico, is nowhere here sufficiently abundant so that, as in the Dominican Republic, this name is applied to a town. Listed by Mr. R. H. Van Zwaluwenburg as a *Sarcopsyllus*, number 1715 "on man," in "Insectae Portoricensis" (1923–237) it is noted as a *Dermatophilus* "common on man, usually after bathing on sandy beaches (Condado and Pt. Cangrejos), occasionally abundant on clay soil under houses. Supposed to cause large scabs on hogs." Dr. H. L. Van Volkenberg (1939-3) lists this flea as "common on pigs raised near the seashore," as it is normally more abundant on sandy beaches than elsewhere. On man, the favorite points of attack by this flea are between the toes and under the finger or toe nails, but instances are known of infestation on the nipple of the breast. The increase in size of the fertilized female causes a peculiar tingling feeling in the host, and is often the first indication of infestation, the minute brownish spot which is the undistended body of the female having not previously been noted. "The dilatation of the abdomen" with the developing eggs, according to Drs. Ewing and Fox (1943-122), "takes place entirely through the stretching of the intersegmental membrane between the second and third abdominal segments."

Hystrichopsyllidae: Leptopsyllinae

Leptopsylla segnis (Schoonherr), originally described as a *Pulex* from the house mouse in Sweden, occurs in Puerto Rico, a single specimen having been found among the fleas collected from over a thousand rats in San Juan, as reported by Dr. A. L. Carrion (1932-195), the identification having been made by Dr. Carroll Fox.