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A NEW SPECIES OF *PROCONTARINIA* (DIPTERA: CECIDOMYIIDAE), AN IMPORTANT NEW PEST OF MANGO IN THE PHILIPPINES

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Abstract.—A **new species** of cecidomyiid, ***Procontarinia frugivora* Gagné**, is reported from mango, *Mangifera indica* (Anacardiaceae), in Luzon Island, Philippines, where it has become a serious pest. Adults, pupae, and larvae are described, illustrated, and compared to other *Procontarinia* species. *Erosomyia* is a **new junior synonym** of *Procontarinia,* so *Erosomyia mangiferae* Felt is **newly combined** in *Procontarinia. Procontarinia mangiferae* (Felt 1916) becomes a **new junior homonym** of *P. mangiferae* (Felt 1911), so is given the **new replacement name *P. biharana* Gagné**. *Rabdophaga mangiferae* Mani is newly referred to *Procontarinia* where it is made a **new synonym** of *P. mangiferae* (Felt 1911).

Key Words: mango, gall midges, new species

In February 2002, gall midge larvae were found exiting from holes of mango fruit (Fig. 1) in Bulacan Province, Luzon Island, Philippines (15.04°N, 121.02°E). Shortly after, adults were reared from these larvae that proved to be a species of Procontarinia Kieffer & Cecconi unlike any of the other 11 species of that genus, all of which make galls on mango leaves. The new species described here was also referable to *Erosomyia* Felt, which was known from a single species, *Erosomyia mangiferae* Felt, a gall-former on mango shoots. Upon investigation, the two genera were found to share distinguishing characters and so are synonymized here.

Mango, *Mangifera indica* L. (Anacardiaceae), is a tropical species of Indo-Burmese origin. It is widely cultivated pantropically and even subtropically, from 36°N to 33°S. In the Philippines, it is the second most important fruit crop in terms of domestic consumption and export value. The damage caused by the newly described cecidomyiid seriously affects the quality and yield of mango. Infested fruit initially show small brownish lesions of 1 mm diameter that grow larger and deeper as the fruit enlarge. Most infested fruit fall to the ground before ripening; those that reach maturity are not marketable. The population outbreak appears at present to be localized on Luzon Island in the provinces of Bulacan, Cavite, and Bataan.

METHODS

Infested fruit were collected and kept in containers lined with paper towels until full-grown larvae emerged. Larvae were then placed in individual vials with vermiculite, where pupation and eventual adult emergence occurred. Specimens of imma-

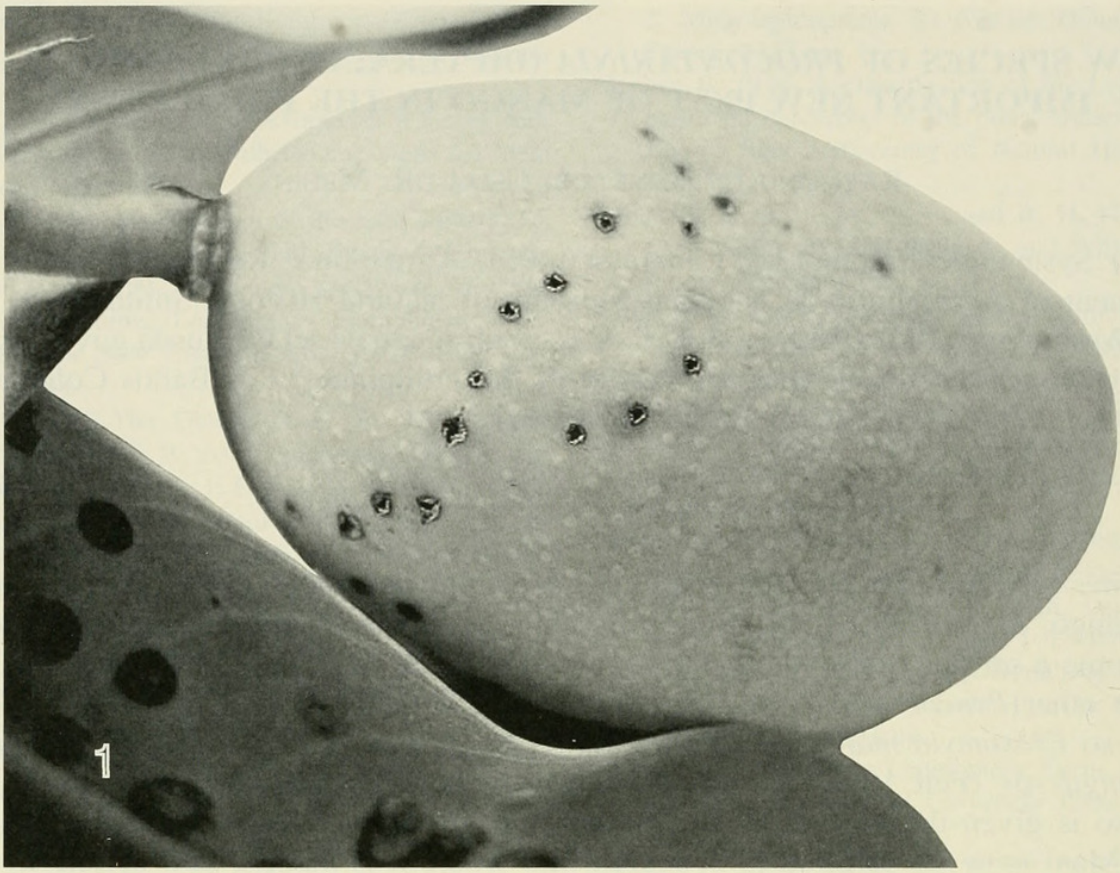


Fig. 1. Young mango fruit with holes made by larvae of *Procontarinia frugivora*.

ture stages and reared adults were preserved in 70% isopropyl alcohol. Samples were mounted on microscope slides using the method outlined in Gagné (1989). Terminology for adult morphology follows usage in McAlpine et al. (1981) and for larval morphology that in Gagné (1989). Larvae were obtained and adults reared by C. dR. Medina who is studying the biology and impact of this pest in the Philippines. The taxonomic investigation was the responsibility of R. J. Gagné.

Procontarinia frugivora Gagné, new species
(Figs. 2–13)

Adult.—*Head:* Eyes connate, 7–8 facets long at vertex; facets circular, closely adjacent but not abutting, lateralmost facets farther apart, separated by up to one facet diameter. Occiput with dorsal protuberance with 2 apical setae. Frons with 4–5 setae. Labella ellipsoid, each with 5–6 lateral setae. Palpus 4-segmented, first segment slightly longer than wide, remaining segments about twice as long as wide, the two distal segments not as wide as first two segments. Antenna: Scape cylindrical, as wide as long, with 1 seta on outer lateral surface and 1–3 setae on inner lateral surface; pedicel with 5–6 setae on inner lateral and ventral surfaces combined; with 12 flagellomeres. Male flagellomeres (Fig. 2) binodal; one circumfilum on each node, loops of the circumfila subequal in length; nodes covered with setulae. Female flagellomeres (Fig. 3) cylindrical, slightly constricted at middle, surrounded by two appressed circumfila connected by two longitudinal bands; necks slightly longer than wide.

Thorax: Wing unmarked, 1.2–1.3 mm long in male (n = 5), 1.5–1.6 mm long in female (n = 5), R_5 curved toward apex, joining C posterior to wing apex, Rs present as stub near base of R_5. Mesanepimeron with 3–4 setae, thoracic pleura otherwise bare. Tarsal claws (Fig. 4) toothed, curved

near midlength; empodia attaining bend in claws.

Male abdomen: First through sixth tergites entire, rectangular, with single posterior row of setae, no lateral setae, scattered scales, and 2 anterior trichoid sensilla; seventh tergite as for preceding but with fewer scales, unsclerotized posteriorly and lacking the posterior row of setae and scales; eighth tergite less sclerotized than preceding tergites, the only vestiture the anterior pair of trichoid sensilla. Second through eighth sternites rectangular, with single posterior row of setae, 2 lateral and one mesal group of setae near midlength, and 2 anterior trichoid sensilla; eighth sternite foreshortened, midlength setal groups consequently abutting posterior setae. Genitalia (Figs. 5–7): cerci nearly completely fused, only a short incision between them present posteriorly, with several posterior setae; hypoproct narrower than conjoined cerci, narrowing slightly from base to broadly convex apex, with a few posterior setae; aedeagus about as long as gonocoxite, cylindrical, rounded at apex, laterally with longitudinal rows of sensory pits; gonocoxite elongate-cylindrical with large, conical mesobasal lobe, bearing scattered cuticular spines but devoid of setulae; gonostylus elongate-cylindrical, tapering gradually from basal third to distal tooth, with setulae near base and covered beyond with minute carinae and widely scattered short setae.

Female abdomen (Figs. 8–10): First through seventh tergites and second through seventh sternites as for male. Eighth tergite weakly sclerotized (Fig. 8, arrow), separation from seventh tergite subequal to length of eighth, with single row of short posterior setae and anterior pair of trichoid sensilla the only vestiture. Eighth sternite not evident. Ovipositor slightly protrusible, venter of eighth segment and dorsum of ninth and tenth segments without vestiture, venter of ninth segment with setae; cerci entirely connate, short, convex apically, with 2 pairs apical sensory setae and scattered setae elsewhere; hypoproct short, narrow, with 2 posterior setae.

Pupa.—Unknown, not preserved.

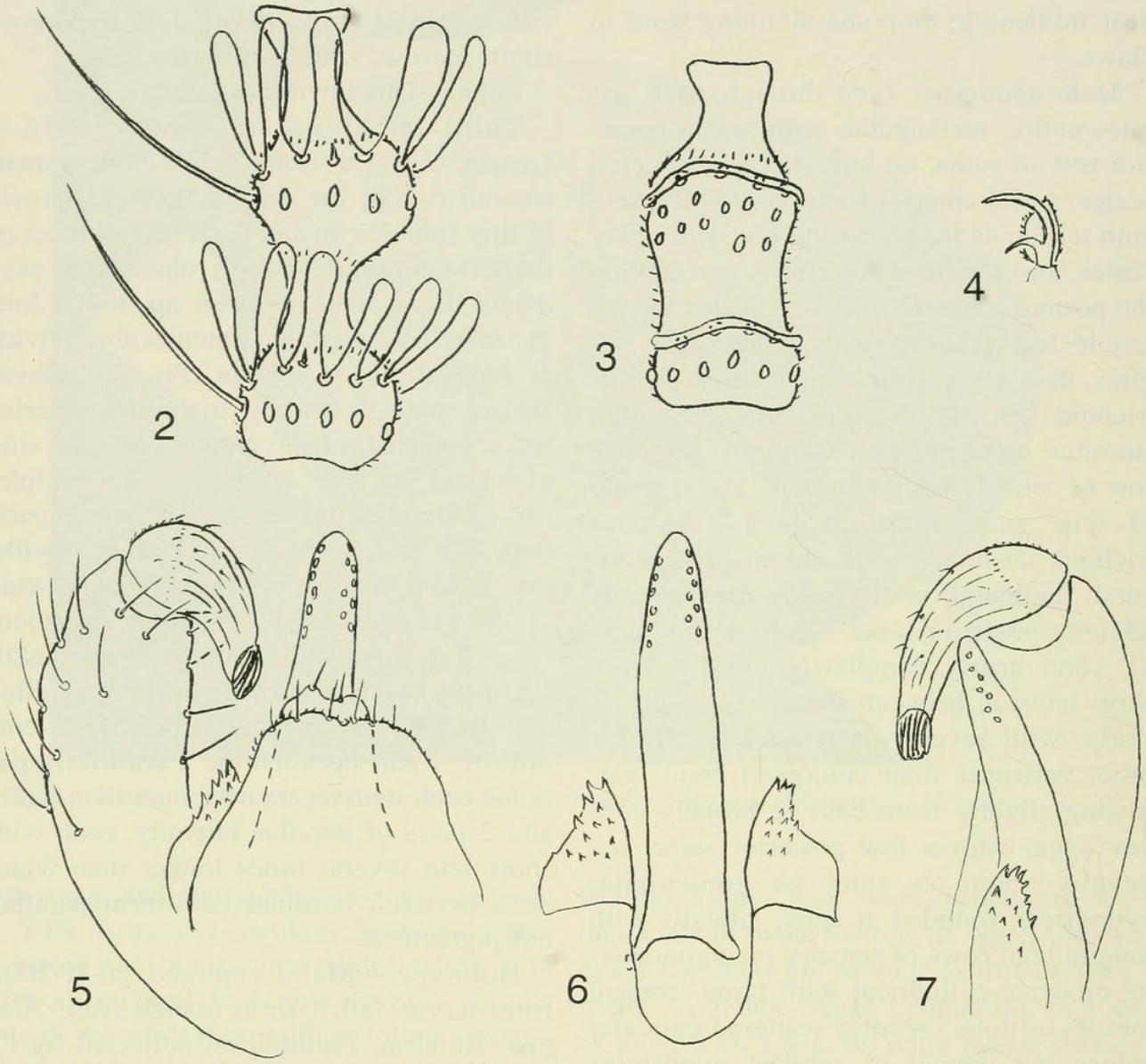
Third larval instar (Figs. 11–13).—Length, 1.6–1.9 mm. White. Integument smooth except for several horizontal rows of tiny spicules on anteroventral surfaces of the first through seventh abdominal segments. Head with posterior apodemes longer than head capsule. Antenna about twice as long as wide. Spatula (Fig. 12) clove-shaped with 2 acutely triangular anterior teeth. Lateral thoracic papillae on each side of central line (Fig. 12) in 2 groups, a triplet and a singlet, 2 papillae in each triplet each with tiny seta, remaining lateral setae without. Dorsal and pleural papillae with setae no longer than wide. Terminal segment (Fig. 13) narrowed abruptly from eighth segment, blunt posteriorly, with 8 papillae as follows: 1 mesoposterior pair large, corniform; 1 pair between the 2 corniform papillae each with a seta no longer than wide; and 2 pairs of papillae laterally, each with short seta several times longer than wide. Area between terminal corniform papillae not pigmented.

Holotype.—Male, emerged 20-II-2002 from larvae fallen from mango fruit, Alagao, Bulacan, Philippines, collected by C. dR. Medina, deposited in the University of Philippines Museum of Natural History, Los Baños, Laguna, Philippines.

Other material examined.—Same data as holotype, 4♂, 5♀, 5 larvae, all with same relevant data as holotype, deposited in the University of Philippines Museum of Natural History and the National Museum of Natural History, Washington, DC, USA.

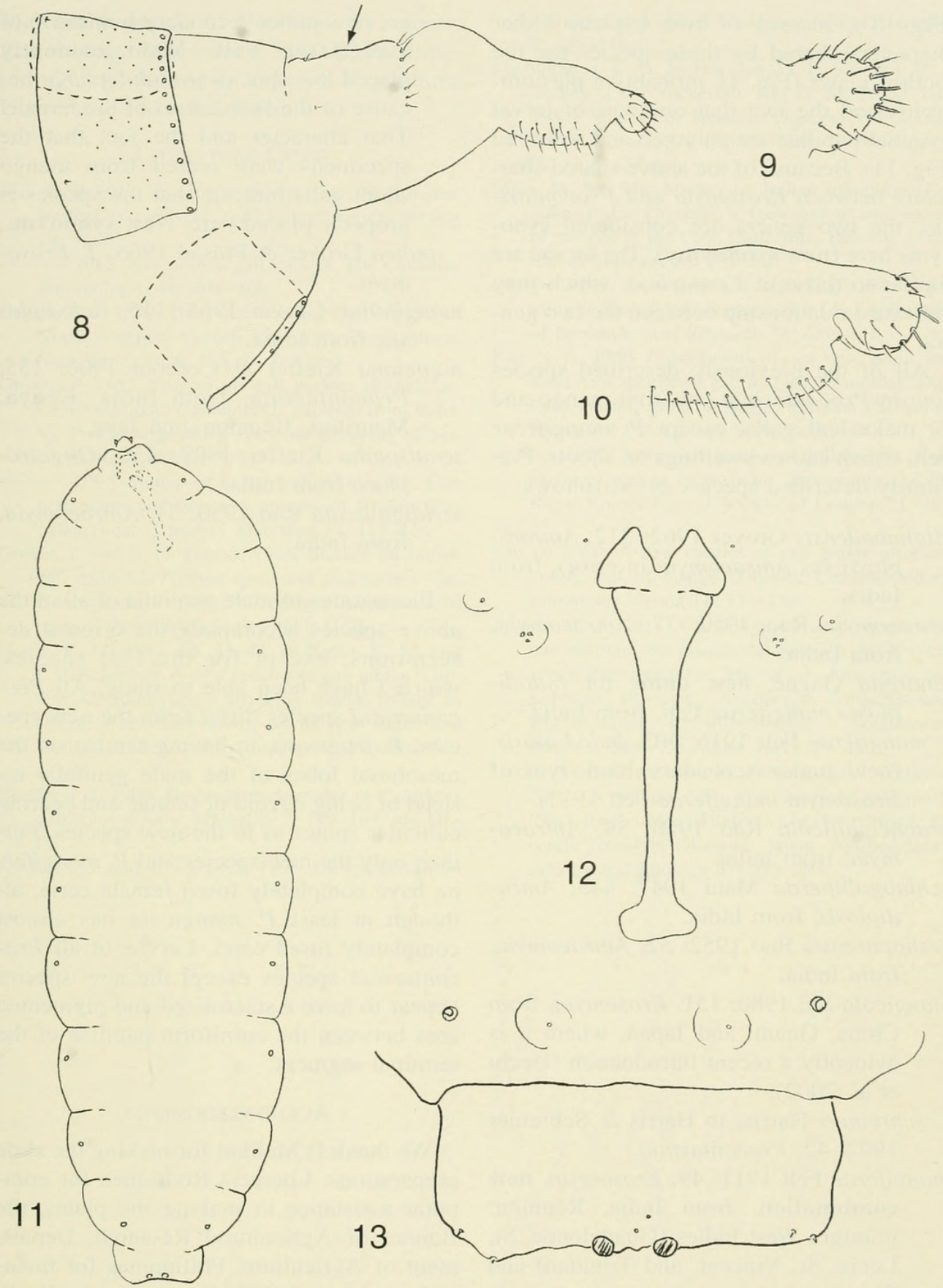
Etymology.—The specific name, *frugivora,* is an adjective that means "fruit eating."

Discussion.—The genus *Procontarinia* Kieffer & Cecconi (1906) was described for *Procontarinia matteiana* Kieffer & Cecconi (1906), reared from leaf galls found on mango grown in the Botanical Gardens in Palermo, Sicily. Felt (1911) described *Erosomyia* for *Erosomyia mangiferae* Felt gall-



Figs. 2–7. *Procontarinia frugivora*. 2, Male third antennal flagellomere. 3, Female third antennal flagellomere. 4, Tarsal claw and empodium. 5, Male genitalia, only left gonopod shown (dorsal). 6, Aedeagus flanked by mesal lobes of gonocoxites (dorsal). 7, Nearer mesal lobe of gonocoxite, aedeagus, and farther gonopod (mesal).

ing shoots of mango on St. Vincent. Felt gave no indication that he took *Procontarinia* into account when describing his genus. When one considers these two genera together one finds that they not only lack differentiating characters but share several apomorphies. The 11 species previously in *Procontarinia,* including *Erosomyia mangicola* Shi (1990) recently transferred to *Procontarinia* by Uechi et al. (2002) and *Erosomyia mangiferae* share the following derived characters: male flagellomeres each have two circumfila per flagellomere (Fig. 2) instead of three; male cerci are more or less fused (Fig. 5) instead of separated from the base; the gonocoxite has a definite mesobasal lobe (Fig. 5), which may be low and rounded or conical, depending on the species; the female eighth tergite is weakly developed and, in addition, separated from the seventh tergite by more than the length of the eighth tergite (Fig. 8); the female cerci are short and partially or completely fused into a single lobe (Fig. 9); and the larvae have only four lateral setae, a triplet and a singlet on either side of the spatula



Figs. 8–13. *Procontarinia frugivora*. 8, Female postabdomen, seventh segment to fused cerci (dorsolateral); arrow points to eighth tergite. 9, Female fused cerci, detail (dorsal). 10, Female ninth segment and fused cerci, detail (lateral). 11, Outline of third instar larva (dorsal). 12, Larval spatula and associated papillae (ventral). 13, Posterior larval segments, detail (dorsal).

(Fig. 10), instead of two triplets. Other characters shared by these species are the toothed claws (Fig. 4), probably a plesiomorphy, and the fact that one pair of larval terminal papillae are enlarged and recurved (Fig. 11). Because of the above shared characters between *Erosomyia* and *Procontarinia*, the two genera are considered synonyms here (**new synonymy**). The larvae are similar to those of *Contarinia*, which may indicate a relationship between the two genera.

All of the previously described species now in *Procontarinia* are from mango and all make leaf galls, except *P. mangiferae* Felt, which causes swellings on shoots. Previously described species are as follows:

allahabadensis Grover 1962: 312, *Amradiplosis* (as *Amraeomyia* in error), from India.

amraeomyia Rao 1950: 37, *Amraeomyia*, from India.

biharana Gagné, **new name** for *Indodiplosis mangiferae* Felt, from India.

mangiferae Felt 1916: 403, *Indodiplosis*, (new junior secondary homonym of *Erosomyia mangiferae* Felt 1911).

brunneigallicola Rao 1950: 39, *Amraeomyia*, from India.

echinogalliperda Mani 1947: 443, *Amradiplosis*, from India.

keshopurensis Rao 1952: 52, *Amraeomyia*, from India.

mangicola Shi 1980: 131, *Erosomyia*, from China, Guam, and Japan, where it is evidently a recent introduction (Uechi et al. 2002).

schreineri Harris, in Harris & Schreiner 1992: 42, *Procontarinia*.

mangiferae Felt 1911: 49, *Erosomyia*, **new combination**, from India, Réunion: immigr.: West Indies (Guadeloupe, St. Lucia, St. Vincent, and Trinidad) and Brazil.

mangiferae Tavares 1918: 48, *Mangodiplosis*, junior secondary homonym of *mangiferae* Felt.

mangiferae Mani 1938: 331, *Rhabdophaga*, new junior secondary homonym of *mangiferae* Felt. Mani evidently placed this species in *Rabdophaga* because of the fused cerci of the female. That character and the fact that the specimens were reared from mango shoot galls indicate that the species is properly placed here. **New synonym**.

indica Grover & Prasad 1966: 7, *Erosomyia*.

mangifoliae Grover 1965: 115, *Indodiplosis*, from India.

matteiana Kieffer & Cecconi 1906: 135, *Procontarinia*, from India, Kenya, Mauritius, Réunion, and Java.

tenuispatha Kieffer 1909: 150, *Oligotrophus*, from India.

viridigallicola Rao 1950: 34, *Amraeomyia*, from India.

Illustrations of male genitalia of all of the above species accompany the original descriptions, except for the Felt species, which I have been able to study. All *Procontarinia* species differ from the new species, *P. frugivora*, in having setulae on the mesobasal lobes of the male genitalia instead of being devoid of setulae and bearing cuticular spines as in the new species. Further, only the new species and *P. mangiferae* have completely fused female cerci, although at least *P. mangicola* has almost completely fused cerci. Larvae of all *Procontarinia* species except the new species appear to have a sclerotized and pigmented area between the corniform papillae of the terminal segment.

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