

ORIENTAL AGROMYZIDAE (Diptera) IN BISHOP MUSEUM, Part 1¹

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Abstract: Thirty-six species of Agromyzidae are recorded from Taiwan, Philippines, Vietnam, Thailand, Malaya and N. Borneo, 18 of which are described as new. New genus *Shizukoa*, type *S. seticopia*, from N. Borneo, also includes *S. maai* (Spencer) (Thailand), *S. magna* n. sp. (Taiwan), and *S. propincua* n. sp. (Vietnam). A key is provided to the 16 species of *Japanagromyza* found in the Oriental Region. Nearly half of the known Oriental agromyzids belong to *Melanagromyza*.

A total of 80 species has been recorded from the Oriental Region by de Meijere (1910-40), Malloch (1914), Spencer (1961), Sasakawa (1962), etc. All of the material upon which this paper is based was collected in Taiwan, Philippines, Vietnam, Thailand, Malaya and North Borneo by J. L. Gressitt, C. M. Yoshimoto, L. W. Quate, T. C. Maa, H. E. Milliron and H. Torrevillas of Bishop Museum, and N. L. H. Krauss of the Hawaii State Dept. of Agriculture, during 1957-60. Eighteen more, including 3 of a new genus, are herein described as new, of which 2 are from Taiwan, 4 from Philippines, 6 from Vietnam, 3 from Thailand, 2 from Malaya and 1 from North Borneo. Also, 17 known species are added as new to their faunas (no new records for Philippines), making the total now known in the Oriental Region 99. This is a small number as compared with the total agromyzid faunas in other regions.

The Oriental species are distributed in 12 genera and 7 subgenera at present. Spencer stated that there is a similarity between the Oriental species and the species from Africa and also Madagascar. The genus *Melanagromyza* contains 34 described species, making it the largest in the Oriental Region. The dominance of this genus is also well illustrated in the material from the Philippines and Vietnam which occupies the great majority of the present material. They consist of 44 and 43 specimens respectively, and of them 40 and 30 belong to *Melanagromyza*. Many of the species have a very wide tropical distribution and undoubtedly have their origins in the Oriental Region, and the species of economic importance are almost certainly spread by man.

The genus *Japanagromyza* is well represented in the Oriental Region, and from recent studies, it is interesting to note, that its range is now known to extend throughout the main zoogeographical regions. One of the peculiar characteristics of this genus is the

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variability in color of the halteres. In the Oriental Region there are proportionately many more species with pale color. A key to the Oriental species of *Japanagromyza* is here presented and *J. angustifrons* Spencer is newly synonymized under *yanoi* (Sasakawa).

In North Borneo, Vietnam and Taiwan, an intermediate genus between the subfamilies Agromyzinae and Phytomyzinae was found to occur. Its external characters are in common with the genus *Agromyza* and *Japanagromyza*, but the structures of male and female terminalia are quite different from the allied genera and similar to that of some genera of Phytomyzinae. I believe it to be worthy of recognition as a new genus, and I expect that some known species from the Oriental and Ethiopian Regions will be placed in this new genus in the future after re-examination of the peculiar terminalia.

The terminology, abbreviations and measurements are the same as described by me (Pacific Ins. 3: 307-472, 1961). The types resulting from this interesting collection are deposited in Bishop Museum, Honolulu.

I wish to acknowledge my indebtedness to Dr. J. L. Gressitt for making this study possible. I am also most grateful to Drs. M. Tokunaga and K. Yasumatsu for their kind help and encouragement.

Subfamily AGROMYZINAE Fallén

Genus *Agromyza* Fallén

1. *Agromyza papillata* Sasakawa, n. sp. Fig. 1, a-e.

Male: Head black; front matt, parafrontalia subshining blackish brown, paler ventrally; ocellar triangle slightly shining; lunule brown; gena brown; antenna testaceous brown, segment 3 darkened apically; palpus pale brown. Thorax shiny black, slightly pollinose; mesopleural suture and base of wing pale brown. Wing hyaline; veins yellowish; calypter yellowish white, with margin more or less darker and fringe brown; halter yellow. Legs black, fore tibia yellowish brown and all tarsi yellowish. Abdomen shiny brownish black.

Head: Front slightly wider than long, $1.3\times$ as wide as eye; parafrontalia $1/5$ width of front, parallel-sided. Ocellar triangle with ventral tip slightly beyond level of 1. *ors*. Lunule lower than semicircular, about $1/4$ as high as front length. Parafrontalia with 4 *or* (all missing but detectable by their pits); *oh* minute, in a row. In profile ventral part of parafrontalia projecting above eye-margin; eye very sparsely hairy, nearly $1.5\times$ as high as wide; gena $1/12$ eye height but extremely broadened posteriorly, $1/6$ of that at posterior end; *vi* short; *pm* 10-12 in 2 rows. *Antennae* slightly separated by carina; segment 3 rounded apically, as long as wide, with minute pile; arista $2\times$ as long as whole length of antenna, swollen on basal $1/6$, rather distinctly pubescent. *Thorax*: Mesonotum with 0+3 *dc*, 1. *dc* very short, $2-3\times$ as long as *acr* and just behind level of *sa*; 6 irregular rows of *acr*, decreasing in 4 rows behind 1. *dc*, posterior 1 or 2 pairs longer; *prsc* subequal in length to 2. *dc*; *ipa* $1/4-1/5$ length of *opa*; humerus with 9-12 setulae plus *h*; mesopleura with 6-8 dorsally directed setulae; sternopleura with 2 short setae before *sp*. *Wing*: Costa reaching M_{1+2} , with sections 2-4 in proportion of 80 : 34 : 22; r-m slightly beyond middle of discal cell (26 : 23); m-m $4/5$ length of penultimate section of M_{1+2} ; ultimate section of M_{1+2} $3.3\times$ as long as penultimate; ultimate section of M_{3+4} $4/5$ length of penultimate.

Legs: Mid tibia with 2 posterodorsal bristles. *Abdomen*: Tergites with moderately short setae; tergite 6 as long as 5; sternite 5 longer than tergite 6, with incision on caudal 2/5. *Terminalia*: Epandrium 1/3 as long as tergite 6; surstylus small, papilliform, bearing 9–11 spines and 4–5 setae; processus longus normal; cercus 2/3 height of epandrium. Hypandrium, basi- and distiphallus similar to those of *albipennis* Meigen in structures, but endophallus much shorter, almost 1/2 length of paraphallus. Ejaculatory apodeme 200 μ long, 160 μ in greatest width. *Length*: Body 2.0 mm, wing 1.8.

Female: Similar to σ , but antennae and palpi darker, also all tarsi brown, abdomen strongly shining black, *mar* longer, sternite 6 quadrate, 2.5 \times as wide as long, as long as tergite 6. *Terminalia*: Ovipositor sheath 1.5 \times as long as tergite 6; apodeme strongly sclerotized, extending anteriorly middle of tergite 5, pouched on anterior 1/2. Egg guide subtriangular, 148 μ long, covered with numerous setae and spinulae distally. Tergite 9 is 160 μ long, distally membranous; sternite small, 48 μ long, with 4 pairs of *nsm*; cerci with 2 long *ts*. Spermathecae lower than semiorbicular, 48 \times 96 to 52 \times 108 μ , necks 20–28 μ long, ducts 920–932 μ long, 10 μ in diameter, brownish proximally. Ventral receptacle with tail long, 680 μ in length. *Length*: Body 2.75 mm, wing 2.4–2.5.

DISTRIBUTION: Vietnam.

Holotype σ (BISHOP 3340), N of Nha Trang, Ninh Hoa, S. Vietnam, 28. XI. 1960, C. M. Yoshimoto; allotype f , Dalat, 1500 m, 26–27. IX. 1960, Yoshimoto; paratypes 1 f , same data as allotype but 10. IX, Gressitt; 1 f , E of Ban Me Thuot, 400–600 m, M'Drak, 8. XII. 1960, Yoshimoto.

This species belongs to *flavisquama*-group with a pair of well-defined prescutellar bristles, but can be distinguished from *A. flavisquama* (Malloch), by having 0+3 dorso-central bristles and a brown fringe on the calypteres and from *susannae* Spencer, known from S. Africa, by the narrower genae, sparser rows of acrostichals and the darker femora.

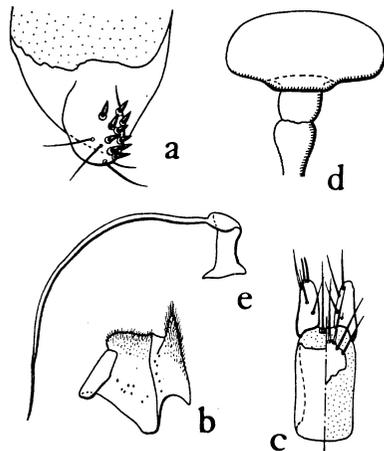


Fig. 1. σ and f terminalia of *Agromyza papillata*, n. sp.: a, surstylus, inner aspect; b, egg guide, inner aspect; c, halves of tergite 9 and sternite 9; d, spermatheca; e, ventral receptacle.

Genus **Japanagromyza** Sasakawa

KEY TO ORIENTAL SPECIES OF JAPANAGROMYZA

- 1. Halteres with knobs entirely yellow..... 2
- Halteres with knobs partly dark..... 10
- 2 (1). Mesonotum and abdomen shining black or dusted with gray 3
- Mesonotum and abdomen with metallic tinge 9
- 3 (2). Cerci normal 4
- Cerci greatly enlarged 7
- 4 (3). Mid tibia with 1 bristle **incisa**
- Mid tibia with 2 bristles..... 5

5 (4).	Distiphallus short	insularum Spenc.
	Distiphallus long, endophallus with a pair of tubular processes distally	6
6 (5).	Front narrower than eye	eucalypti Spenc.
	Front 1.5× as wide as eye	stylata
7 (3).	Cross-vein r-m only slightly before middle of discal cell	triformis Spenc.
	Cross-vein r-m at basal 1/3 of discal cell.....	8
8 (7).	Gena 1/10 eye height.....	trifida Spenc.
	Gena 1/20 eye height	trientis Spenc.
9 (2).	Mesonotum and abdomen with green or coppery tinge.....	cupreata
	Mesonotum entirely black; abdomen with faint coppery shine	cercariae
10 (1).	Halteres entirely brown or black.....	11
	Halteres variegated	13
11 (10).	Prescutellar bristles present.....	delecta Spenc.
	Prescutellars lacking.....	12
12 (11).	Fore tibia with 1 bristle	setigera (Mall.)
	Fore tibia without bristle	yoshimotoi
13 (10).	Front narrower than eye.....	yanoi
	Front broader.....	14
14 (13).	Mesonotum distinctly matt.....	elaeagni
	Mesonotum more shining	15
15 (14).	Fore tibia with 1 bristle.....	variihalterata (Mall.)
	Fore tibia with 2 bristles.....	kalshoveni (de Meij.)

2. **Japanagromyza cercariae** Sasakawa, n. sp. Fig. 2, a-b.

Male: Head black; front matt, parafrontalia slightly brown-tinged, slightly shining; lunule brown, silvery pruinose; face shiny, gray-whitish pollinose; antenna and palpus brownish black. Thorax weakly shiny, black, densely dusted with brownish gray; notopleura brown-tinged; mesopleural suture brown. Wing hyaline; veins pale brown; calypter brown, with margin and fringe darkened; halter with stalk blackish brown but knob entirely yellow. Legs black. Abdomen also densely gray-dusted but with faint coppery shine.

Head: Front almost as long as wide, 1.2 × as wide as eye; parafrontalia 1/6 width of front, slightly converging ventrally. Ocellar triangle with ventral angle blunt, only just beyond level of 1. *ors*. Lunule lower than semicircular, about 1/4 as high as front length, with median furrow. Parafrontalia with 4 *or* (missing except for up- and inwardly directed 1. *ori*, but detectable by their pits); *oh* minute, reclinate, in a row. In profile parafrontalia not projecting above eye; eye sparsely with minute hairs, height and width ratio as 40 : 27; gena about 1/10 eye height. *Antennae* slightly separated by carina; segment 3 small, as long as broad, with minute pile; arista missing. *Thorax*: Mesonotum with 0+2 *dc*, 1. *dc* behind level of *sa*; 8 rows of *acr*, becoming sparser behind 1. *dc* and 4 rows of them ending at level of 2. *dc*; *prsc* weak, about 1/5 length of 1. *dc*; *ia* slightly shorter than 1. *dc*; *ipa* subequal to *acr*. *Wing*: Costa reaching to M_{1+2} , with sections 2-4 in proportion of 80 : 23 : 16; wing tip located between R_{4+5} and M_{1+2} but nearer the former; r-m slightly before middle of discal cell (20 : 25); m-m 3/5 length of penultimate section of M_{1+2} ; ultimate section of M_{1+2} 2.7× as long as penultimate; ultimate section of M_{3+4} about 3/4 length of penultimate. *Legs*: Fore tibia with 1 external and mid tibia with 2

posterodorsal bristles. *Abdomen*: Tergites covered with short setae; tergite 6 subequal to 5; sternite 5 slightly longer than tergite 6, with rather deep incision on posterior 2/5. *Terminalia*: Epandrium small, less than 1/2 length of tergite 6; surstylus narrow but broadened apically, bearing 2 spines and several short hairs, accompanying with finger-like process dorsally; cercus very thick, 4/5 as high as epandrium, dorsally covered densely with short setae and ventrally with 4-5 short hairs and a heavy spine at apex; processus longus small, somewhat Y-shaped. Hypandrium with sidepieces narrow, nearly 2/3 length of phallapodeme, with short apodeme. Distiphallus slightly longer than phallapodeme, only basal sclerites weakly chitinized, ventral process and endophallus membranous, the latter bifided distally. Ejaculatory apodeme 120 μ long, 52 μ in greatest width. *Length*: Body and wing 1.8. *Female*: Unknown.

DISTRIBUTION: Vietnam.

Holotype ♂ (BISHOP 3341), Ninh Hoa, N of Nha Trang, S. Vietnam, 28. XI. 1960, C. M. Yoshimoto.

This species closely resembles *J. cupreata*, n. sp., but is immediately recognizable by the smaller size, less shining mesonotum, weaker prescutellar bristles and only 1 fore-tibial bristle. It also differs distinctly from *J. triformis* Spencer by its smaller size, coppery shining abdomen, weaker prescutellar bristles, a pair of membranous endophallus, and characteristic cerci and surstyli.

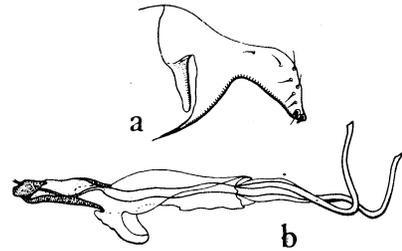


Fig. 2. ♂ terminalia of *Japanagromyza cercariae*, n. sp.: a, surstylus, inner aspect; b, phallus, lateral view.

3. *Japanagromyza cupreata* Sasakawa, n. sp. Fig. 3.

Female: Head black; frontalia matt, parafrontalia shining, slightly dusted; ocellar triangle weakly shining; lunule brown, silvery white pruinose; face, antenna and palpus dark brown. Thorax with mesonotum and scutellum shining coppery-green, pleura more densely gray-dusted than mesonotum, mesopleural suture and base of wing brown. Wing hyaline; veins pale brown; calypter dirty yellow, with margin slightly darkened and fringe brown; halter with knob entirely yellow but stalk pale brown. Legs black. Abdomen shining, coppery, somewhat reddish; ovipositor sheath glossy black.

Head: Front as wide as long and also either eye, almost parallel-sided; parafrontalia about 1/5 width of front, narrowing ventrally. Ocellar triangle with ventral tip acute, reaching to level of 2. *ors*; *oc* rather short, subequal to 2. *ori* in length, accompanying with 7 setulae. Lunule semicircular, a little higher than 1/3 of front length, with median furrow narrow. Parafrontalia with 2 *ors* and 2 *ori*, the former directed up- and slightly outwards, 1. *ori* upwards, 2. *ori* in- and upwards; *oh* long, in sparse row. In profile basal 1/2 of parafrontalia linearly projecting above eye-margin; eye bare, 1.5 \times as high as wide; gena narrow, about 1/13 eye height; *vi* differentiated from 3 short *pm*. *Antennae* distinctly separated by sharp carina; segment 3 subspherical, slightly shorter than broad, with minute pile; arista 3 \times as long as whole length of antenna, swollen on basal 1/6, with microscopic pubescence. *Thorax*: Mesonotum with 0+2 *dc*, 1. *dc* distinctly behind level of *sa*; 10 irregular rows of *acr*, about 6 rows of them ending before *prsc*; *prsc* 1/2 length

of 1. *dc*; *ipa* 1/4 length of *opa*; humerus with 7 setulae plus *h*; mesopleura with 8–10 dorsally directed setulae; sternopleura with 1 seta and 2 setulae before *sp*. *Wing*: Costa with sections 2–4 in proportion of 100 : 30 : 24; r-m before middle of discal cell (21 : 32); m-m 2/3 length of penultimate section of M_{1+2} ; ultimate section of M_{1+2} 2.5× as long as penultimate; ultimate section of M_{3+4} 3/4 length of penultimate. *Legs*: Fore tibia with 2 short external bristles; mid tibia with 2 strong posterodorsal bristles. *Abdomen*: Tergites densely setigerous, *mar* slightly longer; tergite 6 as long as 5. *Length*: Body 2.2 mm, wing 2.3. *Male*: Unknown.

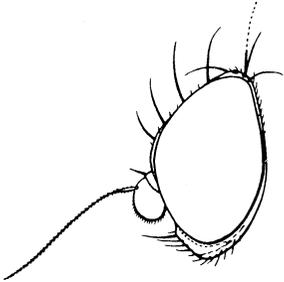


Fig 3. Head of *Japanagromyza cupreata*, n. sp.

DISTRIBUTION: Vietnam.

Holotype ♀ (BISHOP 3342), 30 km NW of Pleiku, 300 m, S. Vietnam, 10. V. 1960, L. W. Quate.

This species is quite specific in having the conspicuous coppery shining mesonotum and abdomen, differing from the known species of this genus. This is somewhat allied to *J. kalshoveni* (de Meijere) in having the 2 fore-tibial bristles, but can be easily distinguished by its paler halteres and the elongated ocellar triangle in addition to the above mentioned character.

4. *Japanagromyza incisa* Sasakawa, n. sp. Fig. 4, a–c.

Male: Head black; front matt, excepting shiny base of *or*; ocellar triangle centrally weakly shining; lunule silver-grayish pruinose; antenna and palpus brownish black. Thorax and abdomen black; mesonotum moderately shining, dusted with gray, abdomen a little more dusted than mesonotum; ovipositor sheath shiny black. Wing hyaline; veins pale brown but costa darker; calypter brownish gray, with margin and fringe blackish brown; halter with knob entirely yellow, stalk dark brown. Legs black, tarsal segments 2–4 of fore leg brown.

Head: Front as long as wide, 1.3× as wide as eye; parafrontalia about 1/6 width of front, almost parallel-sided. Ocellar triangle with ventral tip extending midway between 1. and 2. *ors*; *oc* short, not reaching to level of 2. *ors*, accompanying with 2 pairs of setulae. Lunule deeply sunk, much lower than semicircular, 1/5 as high as length of front, with median furrow. Fronto-orbitals 4 pairs; 1. *ors* directed up- and outwards, 2. *ors* and 1. *ori* upwards, 2. *ori* in- and upwards, 1. *ori* as far apart from 2. *ors* as 2. from 1. *ors*; *oh* minute, in a sparse row. In profile parafrontalia and parafacialia not projecting above eye-margin; eye height and width ratio: 50 : 36, with minute sparse hairs; gena linear, 1/25 eye height; *vi* differentiated from 3 *pm*. Face concave, with linear carina; antennal grooves shallow. *Antennae* slightly separated; segment 3 suborbicular, with rather distinct pile; arista 2× as long as whole length of antenna, swollen on basal 1/5, with microscopic pubescence. *Thorax*: Mesonotum with 0+2 *dc*, 1. *dc* behind level of *sa*; about 10 irregular rows of *acr*; *prsc* missing but detectable from their well-defined pits; mesopleura with 6 dorsally directed setulae below dorsal margin; sternopleura with a long seta before *sp*. *Wing*: Costa reaching to M_{1+2} , with sections 2–4 in proportion of 51 : 17 : 13; r-m before middle of discal cell (24 : 34); m-m about 2/3 length of penultimate section of M_{1+2} ; ulti-

mate section of M_{1+2} about $2.5\times$ as long as penultimate; ultimate section of M_{3+4} about $4/5$ length of penultimate (40:55). *Legs*: Fore tibia externally and mid tibia posterodorsally each with a strong bristle. *Abdomen*: Tergites densely setigerous; tergite 5 as long as 6; sternite 5 about $3/4$ as long as wide, deeply incised on caudal $2/3$. *Terminalia*: Epandrium $1/3$ length of tergite 6; surstylus about $1/2$ as high as epandrium, incurved distally, with 2 protuberances posteriorly, bearing a seta on anterodorsal protuberance, 1 spine, 7-9 setae, and many minute spinulae on distal process; processus longus strongly chitinized. Hypandrium similar to that of *duchesneae*, but sidepieces $3/5$ length of phallapodeme; paragonite small; both processes of postgonite slender. Phallic hood weakly sclerotized, with 9 teeth of serration on dorso-apical part. Distiphallus with paraphallus longer than hypophallus but membranous distally and curved ventrally, ventral process large, ax-like, with large sclerite posteriorly; endophallus about $1/2$ length of phallapodeme, sac-like distally and accompanying with a pair of weakly sclerotized, lateral processes. Ejaculatory apodeme longer than normal, $340\ \mu$ long and $80\ \mu$ in greatest width. *Length*: Body 2.65 mm, wing 2.3. *Female*: Unknown.

DISTRIBUTION: Thailand.

Holotype ♂ (BISHOP 3343), Doi Suthep, 1280 m, Chiangmai, NW Thailand, 29.III. 1958, T. C. Maa.

This species is similar to *J. insularum* Spencer in having the entirely yellow knobs of halteres and short distiphallus. But, in the allied species, the surstyli are provided with many heavy spines; the paraphallus is subequal in length to the basiphallus, and the hypophallus is $1/2$ the length of the paraphallus, the ventral process is slightly shorter than the paraphallus and spinulose apically; the endophallus is $3\times$ as long as the basiphallus, only sclerotized at base and ending in an oblong, membranous process, differing distinctly from the present new species.

5. *Japanagromyza stylata* Sasakawa, n. sp. Fig. 5, a-c.

Male: Head black; front matt, parafrontalia and ocellar triangle subshining; lunule silverly pruinose; antenna blackish brown, arista paler. Thorax and abdomen weakly shining, densely gray-dusted; notopleura slightly tinged with brown; mesopleural suture and base of wing brown. Wing hyaline; veins brown; calypter brownish gray, with margin and fringe brownish black; halter with knob entirely yellow and stalk brown. Legs black.

Head: Front almost as long as wide, $1.5\times$ as wide as eye; parafrontalia about $1/6$ width of front, slightly converging ventrally. Ocellar triangle with ventral tip nearly reaching midway between 1. and 2. *ors*. Lunule semicircular, about $1/4$ length of front, with median furrow linear. Parafrontalia with 4 *or* (all bristles missing); *oh* minute, in a row. In profile parafrontalia not projecting above eye-margin; eye bare, $1.3\times$ as high as wide;

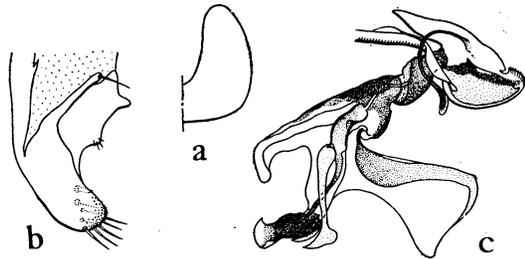


Fig. 4. *Japanagromyza incisa*, n. sp.: a, sternite 5; b, surstylus, anterior aspect; c, phallic hood and phallus, lateral aspect.

gena narrow, about $1/15$ eye height; *vi* long, *pm* 4, in 2 rows. Face deeply concave, with carina short but rather sharp. *Antennae* slightly separated; segment 3 a little wider than long, with minute pile; arista almost bare, $2.5\times$ as long as whole length of antenna, swollen on basal $1/7$. *Thorax*: Mesonotum with $0+2$ *dc*, 1. *dc* behind level of *sa*; 10 rows of *acr* extending level of 1. *dc*, about 4 median rows of them ending before *prsc*; *ia* just before level of 2. *dc*, accompanying with 6 rows of setulae; *prsc* rather weak, about $1/3$ length of 2. *dc*; humerus with 4 setulae plus *h*; mesopleura with 5 dorsally directed setulae; sternopleura with many setulae before *sp*. *Wing*: Costa reaching to M_{1+2} , with sections 2-4 in proportion of 85 : 25 : 20; r-m slightly before middle of discal cell (20 : 28), m-m about $3/5$ length of penultimate section of M_{1+2} and in angle 80° to that; ultimate section of M_{1+2} $2.7\times$ as long as penultimate; ultimate section of M_{3+4} $3/4$ length of penultimate. *Legs*: Fore tibia with 1 external bristle; mid tibia with 2 posterodorsal bristles. *Abdomen*: Tergites moderately setigerous, *mar* shorter than normal; tergite 6 a little longer than 5; sternite 5 about $1.5\times$ as long as tergite 6, with incision on caudal $1/2$. *Terminalia*: Epandrium $1/3$ length of tergite 6; surstylus brown, distinctly projected ventromesally, $3/5$ as high as epandrium, bearing 2 spines at apex and 11-13 hairs on apical

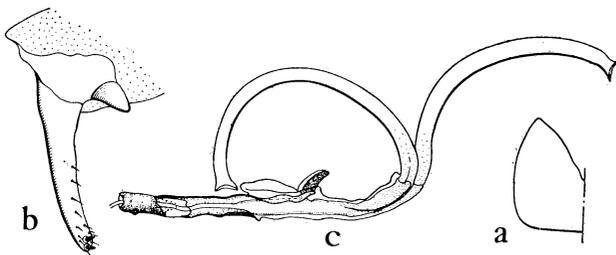


Fig. 5. *Japanagromyza stylata*, n. sp.: a, sternite 5; b, surstylus, anterior aspect; c, phallus, lateral aspect.

half, accompanying with black spine-like process posterobasally; cercus $5/8$ height of epandrium, bearing 3 incurved, sharp spines at cephaloventral apex. Hypandrium weakly sclerotized, pale brown, with sidepieces narrow, $3/4$ length of phallapodeme; apodeme $1/10$ length of sidepiece. Praegonite with a stout spine and 3 sensillae distally. Phallic hood strongly chitinized posteriorly. Distiphallus rather weakly sclerotized, longer than phallapodeme; para- and hypophallus about $2\times$ as long as basiphallus, ventral process short; endophallus with a pair of long curved, tubular processes, distally membranous. Ejaculatory apodeme normal, $160\ \mu$ long, $40\ \mu$ in greatest width, without proximal projection. *Length*: Body 2.2 mm, wing 2.0. *Female*: Unknown.

DISTRIBUTION: Philippines (Palawan).

Holotype ♂ (BISHOP 3344), Tarumpitao Pt., Palawan I., in Jungle, 23.V.1958, H. E. Milliron.

This is highly specific in the size, the elongate surstyli and a pair of long, tubular processes of endophallus.

Two ♂ specimens from the Philippines described by Spencer (1962) as *Japanagromyza* sp. will be referable to this species. But it is uncertain until re-examination of the slides is done, because the characteristic distal part of the endophallus and the small ventral process were not drawn by him.

6. *Japanagromyza yoshimotoi* Sasakawa, n. sp. Fig. 6.

Female: Head black but face, gena, antenna and palpus dark brown; front matt,

base of *or* distinctly shining; ocellar triangle moderately shiny. Thorax and abdomen shiny black, the former densely and the latter very slightly dusted with gray. Wing hyaline; veins pale brown; calypter dirty brown, with margin black, and fringe dark brown; halter with stalk black but knob yellowish brown. Legs black.

Head: Front wider than long, nearly 1.5× as wide as eye; parafrontalia 1/6 width of front, slightly diverging ventrally. Ocellar triangle with ventral tip rather acute, extending midway between 1. and 2. *ors*, bearing 4 setulae plus *oc*. Lunule flat, higher than semicircular, about 1/3 as high as front length, with median furrow. Parafrontalia with 4 *or*; 1. *ors* directed up- and outwards, 2. *ors* upwards; 1. *ori* in- and upwards, 2. *ori* very short and inwards; *oh* minute, in a row but 2 rows ventrad from 1. *ori*. In profile parafrontalia scarcely projecting above eye-margin; eye bare, height and width ratio: 46 : 36; gena about 1/8 eye height; *vi* longer than 4–5 *pm*. Face with antennal grooves deeply concave, carina distinct; parafacialia almost 1/5 as wide as diameter of antennal segment 1. **Antennae** separated at base; segment 3 rounded, with white long pile; arista about 2.7× as long as whole length of antenna, swollen on basal 1/8, pubescent microscopically. **Thorax:** Mesonotum with 0+2 *dc*, 1. *dc* slightly before level of *sa*; 8 rows of *acr* but becoming sparser behind 1. *dc*; *prsc* weak, subequal to *acr*; *ia* accompanying with 4 rows of setulae; *ipa* about 1/4 length of *opa*; humerus with 2 setulae plus *h*; mesopleura with 3–4 dorsally directed setulae. **Wing:** Costa reaching to M_{1+2} , with sections 2–4 in proportion of 98 : 30 : 24; r-m at middle of discal cell (28 : 27); m-m almost 1/2 length of penultimate section of M_{1+2} ; ultimate section of M_{1+2} 3× as long as penultimate; ultimate section of M_{3+4} 2/3 length of penultimate (38 : 56). **Legs:** Fore tibia without distinct bristle, mid tibia with 2 posterodorsal bristles. **Abdomen:** Tergites densely setigerous; tergite 6 slightly longer than 5; ovipositor sheath as long as tergite 6. **Length:** Body 2.4 mm, wing 2.3. **Male:** Unknown.

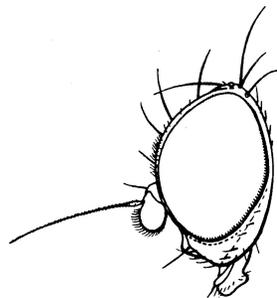


Fig. 6. Head of *Japanagromyza yoshimotoi*, n. sp.

DISTRIBUTION: Philippines (Mindanao).

Holotype ♀ (BISHOP 3345), Alanib, 910 m, Malaybalay, Bukidnon, Mindanao, 25. X. 1959, C. M. Yoshimoto.

The characteristic features of this new species are the dense rows of orbital hairs, distinctly pilose antennal segment 3, absence of strong prescutellar bristles and the external bristle on the fore tibia and dark knobs of the halteres. Differs distinctly from *J. setigera* (Malloch) and *delecta* Spencer by the former 3 characters and the smaller size.

7. *Japanagromyza variihalterata* (Malloch)

Agromyza variihalterata Mall., 1914, Ann. Hist.-Nat. Mus. Hung. 12 : 329.

The larvae of this species mine the leaves of *Glycine sojae* and *Pueraria* spp., making whitish ophistigmatonome of the upper surface type. The adults of this species distinctly differ from *J. kalshoveni* (de Meijere), on *Antidesma lunias*, from Java in the manner noted in the key to the species given above.

MATERIAL EXAMINED. VIETNAM: 1 ♀, Dalat, 1500 m, 29. IV. 1960, Quate.

DISTRIBUTION: Taiwan, Vietnam, Malaya, Indonesia, Ceylon, Japan.

8. *Japanagromyza yanoi* (Sasakawa)

Melanagromyza yanoi Sasak., 1955, Trans. Shikoku Ent. Soc. **4**: 87.

Japanagromyza yanoi, Sasak., 1961, Pacific Ins. **3**: 338.

Japanagromyza angustifrons Spencer, 1961, Trans. R. Ent. Soc. Lond. **113**: 64. **New Synonymy.**

The external characters of *angustifrons* provided by Spencer agree quite well with *yanoi*. The type was from "Maruyama, Taiwan."

DISTRIBUTION: Japan, Taiwan.

Genus ***Melanagromyza*** Hendel

9. *Melanagromyza albisquama* (Malloch)

Agromyza (Melanagromyza) albisquama Mall., 1927, Proc. Linn. Soc. N. S. Wales **52**: 425.

MATERIAL EXAMINED. VIETNAM: 3 ♂♂, 2 ♀♀, Dalat, 1500 m, 29. IV–4. V. 1960, Quate; 2 ♀♀, Dilinh, 1200 m, 22. IV. & 27. IX. 1960, Quate; 1 ♀, NW of Dalat, 1300 m, 4. V. 1960, Quate; 6 ♀♀, Blao, 500–600 m, 14–21. X. 1960, Yoshimoto; 1 ♂, 2 ♀♀, E of Ban Mé Thuot, 400–600 m, M'Drak, 8. XII. 1960, Yoshimoto; 1 ♂, NW of Dilinh, 1100 m, Ap Hung-Lam, 29. IX. 1960, Yoshimoto.

DISTRIBUTION: Vietnam, Sumbawa, Palau, Fiji, Australia, Ceylon, S. Africa.

10. *Melanagromyza atomella* (Malloch)

Agromyza atomella Mall., 1914, Ann. Hist.-Nat. Mus. Hung. **12**: 331.

MATERIAL EXAMINED. TAIWAN: 1 ♀, Sun-moon Lake, V. 1958, Krauss. PHILIPPINES: 4 ♀♀, Talipao, 15–30 m, Jolo I., Sulu, Mindanao, 31. VIII. 1958, Milliron. VIETNAM: 1 ♂, NW of Dilinh, 1100 m, Ap Hung-Lam, 29. IX. 1960, Yoshimoto; 1 ♂, N of Nha Trang, Dai Lanh, 30. XI. 1960, Yoshimoto; 1 ♀, E of Ban Mé Thuot, 400–600 m, M'Drak, 9. XII. 1960, Yoshimoto.

DISTRIBUTION: Taiwan, Philippines, Vietnam, Indonesia, India, Ceylon, Micronesia, New Guinea, Australia.

11. *Melanagromyza declinata* Sasakawa, n. sp. Fig. 3d.

Female: Head black; front matt, parafrontalia with base of *or* shining; ocellar triangle subshiny, with ventral part brownish; lunule tinged with brown; gena dark brown; antenna and palpus brownish black, arista brown. Thorax with mesonotum black, weakly shining, densely gray-dusted; pleura brownish black; mesopleural suture and base of wing brown. Wing hyaline; veins brown; calypter brownish white, with margin pale yellowish-brown and fringe white to ochreous; halter black. Legs black. Abdomen shiny black, anterior 4 tergites slightly dusted with gray.

Head: Front wider than long, almost 1.5× as wide as eye; parafrontalia 1/6 width of front, slightly broadened ventrad from base of 2. *ors*, 1/5 width of that. Ocellar triangle with ventral tip elongated, just beyond level of 1. *ori*; *oc* rather slender. Lunule large, semicircular, higher than 1/2 length of front, with short median furrow. Parafrontalia scarcely projecting above eye-margin in profile, bearing 2 *ors* and 4 *ori*; 1. *ors* directed up- and outwards, 2. up- and inwards; *ori* all inwards; *oh* in 2 dense rows, proclinate

except dorsal 2-3 reclinate hairs of outer row. Eye with sparsely minute hairs but small patch of dense hairs between levels of 1. *ors* and 1. *ori*; height and width ratio as 50 : 36. Gena 1/10 eye height; parafacialia approximately 1/6 as wide as diameter of antennal segment 1; *vi* distinctly differentiated from 4-5 *pm*. *Antennae* separated by carina; segment 3 subspherical, as long as wide, with distinct pile; arista about 2.5× as long as whole length of antenna, swollen on basal 1/5, with microscopic pubescence. *Thorax*: Mesonotum with 0+2 *dc*, 1. *dc* just behind level of *sa*; 8-9 irregular rows of *acr*, 6-7 rows of them ending at level of 2. *dc*; humerus with 7-9 setulae plus *h*; mesopleura with 10 dorsally directed setulae; sternopleura with 2 setae before *sp*. *Wing*: Costa extending to M_{1+2} , with sections 2-4 in proportion of 103 : 28 : 21; r-m beyond middle of discal cell (34 : 25); m-m slightly shorter than penultimate section of M_{1+2} ; ultimate section of M_{1+2} nearly 3.5× as long as penultimate; ultimate section of M_{3+4} 3/5 length of penultimate. *Legs*: Mid tibia with 2 strong posterodorsal bristles. *Abdomen*: Tergites densely setigerous, *mar* long; tergite 6 slightly longer than 5; ovipositor sheath as long as tergite 6. *Length*: Body and wing 2.4 mm. *Male*: Unknown.

DISTRIBUTION: Taiwan.

Holotype ♀ (BISHOP 3346), Taipei, N. Taiwan, V. 1958, N. L. H. Krauss.

This is the only species from the Oriental Region in which the parafrontalia are provided with the dense rows of proclinate orbital hairs.

12. *Melanagromyza gressitti* Sasakawa, n. sp. Fig. 7, a-c.

Female: Head black; frontalia matt; dorsal part of parafrontalia, orbit and brownish ventral part of ocellar triangle subshining; lunule brown, silverly pruinose; antenna and palpus brownish black, segment 1 and arista brown. Thorax subshiny black but lateral sides of mesonotum, noto-, meso- and pteropleura shiny blackish brown; mesopleural suture and base of wing brownish white. Wing hyaline; veins brown; calypter brownish gray, with margin and fringe dark brown; halter brown, with knob narrowly yellowish at apex. Legs brownish black. Abdomen shiny black, anterior tergites densely dusted.

Head: Front narrower than long and also width of eye; parafrontalia about 1/5 width of front, parallel-sided. Ocellar triangle with ventral tip acute, almost reaching to level of 2. *ors*; *oc* rather short. Lunule slightly higher than semicircular, about 1/4 length of front. Parafrontalia not projecting above eye-margin in profile, bearing 4 *or*; 1. *ors* directed up- and slightly outwards, 2. *ors* and 1. *ori* upwards, 2. *ori* in- and upwards; *oh* minute, reclinate, in a row. Eye bare, about 1.5× as high as wide; gena narrow, about 1/14 eye height; parafacialia linear; *vi* strong; 4 short *pm* in a row. *Antennae* approximated at base; segment 3 as broad as long, with minute pile; arista 2.4× as long as whole length

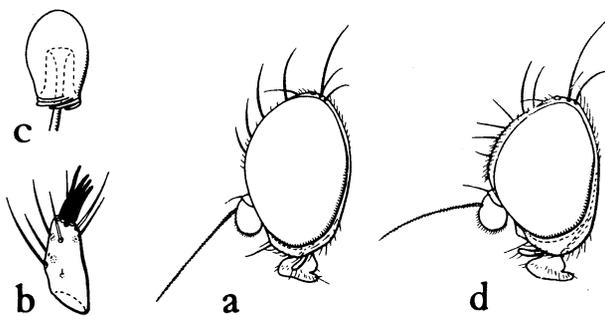


Fig. 7. *Melanagromyza declinata* (d) and *M. gressitti* (a-c) n. spp.: a, head of *gressitti*; b, cercus of ♀, dorsal aspect; c, spermatheca; d, head of *declinata*.

of antenna, swollen on basal $1/5$, pubescent microscopically. *Thorax*: Mesonotum with $0+2$ *dc*, 1. *dc* $2/3$ length of 2, far behind level of *sa*; 10 rows of *acr*, 6–8 rows of them ending at level of 1. *dc*; *ia* shorter than 1. *dc*, accompanying with 6 rows of setulae; *ipa* $1/8$ length of *opa*; humerus with 5–6 setulae plus *h*; scutellum with *as* short, less than $2/3$ length of *bs*; mesopleura with 6 dorsally directed setulae; sternopleura with 3 short setae before *sp*. *Wing*: Costa reaching M_{1+2} , with sections 2–4 in proportions of 98 : 30 : 24; r-m beyond middle of discal cell (32 : 25); m-m slightly shorter than penultimate section of M_{1+2} ; ultimate section of M_{1+2} $3\times$ as long as penultimate; ultimate section of M_{3+4} $3/5$ length of penultimate. *Legs*: Mid tibia with 1 strong posterodorsal bristle. *Abdomen*: Tergites densely setigerous, *mar* slightly longer; tergite 6 subequal to 5; sternite 6 as long as tergite 6. *Terminalia*: Ovipositor sheath slightly longer than tergite 6; apodeme subequal to sheath, weakly sclerotized, pouched on anterior $1/2$. Tergite 9 only claviformly sclerotized, $212\ \mu$ long, $8\ \mu$ broad, densely setulose on lateral membranous parts; sternite very weakly sclerotized except both ends, $52\ \mu$ broad, with 2 pairs of *nsm*; cercus with 4 extremely long *ts*. Egg guide of normal form, $272\ \mu$ long, with 35 minute teeth of serration. Spermathecae suboval, 56×36 to $60\times 36\ \mu$, partite proximally; neck $20\ \mu$ long, duct $300\text{--}332\ \mu$ long, $6\ \mu$ in diameter. Ventral receptacle of normal form, $132\ \mu$ long. Uterus with 14 brownish sensillae at dorsal apex. *Length*: Body 2.4 mm, wing 2.2. *Male*: Unknown.

DISTRIBUTION: Thailand.

Holotype ♀ (BISHOP 3347), Sattahib, 1 m, SE Thailand, 24. XI. 1957, on coconut frond, J. L. Gressitt.

This species is readily distinguishable from all others known from the Oriental Region by the brown halteres with yellow parts on the knobs and the narrow front. This species appears to resemble some species of *Japanagromyza* by its characteristic halteres, but examination of the ♀ terminalia confirms that this belongs to *Melanagromyza*. It differs from *M. polyphaga* Spencer in having the narrower front and genae, and denser rows of the acrostichals.

13. *Melanagromyza lasiops* (Malloch) Fig. 8, a–d.

Agromyza lasiops Mall., 1914, Ann. Hist.-Nat. Mus. Hung. 12: 324.

This is a greenish black species with a wing length of 2.65–3.0 mm; the abdomen is green, blue-green and variably coppery; the very narrow genae; the dense rows of the peristomal setae; the hairy eyes in ♂ but sparsely in ♀ and the conspicuously plumose arista.

All the specimens examined agreed closely with the original description except for the wing venation: sections 2–4 of the costa are in proportion of 126 : 39 : 28; the ultimate section of M_{1+2} is 2.6 (2.2–3.1) times as long as the penultimate and the ultimate section of M_{3+4} is only a little longer than $1/2$ length of the penultimate (40 : 77).

Female terminalia: Ovipositor sheath longer than tergite 6; apodeme strongly sclerotized, as long as sheath, extending anteriorly middle of tergite 5, pouched on anterior $2/3$. Egg guide strongly chitinized, $284\ \mu$ long, with about 25 minute teeth of serration and 10 sensillae on basal transverse plate. Tergite 9 well developed, $272\ \mu$ long, laterally incised at middle; sternite weakly sclerotized excepting caudal margin, $128\ \mu$ long, cercus $56\ \mu$ long,

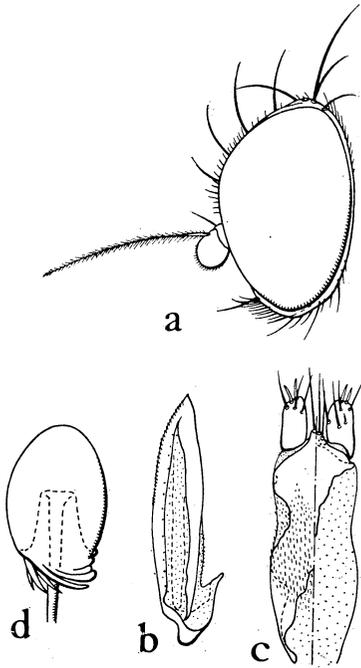


Fig. 8. *Melanagromyza lasiops* (Malloch): a, head, in profile; b, egg guide, lateral aspect; c, halves of tergite 9 and sternite 9; d, spermatheca.

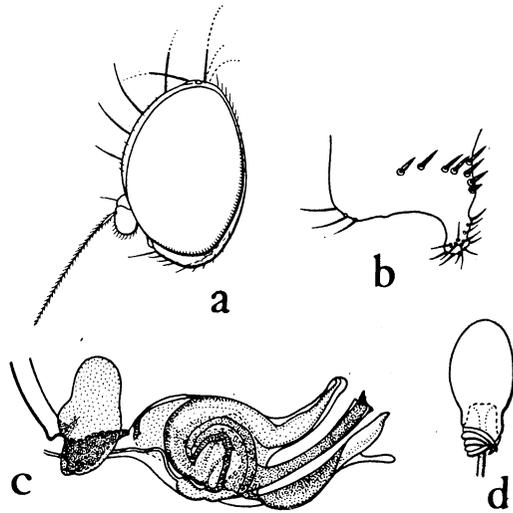


Fig. 9. *Melanagromyza malayensis*, n. sp.: a, head; b, surstylus; c, phallus. d, spermatheca of *M. metallica* (Thomson).

with 4 *ts*, about 1/3 length of cercus. Spermathecae suboval, 68×44 to $92 \times 60 \mu$, partite proximally; duct brown at distal end, 500μ long, 6.4μ in diameter. Ventral receptacle of normal form but basal stipules membranous, 132μ long.

MATERIAL EXAMINED. VIETNAM: 1 ♀, N of Pleiku, 550 m, Kontum, 13. V. 1960, Quate; 2 ♀♀, E of Ban Mé Thuot, 400–600 m, M'Drak, 8–19. XII. 1960, Yoshimoto.

DISTRIBUTION: Taiwan, Vietnam.

14. *Melanagromyza malayensis* Sasakawa, n. sp. Fig. 9, a–c.

Male: Head black; front matt, parafrontalia and ocellar triangle moderately shining; lunule grayish pruinose; antenna and palpus brownish black, arista brown. Thorax and abdomen dull black, densely dusted, the former with faint metallic tinge from rear, the latter coppery shining. Wing hyaline; veins brown; calypter whitish brown, with margin pale testaceous and fringe dark brown; halter black. Legs black.

Head: Front wider than long, $1.3 \times$ as wide as eye; parafrontalia 1/6 width of front, parallel-sided. Ocellar triangle large, extending ventrally almost midway between 2. *ors* and 1. *ori*, bearing 2 pairs of setulae plus *oc*; *oc* short, subequal to 2. *ori*. Lunule semi-circular, about 1/3 length of front. Parafrontalia with 2 *ors* and 2 *ori* (broken except inwardly directed 2. *ori*); *oh* minute, reclinate, densely in a row. In profile parafrontalia pro-

jecting above eye-margin; eye almost bare, about $1.4\times$ as high as wide; gena narrow, about $1/11$ eye height. *Antennae* slightly separated by carina; segment 3 slightly shorter than broad, with whitish pile; arista $2.5\times$ as long as whole length of antenna, swollen on basal $1/6$, distinctly pubescent. *Thorax*: Mesonotum with $0+2$ *dc*, 1. *dc* behind level of *sa*; 10 rows of *acr*, but about 7 rows of them posteriorly extending before 2. *dc*; *ia* nearly $1/2$ length of 1. *dc*; *ipa* $1/7$ length of *opa*. *Wing*: Costa reaching to M_{1+2} , with sections 2-4 in proportion of 68 : 20 : 15; wing tip between R_{4+5} and M_{1+2} but distinctly nearer R_{4+5} ; r-m almost at middle of discal cell (21 : 18); m-m slightly shorter than penultimate section of M_{1+2} and perpendicular to that; ultimate section of M_{1+2} $3\times$ as long as penultimate; ultimate section of M_{3+4} about $3/5$ length of penultimate (23 : 38). *Legs*: Mid tibia without distinct bristle. *Abdomen*: Tergites densely setigerous; tergite 6 as long as 5; sternite 5 little wider than long, with incision on caudal $1/5$. *Terminalia*: Epandrium about $1/3$ length of tergite 6; surstylus broad, with 8 long spines cephalodorsally and 13 setae on small, ventral projection. Hypandrium with apodeme; sidepieces narrow, $3/4$ length of phallapodeme; praegonite small, with 6 sensillae; phallic hood with a pair of spine just caudad of mediolateral incisions and numerous spinulae anterolaterally. Basiphallus with lateral lobes; distiphallus $1/2$ length of phallapodeme; endophallus characteristically folded $2\times$ at basal part. Ejaculatory apodeme as long as distiphallus, extremely expanded, $300\ \mu$ long, $260\ \mu$ broad, with basal projection. *Length*: Body and wing 2.3 mm. *Female*: Unknown.

DISTRIBUTION: Malaya.

Holotype ♂ (BISHOP 3348), Ulu Langat, 300-390 m, Selangor, Malay Peninsula, 14. VI. 1958, T. C. Maa.

This species is extremely similar to *M. subfusca* (Malloch), but can be distinguished by the more conspicuous ocellar triangle, coppery shining abdomen, longer ultimate section of M_{3+4} and the folded endophallus.

15. *Melanagromyza metallica* (Thomson) Fig. 9d.

Agromyza metallica Th., 1869, Eugenes Resa. Dipt., p. 609.

Four ♂ specimens examined have the smaller wings, measuring 1.7-1.9 mm in length, but they can be recognized by the other main characters including the terminalia.

Female terminalia: Ovipositor sheath glossy black, as long as tergite 6; apodeme well sclerotized, slightly longer than sheath, pouched on anterior $2/3$. Egg guide $240\ \mu$ long, $60\ \mu$ wide, with 30 teeth of serration and many spinules on dorsoproximal membrane. Segment 9 similar to that of *pulicaria* (Meigen) in shape, tergite $192\ \mu$ long, $48\ \mu$ broad; sternite $160\ \mu$ long, posterior apex protruded as well as in tergite, bearing 3 pairs of *nsm*; cercus $40\ \mu$ long, with 4 *ts*. Spermathecae and ventral receptacle similar to those of *sojae* (Zehntner) in shape, the former 72×35 to $80\times 44\ \mu$, ducts $428\ \mu$ long, the latter with basal stipules almost membranous, $140\ \mu$ long.

MATERIAL EXAMINED: VIETNAM: 1 ♀, N of Pleiku, 550 m, Kontum, 13. V. 1960, Quate; 1 ♂, 1 ♀, E of Ban Mé Thuot, 400-600 m, M'Drak, 18-19. XII. 1960, Yoshimoto. THAILAND: 1 ♂, Fang, 450 m, Pangmakampon, 16. XI. 1957, Gressitt. TAIWAN: 1 ♀, Taipei, V. 1958, Krauss. PHILIPPINES: MINDANAO: 6 ♂♂, 3 ♀♀, 8 km S of Zamboanga del Norte Manucan, 420 m, 12. X. 1959, Quate; 2 ♂♂, 1 ♀, 10 km SE of S Francisco, Agu-

san, 14. XI. 1959, Quate; 1 ♂, S. Francisco, Agusan, 17. XI. 1959, Yoshimoto; 1 ♀, Gurain Mts., 1380 m, Lanao, 16. VI. 1958, Milliron; 3 ♂♂, 8 ♀♀, Mt. Katanglad, 1250 m, Bukidnon, 4-9. XII. 1959, Quate; 1 ♀, S. Gingoog, Misamis Or., 600-700 m, Hindangon, 20. IV. 1960, Torrevillas; 1 ♂, Mt. Balatukan, SW of Gingoog, 1. V. 1960, Torrevillas; 1 ♂, 1 ♀, Minalwang, 1050 m, Misamis Or., 24. III. 1961, Torrevillas. NEGROS OR.: 1 ♂, 6 ♀♀, L. Balinsasayao, 1-7. X. 1959, Quate & Yoshimoto.

DISTRIBUTION: Taiwan, Philippines, Vietnam, Thailand, Indonesia, Micronesia, Melanesia, Australia, Africa.

16. *Melanagromyza nigrisquama* (Malloch)

Agromyza nigrisquama Mall., 1914, Ann. Hist.-Nat. Mus. Hung. **12**: 332.

MATERIAL EXAMINED. VIETNAM: 1 ♂, Dilinh, 27. IX. 1960, Yoshimoto; 1 ♂, Blao, 600 m, 14. X. 1960, Yoshimoto.

DISTRIBUTION: Taiwan, Vietnam, India.

17. *Melanagromyza obtuosa* (Malloch)

Agromyza obtuosa Mall., 1914, *l. c.*, 323.

The specimens are much smaller than the type, with the wing length measuring 2.2 mm in ♂ and 2.4 mm in ♀, but is recognizable by the elongated ocellar triangle and other essential characters.

MATERIAL EXAMINED. MALAYA: 1 ♂, Connaught Bridge, 9 m, 14. III. 1958, Maa; 1 ♀, Subang Forest Res., 90-120 m, Selangor, 14. III. 1958, Maa.

DISTRIBUTION: Taiwan, Indonesia, Malaya, India, Ceylon.

18. *Melanagromyza phaseoli* (Tryon)

Oscinis phaseoli Tr., 1895, Trans. Nat. Hist. Soc. Qd. **1**: 4.

MATERIAL EXAMINED. VIETNAM: 1 ♀, Dalat, 1500 m, 29. IV. 1960, Quate.

DISTRIBUTION: Taiwan, Philippines, Vietnam, Malaya, Java, W. Micronesia, Australia, Africa.

19. *Melanagromyza piliseta* (Malloch)

Agromyza piliseta Mall., 1914, Ann. Hist.-Nat. Mus. Hung. **12**: 326.

MATERIAL EXAMINED: N. BORNEO: 2 ♀♀, Tenompok, 1460 m, Jesselton, 19. II. 1959, Maa.

DISTRIBUTION: Taiwan, Borneo, Sumbawa, Flores, Ceylon.

20. *Melanagromyza sojae* (Zehntner)

Agromyza sojae Zehnt., 1900, Ind. Natuur. **11**: 113.

MATERIAL EXAMINED. MALAYA: 1 ♂, Subang Forest Res., 90-120 m, Selangor, 12. III. 1958, Maa; 1 ♀, Kuala Terenggan, 220 m, Pahang, 15. XII. 1958, Gressitt.

DISTRIBUTION: Japan, Taiwan, Malaya, Indonesia, Fiji, Micronesia, Australia, India, Egypt.

Genus **Ophiomyia** Braschnikov**21. Ophiomyia lantanae** (Froggatt)

Agromyza lantanae Frog., 1919, Agr. Gaz. N. S. Wales **30**: 665.

MATERIAL EXAMINED: TAIWAN: 7 ♂♂, 4 ♀♀, Taipei, V. 1958, Krauss. VIETNAM: 1 ♂, Dalat, 1500 m, 29. IV. 1960, Quate.

DISTRIBUTION: Australia, Hawaii, Micronesia, Taiwan, Malaya, Vietnam, India, Africa, Mexico.

Genus **Shizukoa** Sasakawa, n. gen.

Type-species: *Shizukoa seticopia* Sasakawa, n. sp.; present designation.

Moderately large black species, with mesonotum subshining, gray-dusted and halteres yellow. Front wider than eye; ocellar triangle small; parafrofrontalia with 2 upper and 2 lower fronto-orbital bristles and reclinate orbital hairs; genae narrow; antennae usually brownish in color. Mesonotum with 1+3 dorsocentral bristles, in common with many species of *Agromyza* Fallén; a pair of prescutellar bristles, in common with many of *Japanagromyza* Sasakawa. Wing with subcosta coalescing with R₁ before reaching costa, which places it in the subfamily Agromyzinae; costa reaching apex of M₁₊₂. Fore tibia with or without external bristle; mid-tibial bristles present. Male terminalia with postgonites strongly elongate vertically, terminating ventrally with 2 teeth, surstyli separated from epandrium by suture and processus longus with a pair of setae, in common with many genera of Phytomyzinae; hypandrium without apodeme; distiphallus with para- and hypophallus united with each other, endophallus composed of a pair of moderately sclerotized tubular processes; ejaculatory bulb sclerotized basally opposite plane of blade. Female terminalia with apodeme of ovipositor sheath and segment 9 extremely long as in stem-mining species of *Melanagromyza* Hendel; egg guides small, subtriangular, almost membranous, in common with many genera of Phytomyzinae; ventral receptacle with a characteristic semispherical cap at distal end. Body length 3–5 mm, wing length 2.5–4.5. Larva and biology unknown.

KEY TO ORIENTAL SPECIES OF SHIZUKOA

1. Fore tibia with 1 external bristle, mid tibia with 3 posterodorsal bristles..... **seticopia**
Fore tibia without bristle, mid tibia with 1–2 posterodorsal bristles..... 2
2. Very large species, wing length 4.2–4.3 mm..... **magna**
Smaller species, wing length 2.8–3.2 mm..... 3
3. Mid tibia with 1 bristle; parafrofrontalia projecting above eye in profile..... **propincua**
Mid tibia with 2 bristles; parafrofrontalia not projecting **maai**

22. Shizukoa maai (Spencer), n. comb.

Agromyza maai Spenc., 1962, Pacific Ins. **4**: 664.

The general structure of the head, mesonotum and wing, and the characteristic ♂ terminalia of the holotype (BISHOP 3256, from Thailand) strongly indicate that this species belongs to *Shizukoa*. In type-slide (no. 278) the epandrium and surstylus are lacking; the postgonite is clearly terminated with 2 teeth, although it was not illustrated by Spencer.

23. *Shizukoa magna* Sasakawa, n. sp. Fig. 10, a-c, e.

Female: Head black; frontalia brownish ventrally, parafrontalia and ocellar triangle slightly shining, gray-dusted; lunule brownish yellow, whitish pruinose; face brown, carina darker; gena pale brown, parafacialia darker; antennal segment 1 yellow, segment 2 yellowish brown; palpus dark brown. Thorax and abdomen subshining black, densely dusted with gray, except for glossy abdominal tergite 6 and ovipositor sheath; mesopleural suture whitish yellow. Wing hyaline; veins brown, yellowish basally; calypter grayish yellow, with margin dark brown and fringe black; halter yellow. Legs black.

Head: Front broader than long, nearly $2\times$ as wide as eye, slightly converging ventrally; parafrontalia about $1/6$ width of front, parallel-sided. Ocellar triangle with ventral tip extending to level of 1. *ors*, bearing about 10 setulae plus *oc*. Lunule lower than semi-circular, about $1/3$ as high as length of front, with median furrow. Parafrontalia bearing 4 pairs of *or* (all strong but broken); *ors* directed upwards, *ori* directed up- and inwards; distance between 2 *ors* a little longer than that between 1. *ors* and *vti* and distance between 2. *ors* and 1. *ori* shortest, about 0.4 as long as distance of the former; *oh* minute, in a row, extending from 1. *ors* to below 2. *ori*. In profile parafrontalia slightly and parafacialia linearly extending beyond eye-margin; eye slightly higher than width (8 : 7), sparsely with minute hairs; gena $1/8$ eye height; *vi* strong, accompanying with 5-6 strong *pm*. Face weakly concave; parafacialia $1/3$ as wide as diameter of antennal segment 1. *Antennae* distinctly separated by low carina at base; segment 3 and arista missing. *Thorax*: Mesonotum with 1+3 *dc* (all bristles missing in type-specimens but detectable from the well-defined pits at their base), 1. *dc* situated before level of *prs*, 3. *dc* on level of *sa*, anterior 3 *dc* almost equidistant; about 8 rows of *acr*, extending posteriorly before level of *prsc*; *ipa* short; mesopleura with 4-5 dorsally directed setulae; sternopleura with 2 strong setae before *sp*. *Wing*: Costa with sections 2-4 in proportion of 91.5 : 26 : 20; wing tip located between R_{4+5} and M_{1+2} but distinctly nearer the former; r-m situated on level of R_1 -termination and far beyond middle of discal cell (27 : 14); m-m subequal in length to penultimate section of M_{1+2} , curved distally at middle; ultimate section of M_{1+2} about $6\times$ as long as length of penultimate; ultimate section of M_{3+4} subequal to penultimate (44 : 40). *Legs*: Mid tibia with 2 posterodorsal bristles. *Abdomen*: Tergites densely setigerous, *mar* longer; tergite 6 nearly $2.5\times$ as long as 5; sternite 6 slightly shorter than tergite 6. *Terminalia*: Ovipositor sheath $3/5$ length of tergite 6; apodeme long, clavate, extending to anterior margin of tergite 5, strongly sclerotized on ventromesal part, pouched on anterior $7/8$. Egg guide subtriangular, only weakly sclerotized, $60\ \mu$ long, with several sensillae. Tergite 9 extremely long, $992\ \mu$ and $48\ \mu$ broad, overspreading laterally; sternite with 3 pairs of *nsm*; cercus $64\ \mu$ long, with 4 short *ts*. Spermathecae relatively large, suborbicular, with truncate ends proximally and distinct protuberances apically, 80×96 to $88\times 100\ \mu$; duct $12\ \mu$ in diame-

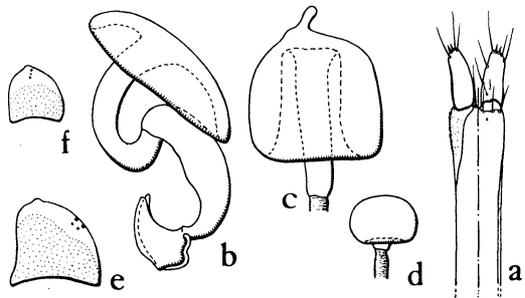


Fig. 10. ♀ terminalia of *Shizukoa magna* (a-c, e) and *S. propinqua* (d, f), n. spp.: a, halves of tergite 9 and sternite 9; b, ventral receptacle; c-d, spermathecae; e-f, egg guides, lateral aspect.

ter; ventral receptacle distinctive as figured, with chitinized, semispherical part. *Length*: Body 4.7 mm, wing 4.2–4.3. *Male*: Unknown.

DISTRIBUTION: Taiwan.

Holotype ♀ (BISHOP 3349), Keelung, 100 m, N. Taiwan, 6. X. 1957, T. C. Maa; paratopotype ♀, 29. XI. 1957, Maa.

As far as I know, this is the largest species in the Agromyzidae. As shown in the key and descriptions, this and the next species, except in size, are related to one another in coloration, wing venation and the structures of the ♀ terminalia, but the front and genae are broader, the mid-tibial bristles are 2, and the spermathecae are provided with apical protuberances, etc.

24. *Shizukoa propinqua* Sasakawa, n. sp. Fig. 10, d, f.

Female: Head black, slightly grayish dusted; front matt, parafrontalia subshining; ocellar triangle very weakly shining; lunule brownish yellow; antenna and palpus brown, segment 1 brownish yellow. Thorax and abdomen subshiny black, dusted with gray; mesopleural suture and base of wing yellowish; tergite 6 with yellow caudal margin. Wing hyaline; veins brown; calypter grayish yellow, with margin and fringe brownish black; halter yellow. Legs black.

Head: Front slightly wider than long, $1.4\times$ as wide as eye; parafrontalia about $1/6$ width of front, slightly narrowing ventrally. Ocellar triangle with ventral tip reaching level of 1. *ors*. Lunule lower than semicircular, $1/4$ as high as length of front, with median furrow. Parafrontalia with 2 *ors* (missing) and 2 *ori*, each strong, directed in- and upwards; *oh* in a row. In profile parafrontalia distinctly and parafacialia linearly projecting above eye-margin; eye bare, eye height and width ratio as 6 : 5; genae very narrow, $1/15$ eye height; parafacialia $1/4$ as wide as diameter of antennal segment 1; *vi* strong; *pm* 5, accompanying with additional row of 4 short hairs. *Antennae* separated by low carina (segment 3 and arista missing). *Thorax*: Mesonotum with 1+3 *dc*, 1. *dc* before level of *prs*, 3. *dc* behind level of *sa*; 6–7 irregular rows of *acr*, 4 rows of them extending before *prsc*; *prsc* equal to 1. or 2. *dc* in length; humerus with 6 setulae plus *h*; mesopleura with 5 dorsally directed setulae; sternopleura with 3 short setae before *sp*. *Wing*: Costa reaching M_{1+2} , with sections 2–4 in proportion of 122 : 34 : 25; r-m beyond middle of discal cell (36 : 25); ultimate section of M_{1+2} about $4.5\times$ as long as penultimate; ultimate section of M_{3+4} $5/6$ length of penultimate. *Legs*: Mid tibia with 1 posterodorsal bristle. *Abdomen*: Tergite 6 about $1.8\times$ as long as 5, with *mar* $5/6$ length of tergite. *Terminalia*: Ovipositor sheath glossy black, slightly shorter than tergite 6; apodeme extremely elongate, extending to anterior margin of tergite 4, nearly $1.5\times$ as long as sheath, more weakly sclerotized than in *S. magna*, pouched on anterior $4/5$. Egg guide subtriangular, very weakly sclerotized apically, $48\ \mu$ long, with 3 sensillae. Segment 9 is $640\ \mu$ long, $32\ \mu$ broad; tergite more slender than that of *magna*, lateral setulae well developed; sternite with 3 pairs of *nsm* and 14 sensillae on distal part; cercus $48\ \mu$ long, with 4 *ts* which are $1/4$ length of cercus. Spermathecae semispherical, 34×44 to $36\times 52\ \mu$; neck $12\ \mu$ long; duct $520\ \mu$ long, $12\ \mu$ in diameter, brown-tinged on apical $1/2$. Ventral receptacle similar to that of *magna* in shape but smaller, $144\ \mu$ long and apical cap-like part $40\ \mu$ in diameter, being $1/3$ that of *magna*. *Length*: Body 3.0 mm, wing 2.8. *Male*: Unknown.

DISTRIBUTION: Vietnam.

Holotype ♀ (BISHOP 3350), Ninh Hoa, N of Nha Trang, S. Vietnam, 28. XI. 1960, C. M. Yoshimoto.

25. *Shizukoa setycopia* Sasakawa, n. sp. Fig. 11, a-e.

Male: Head black; parafrontalia slightly tinged with brown; front and parafrontalia matt, gray-dusted, only bases of *or* shining; lunule yellowish brown, silverly pruinose; face and gena brownish black; antennae pale brown; palpus dark brown. Thorax and abdomen black, densely dusted with gray; mesopleural suture and base of wing brownish white. Wing hyaline, tinged with yellow-brown; veins brown; calypter brownish white, with margin and fringe brownish black; halter yellow. Legs black.

Head: Front slightly wider than long, $1.7\times$ as wide as eye; parafrontalia about $1/5$ width of front, parallel-sided. Ocellar triangle with ventral tip extending to level of 1. *ors*, bearing 6 pairs of setulae plus *oc*. Lunule flat, lower than semicircular, $1/4$ as high as length of front. Parafrontalia slightly projecting above eye-margin in profile, bearing 4 *or* (all broken, direction of inclination not detectable) and a row of minute *oh*, extending from middle between *vti* and 1. *ors* to below 2. *ori*; eye almost bare, height and width ratio as 4:3; gena nearly $1/10$ eye height; *vi* long, differentiated from 5 *pm*. Face concave, wider than high, with carina dorsally distinct; parafacialia linear. *Antennae* separated by carina; segment 3 longer than wide, narrowing apically, with pile as long as arista thickness, arista $3\times$ as long as whole length of antenna, swollen on basal $1/5$, microscopically pubescent. *Thorax*: Mesonotum with $1+3$ *dc*, 1. *dc* just behind level of *prs*, 3. *dc* behind level of *sa*; 8 irregular rows of *acr* but becoming sparser behind 3. *dc*; *prsc* as long as 3. *dc*; *ia* accompanying with 6 rows of setulae; *ipa* about $1/4$ length of *opa*; humerus with 8 setulae plus *h*; mesopleura with 7 reclinate setulae below dorsal margin; sternopleura with 3 setae before *sp*. *Wing*: Costa reaching to M_{1+2} , with sections 2-4 in proportion of 125:40:30; r-m beyond middle of discal cell (36:22); m-m a little longer than r-m; ultimate section of M_{1+2} $5.6\times$ as long as penultimate; ultimate section of M_{3+4} subequal to penultimate (53:56). *Legs*: Fore tibia with 1 external bristle; mid tibia with 3 posterodorsal bristles. *Abdomen*: Tergites densely setigerous; tergite 6 little longer than 5; sternite 5 almost as long as wide, about $2\times$ length of tergite 6, with shallow incision on caudal $1/12$. *Terminalia*: Epandrium nearly $1/4$ as long as tergite 6; cercus $2/3$ as high as epandrium; surstylus suboval in form, distinctly separated from epandrium by suture, bearing about 40 setae in about 4 rows; processus longus U-shaped but arms diverging ventrally, strongly sclerotized, bearing a pair of long setae on posterior apices. Hypandrium narrow, $1/3$ length of phallapodeme, without apodeme; praegonite well sclerotized, proximally united with hypandrium, $1/3$ length of hypandrial sidepiece, with 8 stout setae; post-gonite also

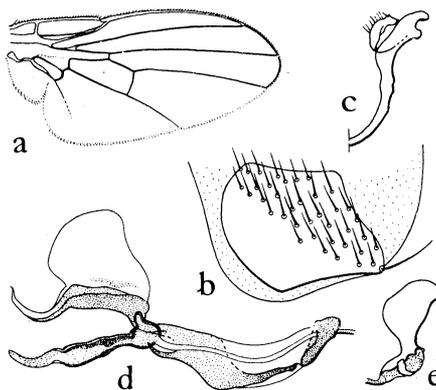


Fig. 11. *Shizukoa setycopia*, n. sp.: a, wing; b, surstylus, inner aspect; c, half of hypandrium; praegonite; d, phallus, lateral aspect; e, ejaculatory apodeme.

well sclerotized, greatly broadened ventrally, inner process with 2 teeth apically, and with 1 stout seta and 4 slender setae at apex. Phallic hood a little less than $1/2$ length of phallopodeme, strongly sclerotized but narrowly along lateral sides and bispinate at posterior end. Basiphallus very narrow; distiphallus about $2/5$ length of phallopodeme, para- and hypophallus united with each other, weakly sclerotized, ventral process as long as endophallus and ventrally broadly membranous, endophallus composed of a pair of tubular processes but membranous on distal $1/2$, spinulose on inner side of distal end of sclerotized part and setulose almost through whole length of membranous part. Ejaculatory apodeme 230μ long and 180μ wide, with several sensillae proximally; bulb with transverse sclerite. *Length*: Body 3.1 mm, wing 2.95. *Female*: Unknown.

DISTRIBUTION: North Borneo.

Holotype ♂ (BISHOP 3351), Kalabakan, Primary Forest, Tawau, N. Borneo, 11. XI. 1958, T. C. Maa.

This species is readily distinguishable from the other species by having many more bristles on the fore and mid tibiae, and the pale testaceous wing.

Subfamily PHYTOMYZINAE Fallén

Genus *Phytobia* Lioy

26. *Phytobia* (*Poemyza*) *cornigera* (de Meijere) Fig. 12, a-c.

Dizygomyza (*Poemyza*) *cornigera* de M., 1934, Tijdschr. Ent. 77: 264.

This is a large black species with narrowly yellow knees on the fore and mid legs, and is known as a leaf-miner on a species of Cyperaceae from Java.

Male terminalia: Epandrium is nearly $1/2$ as long as tergite 6, with small, brown apical process, about $1/3$ as high as length of epandrium; surstylus is triangular, provided with 7 spines at apex and many setae along caudal margin; processus longus is similar to that of species of *pygmaeae*-group, slightly hamate at apex. Hypandrium is short, about $1/2$ length of phallopodeme; sidepieces are broadly united at base; prae- and postgonites are normal. Phallic hood and distiphallus are similar to those of *semiposticata* (Hendel), but ventral process is larger and apically provided with 13 minute teeth of serration. Ejaculatory apodeme is 128μ long and 68μ in greatest width.

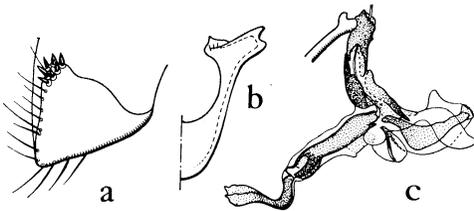


Fig. 12. ♂ terminalia of *Phytobia cornigera* (de Meijere): a, surstylus, inner aspect; b, half of hypandrium; c, phallus, lateral aspect.

MATERIAL EXAMINED. MALAYA: 1 ♂, Connaught Bridge, 9 m, 14. III. 1958, Maa.

DISTRIBUTION: Java, Malaya.

27. *Phytobia* (*Poemyza*) *negrosensis* Sasakawa, n. sp. Fig. 13, a-b.

Male: Head including antenna and palpus brown, but parafrontalia weakly shining and its inner side from base of 2. *ors* to vertex yellowish, central part of ocellar triangle

and dorsal half of lunule darkened, and occiput brownish black. Thorax and abdomen subshiny black, dusted with gray; notopleura tinged with brown; mesopleural suture and base of wing brownish yellow; abdominal tergites 2–6 narrowly with yellowish posterior margins; apical process of epandrium pale brown. Wing hyaline; veins pale brown but costa darker; calypter brownish yellow, with margin and fringe blackish brown; halter yellow. Legs black, knee of fore leg narrowly yellow and those of mid and hind legs only slightly brownish, tarsi somewhat brownish.

Head: Front about $1.5\times$ as wide as eye, converging ventrally; parafrontalia a little less than $1/3$ width of front on upper part, diverging ventrally, $2/5$ of that just dorsad of antennal base. Ocellar triangle of normal size, *oc* parallel, accompanying with a pair of setulae. Lunule narrow and very high, dorsally almost reaching to anterior tip of ocellar triangle which is located midway between 1. and 2. *ors*. Parafrontalia with 4 *or*; *ors* directed upwards, *ori* in- and slightly upwards, 2. *ori* hair-like, about $1/3$ length of 1. *ors*; distance between *vii* and 1. *ors* subequal to that between *ors* and $2\times$ as long as that between *ori*; *oh* short, in a sparse row. In profile parafrontalia slightly extending beyond eye-margin but parafacialia not so; eye with minute hairs sparsely, height and width ratio as 32 : 26; gena very narrow, about $1/15$ eye height; *vi* long; *pm* 3, anterior one subequal in length to *vi*. **Antennae** slightly separated by carina; segment 3 rounded, a little shorter than wide, with distinct pile dorsoapically; arista about $2.5\times$ as long as whole length of antenna, swollen on basal $1/5$, rather distinctly pubescent. Palpus with 3 sub-apical setae. **Thorax:** Mesonotum with 1+3 *dc*, 1. *dc* extremely weak, only slightly longer than *acr*, 2. *dc* $1/3$ length of 4., 3. *dc* $2/3$ length of 4. and located on level of *sa*; 2. *dc* as far from transverse suture as 3. *dc* from 4.; 6 rows of *acr* becoming sparser caudad of 3. *dc* and ending midway between 3. and 4. *dc*; *ia* as long as 2. *dc*; *ipa* hair-like; humerus with 3 setulae plus *h*; mesopleura with 2 reclinate setulae below dorsal margin; sternopleura with a setula before *sp*. **Wing:** Costa reaching to M_{1+2} , with sections 2–4 in proportion of 70 : 28 : 18; R_{4+5} and M_{1+2} almost parallel; r-m at basal $1/4$ of discal cell (12 : 30); m-m $3/5$ length of penultimate section of M_{1+2} , perpendicular to that; ultimate section of M_{1+2} about $2.5\times$ as long as penultimate; ultimate section of M_{3+4} nearly $3/4$ of penultimate (39 : 32). **Abdomen:** Tergites moderately setigerous, *mar* very long; tergite 6 almost $2\times$ as long as 5; sternite 5 is $3/4$ length of tergite 6, posteriorly membranous in shape of inverse triangle, $1/2$ as long as its whole length. **Terminalia:** Epandrium $1/4$ as long as tergite 6, with apical process distinct, about $1/2$ as high as length of epandrium, somewhat constricted near tip; cercus slightly longer than apical process of epandrium. Surstylus strongly incurved, distally somewhat upturned, bearing 3 spines on posterobasal part; processus longus short, with about 10 minute notches, dorsal lobes small. Hypandrium with sidepieces narrow, only broadened posteriorly, about $3/5$ length of phallapodeme; praegonite with 4–5 sensillae; postgonite strongly sclerotized, of normale shape. Distiphallus longer than phallapodeme, endophallus more sclerotized than paraphallus but membranous distally, about $1.7\times$ as long as sidepiece of hypandrium. Ejaculatory apodeme of normal form, blade weakly sclerotized, $120\ \mu$ long,

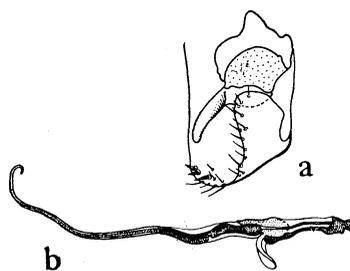


Fig. 13. ♂ terminalia of *Phytobia negrosensis*, n. sp.: a, surstylus and processus longus, inner aspect; b, phallus, lateral aspect.

with several sensillae on basal protuberance. *Length*: Body 1.6 mm, wing 1.8. *Female*: Unknown.

DISTRIBUTION: Philippines.

Holotype ♂ (BISHOP 3352), L. Balinsasayao, Negros Or., 1. X. 1959, L. W. Quate.

This new species is clearly distinct from any of the Oriental species by the very high and narrow lunule, the only yellow knees of the fore legs and very long endophallus.

28. *Phytobia* (*Poemyza*) *spinipenis* Sasakawa, n. sp. Fig. 14, a-b.

Male: Head black but front and gena brown, the former dorsally and the latter caudally paler; lateral margins of ocellar triangle, inner margin of shiny parafrontalia dorsal from base of 2. *ors* and vertex between ocellar triangle and *vti* yellow; antenna and palpus brownish black. Thorax shiny black, slightly gray-dusted; notopleura tinged with brown; mesopleural suture and base of wing yellow. Wing hyaline but slightly tinged with brown; veins pale brown, yellowish basally; calypter yellow, with margin and fringe brown; halter yellow. Legs brownish black, all knees yellow on distal 1/5 length of femora, tarsi brown. Abdomen shiny blackish brown, anterior tergites paler, tergites 2-4 with yellowish caudal margins.

Head: Front 2.5× as wide as eye, slightly converging ventrally; parafrontalia about 1/4 width of front, diverging ventrally and in widest point 1/3 of that. Ocellar triangle normal, ventrally almost extending level of 1. *ors*, bearing 4 setulae plus *oc*. Lunule narrow, as high as length of front. Parafrontalia bearing 4 *or*, an additional pair of incurved setulae just ventrad of 2. *ori*; 1. *ors* directed up- and outwards, 2. *ors* upwards, 1. *ori* up- and inwards, 2. *ori* inwards; *oh* rather long, in sparse row but accompanying with additional mesal row of 4-5 setulae between 2. *ors* and 2. *ori*. In profile parafrontalia distinctly and parafacialia linearly projecting above eye-margin; eye 1.6× as high as wide, rather densely covered with hairs; *vi* longer than 3-4 *pm*. Face with antennal grooves deeply concave (antennae missing); carina sharpened dorsally. *Thorax*: Mesonotum with 1+3 *dc*, 1. *dc* slightly longer than *acr* and behind level of *prs*; 6 rows of *acr*; *ipa* 1/3 length of *opa*; scutellum with a pair of setae midway between *bs* and *as*; humerus, meso- and sternopleura each with a reclinate setula. *Wing*: Costa reaching to M_{1+2} , with sections 2-4 in proportion of 84 : 22 : 14; wing tip between R_{4+5} and M_{1+2} but distinctly nearer the latter; r-m before middle of discal cell (13 : 17); m-m nearly 1/2 as long as penultimate section of M_{1+2} ; ultimate section of M_{1+2} about 4.5× as long as penultimate; penultimate section of M_{3+4} about 3/4 of ultimate (30 : 43).

Abdomen: Tergites sparsely covered with setae; tergite 6 is 1.5× as long as 5; sternite 5 as long as tergite 6, 1.3× as wide as long, with incision on caudal 1/3. *Terminalia*: Epandrium 1/3 length of tergite 6, with apical process about 1/5 epandrial length; surstylus with about 20 setae and 4 spines along posterior margin; processus longus, prae- and postgonite quite similar to that of *bisetiorbita*. Hypandrium almost 2/5 length of phallopodeme. Basiphallus setigerous ventrally; distiphallus longer than hypandrium; paraphallus

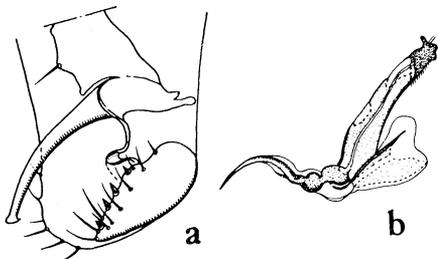


Fig. 14. ♂ terminalia of *Phytobia spinipenis*, n. sp.: a, surstylus and processus longus, inner aspect; b, phallus, lateral aspect.

well developed; endophallus with distal processes rather sharply pointed. Ejaculatory apodeme $152\ \mu$ long and $140\ \mu$ broad, bulb with large basal sclerite. *Length*: Body and wing 2.4 mm. *Female*: Unknown.

DISTRIBUTION: Malaya.

Holotype ♂ (BISHOP 3353), Mt. Brinchang, 2030 m, Cameron Highlands, Pahang, Malaya, 1. I. 1959, L. W. Quate.

This species is immediately distinguishable from *P. oryzivora* Spencer from Malaya by the dark fringe on the calypteres, the broader front and 3 pairs of setae on the scutellum. This species also resembles Japanese *bisetiorbita* Sasakawa in the general coloration and the arrangement of orbital hairs, but shows the following quite definite points: all knees yellow, the acrostichals arranged in 6 rows, the surstyli provided with 4 spines and the endophallus with a pair of sharply pointed processes distally.

29. *Phytobia* (*Icteromyza*) *geniculata* (Fallén)

Agromyza geniculata Fal., 1823, Dipt. Suec., Agromyzid. 2: 6.

MATERIAL EXAMINED. TAIWAN: 1 ♀, Keelung, 100 m, 8. X. 1957, Maa.

DISTRIBUTION: Europe, Manchuria, Japan, Taiwan, Africa.

30. *Phytobia* (*Icteromyza*) *piliseta* (Becker)

Agromyza piliseta Beck., 1903, Mitt. Zool. Mus. Berlin 2: 190.

MATERIAL EXAMINED. MALAYA: 1 ♂, Kuala Tahan, King Geo. V Nat'l. Park, Pahang, 12. XII. 1958, Gressitt & Maa.

DISTRIBUTION: S. Europe, Africa, Malaya, New Guinea, Micronesia.

31. *Phytobia* (*Dizygomyza*) *vietnamensis* Sasakawa, n. sp. Fig. 15, a-c.

Male: Head brown, including antenna and palpus; ocellar triangle, occiput and peristome black, the former shining; dorsal 1/2 of frontalia and inner margin of subshiny parafrontalia paler; lunule silverly pruinose. Thorax weakly and abdomen strongly shining black, densely gray-dusted; notopleura brown, other pleura brown-tinged; mesopleural suture and base of wing yellowish white. Wing hyaline; veins pale brown, whitish yellow basally; calypter yellowish, with margin and fringe dark brown; halter yellow. Legs black, fore knee scarcely yellowish, tarsi pale yellowish brown.

Head: Front about $2\times$ as wide as eye, slightly diverging ventrally; parafrontalia 1/5 width of front, parallel-sided. Ocellar triangle with ventral tip extending midway between 1. and 2. *ors*, bearing 3 setulae plus *oc*. Lunule large, semicircular, as high as front length. Parafrontalia with 2 reclinate *ors* and 2 incurved *ori*; *oh* erect, in a row; a few setulae mingled between ventral *or*. In profile parafrontalia projecting above eye-margin; eye almost bare, slightly higher than wide ($40:32$) gena about 1/7 eye height; *vi* differentiated from 4 short *pm*. Face with carina broad and low, furrowed; parafacialia linear. *Antennae* broadly separated in distance 1/4 width between eyes; segment 3 enlarged, with white long pubescence; segment 4-5 rather long, as long as length of basal thickness of arista; arista $1.5\times$ as long as whole length of antenna, with minute pubescence. Palpus with 4 subapical setae. *Thorax*: Mesonotum with 1+3 *dc* and 6 rows of *acr*, becoming sparser behind 3. *dc*, 4 rows of them extending level of 4. *dc*; *prsc* very weak. *Wing*:

Costa reaching to M_{1+2} , with sections 2-4 in proportion of 83 : 34 : 20; wing tip between R_{4+5} and M_{1+2} but nearer M_{1+2} ; r-m slightly before middle of discal cell (25 : 28); m-m $2/3$ length of penultimate section of M_{1+2} ; ultimate section of M_{1+2} about $3\times$ as long as penultimate; ultimate section of M_{3+4} about $4/5$ length of penultimate (38 : 52). *Legs*: Mid tibia with 1 strong posterodorsal bristle. *Abdomen*: Tergites sparsely covered with slender setae; tergite 6 as long as 5; sternite 5 as long as tergite 6, with broad incision on caudal $1/2$. *Terminalia*: Epandrium $1/3$ length of tergite 6, with short apical process, $2/5$ length of epandrium; surstylus triangular, bearing 13 spines at apex; processus longus and hypandrium similar to those of *luctuosa* (Meigen); praegonite with 1 minute spine and several sensillae. Distiphallus of normal form, but longer than $1/2$ length of phallapodeme, ventral process numerous spinulose at apex. Ejaculatory apodeme $162\ \mu$ long and $136\ \mu$ in greatest width. *Length*: Body 1.9 mm, wing 2.2.

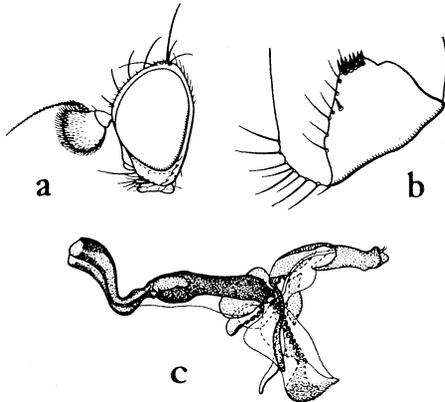


Fig. 15. *Phytobia* (Diz.) *vietnamensis*, n. sp.: a, head, ♂; b, surstylus, inner aspect; c, phallus, lateral aspect.

Female: Similar to ♂, but eye $1.7\times$ as high as wide; gena $1/9$ eye height; antennae separated in distance $1/5$ width between eyes; segment 3 small, somewhat ax-shaped, with minute pile; arista $2\times$ as

long as whole length of antenna. *Length*: Body and wing 2.3 mm.

DISTRIBUTION: Vietnam.

Holotype ♂ (BISHOP 3354), NW of Dilinh, 1100 m, Ap Hung-Lam, S. Vietnam, 29. IX. 1960, C. M. Yoshimoto; allotype ♀, Dalat, 1500 m, 26. IX. 1960, Yoshimoto.

This species very much resembles *P. omissa* Spencer in the coloration, but can be easily separated by having 2 fronto-orbital bristles, 1 mid-tibial bristle and a shorter ultimate section of M_{3+4} .

Genus *Phytagromyza* Hendel

32. *Phytagromyza atrata* (Malloch)

Napomyza atrata Mall., 1914, Ann. Hist.-Nat. Mus. Hung. 12: 333.

One ♀ specimen quite agrees with the original description except for the wing length which measures 2.2 mm.

MATERIAL EXAMINED: 1 ♀, Dilinh, Vietnam, 27. IX. 1960, Yoshimoto.

DISTRIBUTION: Taiwan, Vietnam, Indonesia, India.

33. *Phytagromyza tibialis* Sasakawa, n. sp. Fig. 16.

Female: Head brownish black; front matt; parafrontalia dark brown; brown ventral part of ocellar triangle and dorsal part of parafrontalia shining; lunule and antennal grooves silver-grayish pruinose; gena pale brown; antenna and palpus brown. Thorax subshiny black, densely gray-dusted, with lateral side of mesonotum brown and pleura dark brown.

Wing hyaline; veins pale brown, yellowish basally; calypter whitish, with margin pale testaceous and fringe pale brown; halter yellow. Legs black but tarsi brownish yellow. Abdomen brownish black, tergite 6 paler, subshining; ovipositor sheath shiny black.

Head: Front as long as wide, almost as wide as eye; parafrontalia 1/5 width of front, slightly narrowing ventrally. Ocellar triangle with ventral tip rather acute, extending midway between 1. and 2. *ors*, bearing 2 setulae plus *oc*. Lunule semicircular, nearly 1/3 length of front. Parafrontalia with 4 *or*; 1. *ors* directed up- and outwards, 2. *ors* upwards; *ori* inwards, 2. *ori* less than 1/3 length of 1. *ors*; *oh* in a row. In profile parafrontalia not projecting above eye; eye bare, almost 1.5× as high as wide; gena 1/9 eye height; *vi* distinctly differentiated from 4 *pm*. Face with carina sharpened dorsally. **Antennae** slightly separated by carina; segment 3 a little shorter than broad, with whitish pile; arista 2.5× as long as whole length of antenna, swollen on basal 1/5, pubescent microscopically. **Thorax:** Mesonotum with 0+3 *dc*, 1. *dc* strong, 4/5 length of 2.; 6-7 irregular rows of *acr*, becoming sparser behind 2. *dc* and 4 rows of them ending just behind level of 3. *dc*; *ia* shorter than 1. *dc*, accompanying with 4 irregular rows of setulae; *ipa* 1/3 length of *opa*; humerus with 6 setulae plus *h*; mesopleura with 3-4 dorsally directed setulae. **Wing:** Costa extending slightly beyond R_{4+5} , with sections 2-3 and distance between R_{4+5} and M_{1+2} in proportion of 66 : 37 : 25; wing tip near M_{1+2} ; m-m just basad of r-m; ultimate section of M_{3+4} about 7× as long as penultimate. **Legs:** Mid tibia with 3 strong posterodorsal bristles. **Abdomen:** Tergite 6 shorter than 5; ovipositor sheath densely setigerous dorsally, pubescent on proximal 1/2. **Length:** Body 1.8 mm, wing 1.9. **Male:** Unknown.

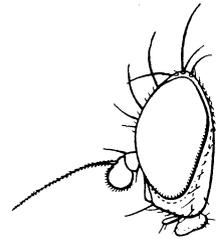


Fig. 16. Head of *Phytomyza tibialis*, n. sp.

DISTRIBUTION: Thailand.

Holotype ♀ (BISHOP 3355), Doi Suthep, 900 m, near Chiangmai, NW Thailand, 14. XI. 1957, on bamboo leaf, J. L. Gressitt.

This species is immediately distinguishable from *P. atrata* (Malloch) by the smaller size and in having 3 pairs of strong dorsocentral bristles and 3 strong mid-tibial bristles. It is suggested that the species is a leaf-miner of bamboo.

Genus *Pseudonapomyza* Hendel

34. *Pseudonapomyza spicata* (Malloch) Fig. 17, a-b.

Phytomyza spicata Mall., 1914, Ann. Hist.-Nat. Mus. Hung. 12 : 334.

This species is highly specific in having the fine point on the antennal segment 3, the long ventral process on the distiphallus, the setulose ventral membrane and the endophallus surrounded by spinulose membrane, and has been known as a leaf-miner of corn, sugar cane and other species of the Gramineae.

MATERIAL EXAMINED: TAIWAN: 1 ♂, Taipei, V. 1958, Krauss; 3 ♀ ♀, Taichung, Taiwan, V. 1958, Krauss.

DISTRIBUTION: Taiwan, Fiji, Samoa, Micronesia, Hawaii, Australia.

35. *Pseudonapomyza quatei* Sasakawa, n. sp. Fig. 17, c-e.

Male: Head brown, including antenna and palpus, but ocellar triangle and occiput black, the former and dorsal part of parafrontalia shining; frontalia matt, parafrontalia darker. Thorax and abdomen black, densely dusted with gray; notopleura brown-tinged. Wing hyaline; veins pale brown, conspicuously whitish basally; calypter with margin and fringe white; halter yellow. Legs brownish black, fore tibia and tarsi more brownish.

Head: Front slightly wider than long, $1.5\times$ as wide as eye; parafrontalia broad, wider than $1/4$ width of front, slightly converging ventrally. Ocellar triangle with ventral tip not reached to level of 1. *ors*, bearing 2 setulae plus short *oc*. Lunule flat, $1/3$ as high as front length. Parafrontalia with 3 *or*; *ors* directed up- and outwards; *ori* 2, inwards; *oh* 4-5, in a row. In profile parafrontalia slightly projecting above eye just dorsad of antenna; eye bare, $1.5\times$ as high as wide; gena $1/6$ eye height; *vi* differentiated from 3 *pm*. *Antennae* approximated at bases; segment 3 with blunt angle at dorsal apex, with microscopic pile; arista $2\times$ as long as whole length of antenna, swollen on basal $1/5$, pubescent microscopically. *Thorax*: Mesonotum with $0+3$ *dc*, 1. *dc* $1/3$ length of 3.; 4 rows of *acr* extending before level of 3. *dc*; 3 rows of setulae between *dc* and *sa*; *ipa* $1/3$ length of *opa*; humerus with 3 setulae plus *h*; mesopleura with 3 dorsally directed setulae below dorsal margin; sternopleura with 2 setulae before *sp*. *Wing*: Costa with sections 2-3 and distance between R_{4+5} and M_{1+2} in proportion of 32 : 18 : 26. *Abdomen*: Tergites sparsely setigerous; tergite 6 as long as 5; sternite 5 subequal to tergite 6, broadly incised on caudal $1/3$. *Terminalia*: Epandrium $3/5$ length of tergite 6; surstylus covered with 38 stout spine-like setae and spinulose on distal membranous part; processus longus similar to that of *spicata*. Hypandrium $1/2$ length of phallopodeme, with sidepieces narrow, only broadened on posterior $1/2$; praegonite with 1 seta and several sensillae. Basiphallus ring-like; para- and hypophallus well developed at both ends, spinose on basal membranous part; ventral process with small proximal sclerites; endophallus with large, quadrifurcate sclerites on lateral sides. Ejaculatory apodeme $120\ \mu$ long, $80\ \mu$ in greatest width. *Length*: Body 1.3 mm, wing 1.2. *Female*: Unknown.

DISTRIBUTION: Vietnam.

Holotype ♂ (BISHOP 3356), N of Pleiku, 650 m, S. Vietnam, 9. V. 1960, L. W. Quate.

In general appearance this species is somewhat intermediate between *P. asiatica* Spencer and *philippinensis* Spencer, both of which agrees in having the bluntly angulate antennal segment 3 and the less shining mesonotum. There is, however, a very definite difference in the size and the characteristic structures of the surstyli and distiphallus. Also differs from *P. trilobata*, n. sp. by the whitish wing base and the 3 pairs of the fronto-orbitals.

36. *Pseudonapomyza trilobata* Sasakawa, n. sp. Fig. 17, f-g.

Male: Head brownish black; front matt, parafrontalia gray-dusted, slightly shining on dorsal part; ocellar triangle shiny; face and gena brown. Mesonotum and abdomen subshiny black, densely dusted with gray; scutellum brownish black; notopleura, lateral sides of mesonotum and pleura brown. Wing hyaline; costal and radial veins pale brown but yellowish basally; calypter yellowish white, with margin darker and fringe whitish; halter yellow. Legs brownish black.

Head: Front wider than long, about $1.8\times$ as wide as eye; parafrontalia $1/5$ width

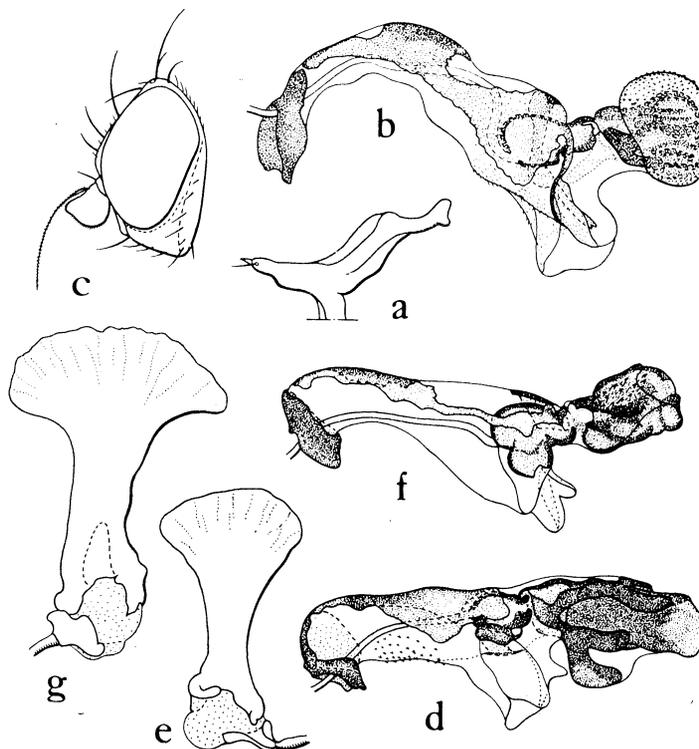


Fig. 17. *Pseudonapomyza spicata* (Malloch) (a, b), *P. quatei*, n. sp. (c-e) and *P. trilobata*, n. sp. (f, g): a, processus longus, ventral aspect; b, d & f, phallus, lateral aspect; c, head, in profile; e & g, ejaculatory apodeme.

of front. Ocellar triangle with ventral tip slightly beyond level of 1. *ors*. Parafrontalia with 4 *or*; 1 *ors*; 1. and 2. *ori* directed in- and upwards, 3. *ori* inwards. In profile parafrontalia not projecting above eye-margin; eye 1.4× as high as wide; gena rounded ventrally, about 1/8 eye height (antennal segment 3 and arista missing). Other structures similar to those of *quatei*. **Thorax**: Mesonotum with 0+3 *dc*; 4 rows of *acr*, median 2 rows of them ending at level of 3. *dc*; mesopleura with 1 dorsally directed setula. **Wing**: Costa with sections 2-3 and distance between R_{4+5} and M_{1+2} in proportion of 35 : 16 : 30. **Abdomen**: Tergite 6 as long as 5; sternite 5 longer than tergite but membranous on posterior 1/2, broadly incised on caudal 1/2. **Terminalia**: Epandrium 5/7 length of tergite 6; surstylus narrowly produced, bearing 15 incurved hairs on caudal part and minute, numerous setulae on cephalal; processus longus as long as epandrium. Hypandrium similar to that of *quatei*; inner process of postgonite with 1 seta and 2 sensillae; praegonite with 5 sensillae. Basiphallus short, ring-like; distiphallus with paraphallus narrowing distally, ventral process small very weakly sclerotized; endophallus with basal part trilobite in lateral view, distal part heavily sclerotized and bearing 4 rows of about 10 stout spines on inner dorsal side and numerous spinulae on distal membrane. Ejaculatory apodeme greatly enlarged, 160 μ long and 120 μ in greatest width, while in *spicata*, 192 μ long and 132 μ broad, duct pale

brown, 4 μ in diameter. *Length*: Body 1.4 mm, wing 1.3. *Female*: Unknown.

DISTRIBUTION: Philippines (Sulu).

Holotype ♂ (BISHOP 3357), Talipao, 15–30 m, Jolo I., Sulu, nr. Mindanao, 31. VIII. 1958, H. E. Milliron.

This species is readily distinguishable from *spicata* (Malloch) by the less shining mesonotum and the structures of the ♂ terminalia; in *spicata*, the surstyli are provided with 10–12 hairs; apical spine-like processes on the processus longus are longer; the paraphallus is broadened distally, ventral process is subequal in length to the distiphallus; and the endophallus is covered with numerous spinulae on the dorsal and ventral parts.

RECENT LITERATURE ON PACIFIC INSECTS

DIPTERA

(Continued from page 22)

- Iyengar, M. O. T., H. DeRook & W. J. O. M. van Dijk. 1959. Interruption of transmission of anopheles-borne filariasis by indoor residual spraying in Netherlands New Guinea. *Trop. Geogr. Med.* **11** (3): 287–90.
- James, M. T. 1961. A new *Chiromyza* from Australia (Diptera, Stratiomyidae). *Ann. Mag. Nat. Hist.* **4** (42): 365–68.
- Kano, Rokuro. 1962. Notes on flies of medical importance in Japan. Part XVI. Three new species of the genus *Melinda* (Calliphoridae, Diptera) from Japan. *Sanit. Zool.* **13** (1): 1–6.
- Kato, S. 1961. Taxonomic studies on soy bean leaf and stem mining flies (Diptera, Agromyzidae) of economic importance in Japan, with descriptions of three new species. *Bull. Nat. Inst. Agric. Sci. ser. C*, no. **13**: 171–206, 75 figs.
- Kato, Y. & K. Kitahara. 1960. Flies from the district of Mansatu, Kagosima Prefecture. *Japan. Jour. Sanit. Zool.* **11** (2): 64 (in Japanese).
- Kessel, E. L. 1961. New species of flat-footed flies from North America (Diptera: Platypozidae). *Wasmann Jour. Biol.* **19** (2): 191–227.
- Kirner, S. H. & H. de S. Lopes. 1961. A new species of *Boettcherisca* Rohdendorf, 1937 from Formosa (Diptera, Sarcophagidae). *Mem. Inst. Oswaldo Cruz* **59** (1): 65–67, 9 figs., 3 refs. (*Boettcherisca formosensis* n. sp.).
- Klein, J. M. & E. N. Marks. 1960. Australian mosquitoes described by Macquart. I. Species in the Paris Museum, *Aedes* (*Finlaya*) *alboannulatus* (Macquart), *Aedes* (*Finlaya*) *rubrithorax* (Macquart), *Aedes* (*Ochlerotatus*) *albirostris* Macquart. New synonymy and a new species from New Zealand. *Linn. Soc. N. S. Wales* **85** (1): 107–16, 2 figs.
- Koizumi, K. 1959. On four Dorilaid parasites of the green rice leaf-hopper, *Nephotettix cincticeps* Uhler (Diptera). *Sci. Rep. Fac. Agric. Okayama Univ.* **13**: 37–45, 4 figs.
- Kosimizu, N. & T. Yamada. 1960. Practical survey of seasonal change of mosquito production sources in suburban area of Kawasaki. *Japan. Jour. Sanit. Zool.* **11** (2): 71 (in Japanese).

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