

**Studies on the Calypterate Muscoid Flies from Japan VI. Revision
of the Tribes Bengaliini and Polleniini of the Subfamily
Calliphorinae and the Subfamilies Chrysomyiinae
and Rhiniinae (Diptera, Calliphoridae)**

Hiromu KURAHASHI*

(Department of Biology, Faculty of Science, Kanazawa University)

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The species belonging to the tribe Polleniini (Subfamily Calliphorinae) are mostly dull black with thin silvery or golden dusting and golden curly or black velvety hairs, and they are called the cluster flies. Three genera, *Xanthotryxus*, *Dexopollenia* and *Pollenia* have been recorded to occur in the Palaearctic Region. The *Xanthotryxus* and *Dexopollenia* are certainly indigenous in the eastern parts of Eurasia. On the other hand, the *Pollenia* is dominantly distributed in western parts of the Continent. Another tribe Melanodexiini, which is closely related to Polleniini, is known to be found in the New World. The biology of flies of this group is less known, though it has been said that *Pollenia rudis* (Fabricius, 1786) is a common parasite of earthworms in North America (Hall, 1948). The tribe Bengaliini (Subfamily Calliphorinae) may be intermediate between the Calliphorini and the Rhiniinae in the morphology, especially in the abdominal structure. A number of species, however, show a more or less high degree of specialization with respect to some features, especially the male hypopygium. This shows that the present tribe has been separated from the other tribes and subfamilies by taking a different way of evolution. Ecologically some species are known to be connected with termites (Altson, 1932).

The subfamily Chrysomyiinae consist of two tribes Chrysomyiini and Phormiini. Flies of the former tribe which are called the screwworm flies are of economic and medical importance throughout the tropical regions in the world. The tribe Phormiini contains species so-called the black blowflies and the nestling screwworms, none of which apparently occurs in tropical and subtropical climatic regions. As valued from a combination of a number of external features and the male genitalia, the Phormiini show a more primitive morphology than the Chrysomyiini. Some species of the

* Present address: Department of Anatomy, Faculty of Medicine, Kanazawa University

Protocalliphora have appearance to quite similar some primitive species of the Polleniini and Cosmiini. This may indicate that there is a certain phylogenetic relationship among the groups.

The Rhiniinae are composed of a highly specialized group of the Calliphoridae, but they have nevertheless a close relationship to the members of the other Calliphorid subfamilies. There is a strong evolutionary tendency in the Rhiniinae towards a reduction of the chaetotaxy and a protruding of the epistome. Assuming that the progressive changes of such characters are a sign of specialization, the members of the Rhiniini appear to have been derived from such an ancestor as the most primitive genera *Isomyia* and *Rhyncomyia* of the tribe Cosmiini. The tropical and temperate zones of the Old World are the territory of the Rhiniini, most of which seem to be associated with developing stages of termites, hymenopterans and orthopterans, etc. there found (Zumpt, 1958). Our knowledge of these groups in Japan has not yet been summarized. This may be explained by the fact that materials of most species can be obtained only in Ryukyu Islands, and are less preserved in the Japanese institutes and museums. The descriptions of these species are scattered over many journals and moreover the type specimens are preserved in foreign institutes and museums.

Subfamily CALLIPHORINAE

Key to the tribes Bengaliini and Polleniini

(Insert to the key of 7 on Kontyû 32;227)

- 7a. Eyes dichoptic in both sexes; prosternum hairy; body predominantly yellowish or brownish with a more or less extended black pattern Tribe Bengaliini, *Bengalia*
- 7b. Eyes dichoptic in female only; prosternum bare; body metallic black more or less dusted; if body of testaceous yellow colouration, thoracic dorsum covered with numerous golden curly hairs Tribe Polleniini (17)

Tribe Bengaliini

Bengalia Rob.-Desvoidy

(1830, Ess. Myod. 2, p. 425)

Syn. : *Ochromyia* Macquart, 1835

Anisomyia Walker, 1860

Homodexia Bigot, 1885

Parabengalia Roubaud, 1913

Eubengalia Townsend, 1926

Type-species: *Bengalia labiata* Rob.-Desvoidy

The *Bengalia* is known to occur only in the Ethiopian, Madagascan and Oriental Regions, including species of a general velvety-brown colour and more or less distinctly darkened hind abdominal margins.

Length 6–15 mm. Zumpt (1956) defined the present genus as follows: —

“Head: eyes bare, widely separated in both sexes; frons at the narrowest point almost half as broad as the eye is long, in the male only a little narrower than in the female; bristles in the female fully developed, in the male two fronto-orbital bristles lacking; parafacialia setulose in full extent; face without, or with only a rudimentary carina; arista with long hairs on both sides; clypeus in the Ethiopian species of normal shape, not strikingly projecting as in some Oriental species; proboscis very stout, with some long hairs on its upper surface. Thorax: propleura bare; supra-squamal ridge, supra-spiracular convexity without long and elect hairs; post-alar declivity hairy. Chaetotaxy: *ac* 0+1, *dc* 2+4, *ia* 0+2, *ph* 1, outer *ph* absent, *h* 2–3, *prs* 1, *n* 2, *sa* 2–4, *pa* 2, *sc* 3–4+1–2, *st* 1+1, *pp* usually 2, *pst* mostly 1, but sometimes accompanied by more or less strong additional hairs. Abdomen: fifth sternite in the male with an apical plate of characteristic shape; hypopygium with free inner forceps and big outer ones composed of two parts, the upper one being small and hairless, the lower one sometimes very large and provided with hairs; phallosome without spinus; theca and phallus well developed; vesicae mostly large and denticulate; phallus also with additional processi of different shape. Wings R_5 open; first longitudinal vein bare; third vein setulose at base and for varying distances up to discal cross-vein; squamae bare on the disc, lower one large and truncate. Legs: markedly different in both sexes, in the male the front tibia is mostly armed with a comb of stout spinules on the upper half of the inner side; mid femur also with a similar comb in the apical ventral half; hind and mid tibiae provided with a tuft of long hairs in some species, but in the female lacking these features, on the other hand, female hind femur often provided with strong ventral bristles, which reduced to fine hairs in male.”

Bengalia latro de Meijère

(Japanese name: Bengaru-baë)

(1910, Tijds. v. Ent. 53, p. 336; Fan, 1965, Key Common Synanthrop. Flies China, p. 191)

Syn.: *Bengalia bezzii*: Kano & Shinonaga (1965, Ill. Keys Adult Filth Flies Jap., p. 1), **syn. nov.**

♂.—Head: eyes bare, widely separated by a distance equal to one-third total width of head; frontal stripe broad, parallel-sided, brown, setulose anteriorly; frons parallel-sided; parafrontalia very narrow, setulose, yellowish-grey dusted; parafacialia narrow, yellow-dusted, setulose; jowls narrow, brown, bare or almost so; post-jowls and occiput with yellow hairs; face brown, grey-dusted, without median carina; antennae brown, the third segment slightly darkened apically, about three times as long as second; arista long-plumose; bristles on oral margin well-developed; palpi yellow; proboscis very stout; labellum small,

Thorax: brown, darkened on the disc, densely covered with silver and yellowish grey dusting; four obscure dark longitudinal stripes present on scutum; pleura covered with fine white and black hairs; propleural, prostigmatic, hypopleural and mesopleural

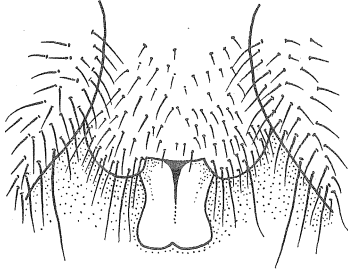


Fig. 1. Male fifth sternite of *Bengalia latro* de Meijère, ventral view.

bristles all well-developed; post-alar declivity with white hairs; prosternum narrow, with white hairs; supra-squamal ridge bare; prothoracic spiracle white; mesothoracic spiracle brown. Chaetotaxy: *ac* 0+1, *dc* 2+4, *ia* 0+2, *h* 2, *ph* 1, *prs* 1, *sa* 2-4, *pa* 2, *n* 2, *sc* 3+1, *st* 1+1.

Wings: hyaline, slightly infuscated wholly; R_5 open; fourth longitudinal vein quite sharply angled; basicosta yellow; subcostal sclerite with yellow pubescence; stem-vein bare; third longitudinal vein with black setulae up to discal cross-vein above and below; squamae yellow, bare on the disc, lower one lobulate. Halteres yellow.

Legs: brown; front tibia with a row of *ad* and 1 *pd*, some stout spines present on ventral side of basal half, fine long hairs also present on postero-ventral side of apical half; mid femur with six to seven spines on ventral side of apical quarter; mid tibia with 3 *ad* and 1 *a*, fine long hairs present on apical half of antero-ventral side; each one of apical *a*, *ad* and *d* well-developed.

Abdomen: brown, each tergite dark-banded on posterior margin; first and second visible tergites with lateral marginal bristles; third tergite with one pair of median marginal bristles and several laterar marginal bristles; fourth with one pair of discal bristles and some marginal bristles; first sternite with characteristic plate projecting posteriorly, as shown in Fig. 1; first genital segment dark brown; second segment black.

♀.—Head: eyes separated by a distance equal to one-third total width of head; parafrofrontalia with two proclinate fronto-orbital bristles; *ev* and *iv* well-developed. Legs: stout spines and fine long hairs on front tibia and several spines on mid femur completely lacking. Abdomen: oval; fifth sternite normal. Otherwise as described for male.

Length: 8-16mm.

Bionomics: according to de Meijère, the adult flies over ants that are on the move and with great dexterity pounces on them, and seizes their insect prey from them. The adults are often found on plants in shade of jungle.

Specimens examined: 1♂, Iriomote Is., Ryukyu, 12. viii. 1961; 3♀♀, Iriomote Is., Ryukyu, 4. viii. 1961 (Uéda leg.); 1♂, Ishigaki Is., Ryukyu, 2. v. 1963 (Kaneko & Shinonaga leg.).

Geographical distribution: Ryukyu (Iriomote Is., Ishigaki Is.), Formosa, China

(Hainan Is., Chechiang), Vietnam, Laos, Malay, Shingapore, Java, Philippines, Ceylon and India.

Tribe Polleniini

Xanthotryxus Aldrich

(1930, Proc. U. S. Nat. Mus. 78, art. 1, p. 3)

Type-species: *Xanthotryxus mongol* Aldrich

This genus *Xanthotryxus* comprises two species, namely *X. mongol* and *X. draco*, which were newly described by Aldrich (1930) basing on the specimens collected in Szechuen Province, China. Only one of them, *X. mongol* is a species of frequent occurrence in Japan.

Head: eyes bare, closely approximated in male, separated in female; rows of frontal bristles reaching only to bases of antennae; facialia with only a few bristles above vibrissae; vibrissae high above oral margin; palpi normal; proboscis short, with ordinary labellum; antennal axis and vibrissal axis about equal in length; arista long-plumose. Thorax: with dense deciduous curly pale hairs, so on the dorsum and pleura; propleura and prosternum bare; hypopleural bristles present; postscutellum not developed; squamae large, bare. Abdomen: robust with golden or yellow dusting; first visible sternite pilose; dense hairs of dorsum becoming bristle-like on posterior tergites. Wings: third longitudinal vein with a few very delicate pale hairs above and below at base; fourth vein bending forward to in form of an angle; subcostal sclerite with a tuft of yellow hairs; stem-vein bare.

Distribution: Japan and China.

Xanthotryxus mongol Aldrich

(Japanese name: Kumoma-torahubae)

(1930, Proc. U. S. Nat. Mus. 78, art. 1, p. 3; Hori & Kurahashi, 1960, Kontyû 28, p. 243; Kano, 1965, Icon. Ins. Colore Naturali Edita 3, p. 234; Kano & Shinonaga, 1965, Ill. Keys Adult Filth Flies Jap., p. 1)

This species has dense appressed golden pollen on the dorsum of abdomen, and is most beautiful in appearance and largest in size among the Japanese Calliphoridae flies.

♂. — Head: eyes bare, closely approximated; frontal stripe reddish brown, triangular, not disappearing at narrowest point of frons; parafrontalia and parafacialia densely golden-dusted; lower parts of parafrontalia and upper parts of parafacialia setulose sparsely; medianae reddish, golden-dusted; jowls with golden yellow hairs, about one-third head-height; face grey- or golden-dusted; antennae dark brown, slightly reddish brown on bases of third segment, not so close together with a broad median facial carina, the third antennal segment about three times as long as second; arista reddish brown, long-plumose almost to tip; vibrissae inserted far above margin of peristome;

about twelve long fine bristles present on peristomal margin from post-jowls to vibrissae; palpi black, slightly reddish basally.

Thorax: black, covered with dense appressed golden deciduous hairs, grey- or golden-dusted anteriorly and also laterally; thoracic spiracles dark brown; prosternum and propleura bare; post-alar declivity with a tuft of golden curly hairs; supra-spiracular convexity bare; supra-squamal ridge bare. Chaetotaxy; *ac* 2+3, *dc* 2-3+3-4, *ia* 0+2, *sa* 3, *pa* 2, *h* 3-4, *ph* 1, *prs* 1, *n* 2, *st* 1+1, *sc* 3+3.

Wings: brownish hyaline, especially along veins, yellow at base; bend of fourth longitudinal vein with a right angle, as shown in Fig. 8d; stem-vein bare; basicosta black; second longitudinal vein with a few yellow hairs at base below and above; subcostal sclerite with yellow hairs and a small tuft of black short hairs; upper and lower squamae yellow, bare. Halteres yellow.

Legs: black, well bristled; mid tibia with 1-2 *ad*; hind coxa bare behind; claws and pulvilli elongated, the latter yellow.

Abdomen: covered with dense golden- or grey-dusting, and with suberect dense black hairs; third visible tergite with marginal bristles and bristly hairs; genital segments, rather large, black: fifth sternite, forceps and phallosome characteristic, practically large, shown in Fig. 2.

♀.—Head: frons at vertex about one-third of head-width; *iv* and *ev* well developed; one reclinate and two proclinate fronto-orbital bristles developed; frontal stripe broad, parallel-sided, reddish brown; parafrontalia silver-dusted, setulose above. Legs: mid tibia with 2 *ad*; claws and pulvilli small.

Length: 12-13 mm.

Bionomics: *Xanthotryxus mongol* is common in mountainous regions of 1000 to 2000 meters above sea level in summer. Adults frequent on the blossoms of *Hydrangea* and other shrubs. One of ovarian eggs taken from a dissected female is shown in Fig. 7₃.

Geographical distribution: Japan (Honshu) and China (Szechuen Province).

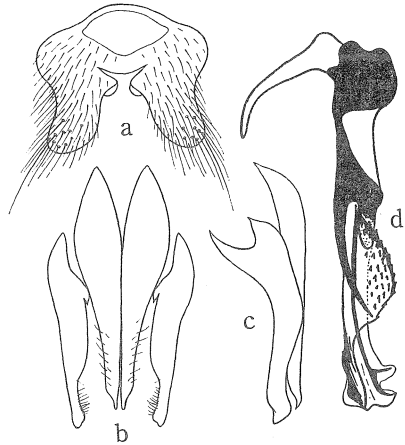


Fig. 2. *Xanthotryxus mongol* Aldrich ♂. a: Fifth sternite, b: Caudal view of forceps, c: Lateral view of forceps, d: Lateral view of phallosome.

Dexopollenia Townsend

(1917, Rec. Ind. Mus. 13, p.201)

Syn. : *Lispoparea* Aldrich, 1930

Pollenia Sen.-White, 1940 (nec Rob.-Desvoidy, p. part)

Type-species: *Dexopollenia testacea* Townsend

This genus is of an oriental, which is closely related to *Xanthotryxus* in the morphology such as the bare parafacialia, the thorax clothed with deciduous yellow hairs and the oval abdomen. The *Dexopollenia*, however, differs from it in having the gentle curve of the fourth longitudinal vein as shown in Fig. 8c, and the yellow colouration of legs. This character of legs serves also as a convenient basis to distinguish this genus from *Pollenia*. Three species, *Dexopollenia geniculata* Malloch, *D. maculata* (Villeneuve) and *D. flava* (Aldrich) have hitherto been recorded from the Palearctic Region. Only the last species is found in Japan.

Body 6–10 mm in length, brown partly, sometimes wholly in colour.

Head: eyes closely approximated in male, separated in female; parafacialia bare on upper parts, sometimes with a few very fine sparse hairs; facialia almost bare; vibrissae inserted distinctly above epistomal margin; face flattened, sometimes with a slightly trace of some indication of a carina, silver-grey dusted; jowls brownish orange, sometimes darkened, silver- or golden- dusted, covered with long fine bristles, about a half to one-third of head-height; medianae rather large; fronto-orbital bristles present in female, but absent in male; antennae pale to dark brown, more or less pollinosed on third segment; arista plumose; palpi brownish. Thorax: either black or brown, or both in colour; prosternum and propleura bare, sometimes with very fine pale hairs; post-alar declivity bare, sometimes with a few yellow hairs; *ac* variable, 0–2+1–3, *dc* 2+3; *ia* 0–1+1–3; *st* 1+1. Abdomen: ovate, slightly flattened horizontally in female, entirely or partly testaceous yellow, without tessellated pattern owing to distinct pollen; marginal and discal bristles on the dorsum well-developed in male, while in female the bristles weak, rarely absent; male hypopygium moderately developed. Wings: stem-vein bare; fourth longitudinal vein bending gently forward with a very obtuse angle; *R*₅ widely open; squamae bare. Legs: usually yellowish brown, and black in a few cases of Oriental species, strongly bristled.

Distribution: Japan, China, Formosa, Borneo, Malay, India and Australia.

***Dexopollenia flava* (Aldrich)**

(Japanese name: Syojo-kurobaë)

(1930, Proc. U. S. Nat. Mus. 78, art. 1, p. 5; Hori, 1961, Kontyû 29, p. 79; Kano, 1965, Icon. Ins. Jap. Colore Naturali Edita 3, p. 234; Kano & Shinonaga, 1965, Ill. Keys Adult Filth Flies Jap., p. 1)

Only one male holotype has hitherto been found in Mt. Omei, Szechuen Province, China, but is rather common in mountainous regions of Honshu, Japan. It was suggested by Zumpt in his monograph (1956) that this holotype-specimen may be a variant of *D. maculata* having yellow venter and 1 pre- and 1 post-sutural *ac* on the thorax, although he regarded the form as a distinct species in the monograph. All individuals which have hitherto been collected in Japan show the characters agree

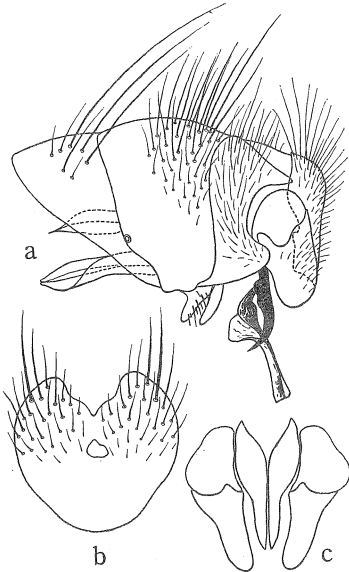


Fig. 3. *Dexopollenia flava* (Aldrich) ♂. a: Lateral view of hypopygium, b: Fifth sternite, c: Caudal view of forceps.

with original diagnosis of *D. flava* and moreover the genitalic evidence indicates that they are not regarded as a mere intraspecific variant of *D. maculata*. The number of the acrostichal bristles, however, is not serviceable for distinguishing these two species because it varies from 1+1 to 1+2 in *D. flava*. Wholly yellow colouration except on the dorsum of thorax and the apical parts of tarsi and hypopleura is characteristic of this species.

♂.—Head: eyes bare, almost contiguous, separated by less than width of anterior ocellus, with somewhat larger facets on upper half or more which gradually diminish in size downwards; frontal stripe yellow, triangular; parafrontalia and parafacialia yellow-dusted, slightly setulose at the level of bases of antennae; face yellow, with slight trace of a broad median carina; medianae and face yellow-dusted; facial ridge narrow, almost bare; jowls yellow-dusted, with fine black hairs; about one-third of head-height; post-jowls with numerous

yellow hairs; antennae yellow, dorsum of the third segment sometimes darkened, the third antennal segment about twice as long as second; arista brown, long-plumose to tip; palpi slender, yellow.

Thorax: wholly yellow except the disc of scutum and covered with dense appressed golden deciduous hairs; propleura and prosternum bare; supra-squamal ridge bare; post-alar declivity with yellow hairs; thoracic spiracles yellow. Chaetotaxy; *ac* 1+1—2, *dc* 2+3, *ia* 0+2, *prs* 1, *ph* 1, *h* 2, *n* 2, *sa* 2, *pa* 2, *st* 1+1, *sc* 3+2—9, sometimes some discals fine.

Wings: yellowish hyaline; all veins yellow; epaulet and basicosta yellow; subcostal sclerite yellow, bare; third longitudinal vein bare; venation as shown in Fig. 8c; squamae yellow, bare. Halteres yellow.

Legs: yellow; tarsi gradually becoming brown towards tip; claus and pulvilli not enlarged; front femur with a distinct row of *pd*, *p* and *pv*; front tibia with a submedian *p*, one submedian *pd* present near the submedian *p*, a row of some short *ad* also developed; mid tibia with a median *ad* and two median *p*, sometimes with a small median *pd* near the median *p*; hind coxa bare behind.

Abdomen: wholly pale yellow, without distinct dusting; first visible tergite with marginal bristles only at sides; second, third and fourth visible tergites each with marginal bristles, the latter two with a irregular row of discal bristles; fourth tergite sometimes with a dark spot on hind margin; genital segments brown, small.

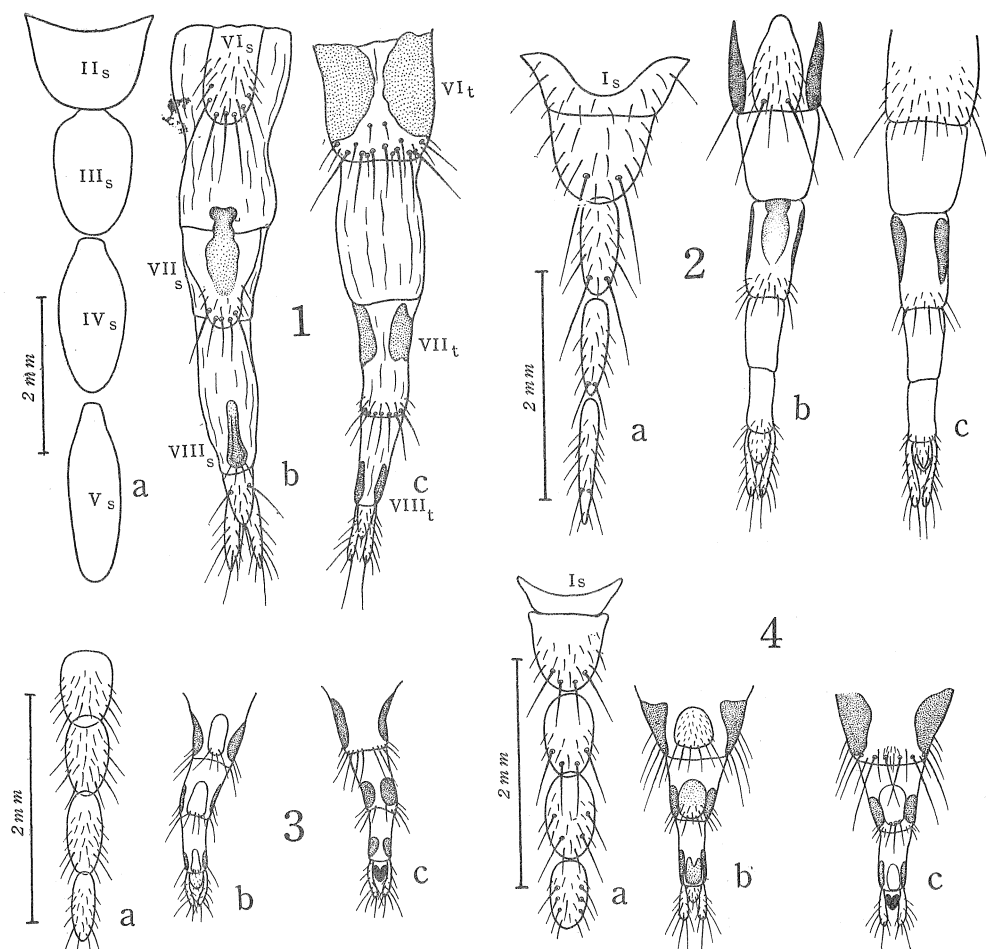


Fig. 4. Female sternites and ovipositors. 1: *Xanthotryxus mongol* Aldrich, 2: *Dexopollenia flava* (Aldrich), 3: *Pollenia argenticincta* (Sen.-White), 4: *Pollenia japonica* Kano et Shinonaga, a: First or second to fifth sternites, b: Ventral view of ovipositor, c: dorsal view of ovipositor.

♀.—Head: eyes with uniform facets, separated at vertex by a distance slightly more than one-third the width of head; frontal stripe broad, almost parallel-sided, somewhat widened anteriorly, orange, sometimes with sparse minute black hairs; *iv* and *ev* well developed; one proclinate and one reclinate fronto-orbital bristle present; parafrontalia setulose. Thorax: scutellum sometimes without bristly hair on the disc. Abdomen: second and third visible tergites with fine marginal bristles; no discal bristle present.

Length: 6–10 mm.

Specimens examined: 1♂, Mt. Hakusan, 2. viii. 1956, (Hori leg.); 1♀, Mt. Hakone, 24. ix. 1956 (Kurahashi leg.); 5♂♂1♀, Mt. Hakusan, 9. vii. 1957 (Hori

leg.); 2♂♂1♀, Mt. Kuragadake, 4. ix. 1960; 3. vii. 1960, 9. x. 1960 (Hori leg.); 1♂, Mt. Shiritaka, 20.vii. 1962 (Kurahashi leg.); 7♂♂1♀, Mt. Daisen, 30. viii. 1962 (Kurahashi leg.); 3♂♂, Mt. Nyuto, Iwate Pref., 9.ix. 1963 (Kurahashi leg.); 2♂♂, Mt. Iwate, Iwate Pref., 7. ix. 1963 (Kurahashi leg.); 5♂♂4♀♀, Mt. Dando, Aichi Pref., 25. vii. 1964 (Kurahashi leg.); 2♂♂1♀, Toyako, Hokkaido, 4. viii. 1966 (Kurahashi leg.).

Bionomics: the adults are commonly observed on the various wild flowers in mountainous regions from July to October. A female collected upon a flower contained 160 mature eggs in her abdomen. One of the eggs is illustrated in Fig. 71.

Geographical distribution: Japan (Hokkaido, Honshu), and China (Mt. Omei).

Pollenia Rob.-Desvoidy

(1830, Ess. Myod. 2, p. 412)

Syn. : *Nittellia* Rob.-Desvoidy, 1830

Cephya Rob.-Desvoidy, 1863

Orizia Rob.-Desvoidy, 1863

Idiopsis Sen.-White, 1923 (nec Brauer et Bergenstamm)

Chaetopollenia Enderlein, 1936

Trichopollenia Enderlein, 1936

Polleniella Jacentkovsky, 1941

Pseudopollenia Jacentkovsky, 1942

Dasypollenia Jacentkovsky, 1942

Bureschiella Jacentkovsky, 1942

Pollenomyia Jacentkovsky, 1942

Polleniomyma Jacentkovsky, 1944

Type-species : *Musca rudis* Fabricius

Body 4–16 mm in length, glossy black, more or less grey- or golden-dusted, with crinkly golden or velvety black hairs on thorax.

Head: eyes more or less approximated in male, widely separated in female; parafacialia broad, setulose in greater degree; face rather sunk between facialia, with some indication of carina; vibrissae inserted slightly above epistomal margin; arista plumose. Thorax: propleura and prosternum bare; post-alar declivity with long hairs; supra-squamal ridge without long hairs; squamae broad, bare. Chaetotaxy; *ac* 2+2–4, *dc* 2+3, *ia* 1+1–2, *ph* 1–2, *h* 2–3, *prs* 1, *n* 2, *sa* 3, *sc* 3–7+1–2, *st* 1+1; propleural and prostigmatic bristles present. Abdomen: not so much robust and oval as in *Xanthotryxus* and *Dexopollenia*. Male hypopygium moderately developed. Wings: stem-vein bare, sometimes with fine hairs; subcostal sclerite bare; first longitudinal vein bare; R_5 open or closed; fourth longitudinal vein bending forward at right angle. Legs: black, strongly bristled.

Idiopsis argenticincta Sen.-White which was classified into the *Pollenia* lately by the same author and his collaborator (1940) has somewhat different appearance from the typical *Pollenia*, especially in the bare parafacialia in male and the gently curved running of fourth longitudinal vein. The structure of phallosome, however, is suggestive to be an ordinary member of the *Pollenia*. The wings of adult fly are overlapped above the abdomen at resting, as seen in the *Pollenia*. Regarding the similarity of these characters as serious, it is probable that this peculiar form is classified into the *Pollenia*.

***Pollenia argenticincta* (Sen.-White)**

(Japanese name: Munagin-kurobaë)

(1923, Mem. Dept. Agric. Ind., ent. ser. 8, p. 48; Hori & Kurahashi, 1962, Kontyû 30, p.118)

This species has no yellow hairs which is characteristic of *Pollenia*.

♂.—Head: eyes bare, closely approximated; frontal stripe black, triangular, reduced to a line between parafrontalia at narrowest point of frons; parafrontalia and parafacialia black shining in dorsal view, anterior part of parafrontalia grey-dusted, sometimes setulose; face and facial ridge flattened, almost bare; medianae black, narrow; jowls black, reddish toward vibrissae, silver-dusted posteriorly, with black fine hairs, about a quarter eye-height; epistome dull luteous; vibrissae arising far above epistomal margin; antennae short, black, the third segment about one and a half times as long as second, the second segment shining; arista brown, short-plumose to half way of its length; palpi black.

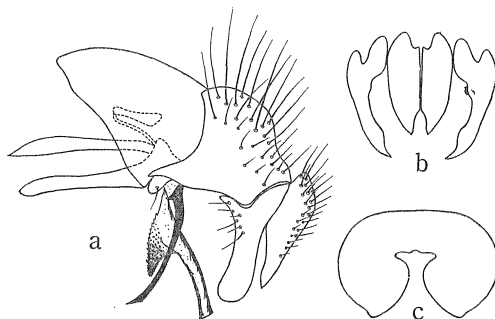


Fig. 5. *Pollenia argenticincta* (Sen.-White) ♂.
a: Lateral view of hypopygium, b: Caudal view of forceps, c: Fifth sternite.

Thorax: entirely black, vervet-like, sometimes grey- or silver-dusted anteriorly and also laterally; thoracic spiracles black; prosterum and propleura bare; hypopleural bristles strong. Chaetotaxy; *ac* 1-2+1-2, *dc* 2-3+3, *ia* 0+2, *h* 2, *ph* 1, *prs* 1, *n* 2, *sa* 2, *pa* 2, *st* 1+1, *sc* 2+0.

Wings: infuscated along veins, with broad dark stripe along costa; epaulet and basicosta black; stem-vein bare; third longitudinal vein bare; fourth vein suddenly bending at a rounded angle, but its distal portion almost parallel to third; costal spine absent; lower squama dark brown, bare, small, tongue-like as in *Protocalliphora* sp.

Legs: entirely black.

Abdomen: entirely black, subshining, vervet-like; no discal bristle present; second

and third visible tergites with marginal bristles only at sides; fourth tergites with marginal bristles on hind margin entirely; genital segments black.

♀.—Head: frons slightly more than the width of one eye; parafrontalia and parafacialia metallic black, remarkably silver-dusted, not so on the upper parts of parafrontalia; frontal stripe broad, widened anteriorly; *iv* and *ev* well-developed; two proclinate fronto-orbital bristles present; squamae yellow; a girdle of silvery dusting from sternopleuron across mesopleuron much more remarkable than in male.

Length: 5–8 mm.

Geographical distribution: Japan (Hokkaido, Honshu, Kyushu) and India (Muktesar, Pusa, Western Himalayas).

Bionomics: *Pollenia argenticincta* is commonly found in the fields of Honshu and Kyushu from March to June, and occurs in mountainous regions over 1300 meters above sea level in summer and fall. The adults visit flowers and rest on grasses and leaves in groups.

Pollenia japonica Kano et Shinonaga

(Japanese name: Kinpatsu-himekurobae)

(1966, Jap. J. Sanit. Zool. 13, p. 223)

Syn.: *Pollenia intermedia*: Kurahashi (1963, Kontyû 31, p. 106)

♂.—Head: eyes bare, closely approximated, separated at narrowest point of frons by the width of ocellar triangle; frontal stripe black, reddish anteriorly, triangular; parafrontalia and parafacialia greyish-brassy dusted densely, and setulose; face black shining, densely grey-dusted on upper half, almost flattened; facial ridge flattened, with a few fine hairs close to vibrissae; medianae dark brown, reddish anteriorly; jowls grey-dusted, with fine black hairs; post-jowls with numerous yellow hairs among black ones, about two-thirds eye-height; epistome brown; antennae short, black, the third segment one and a half times as long as second; arista black, plumose to tip; palpi black.

Thorax: mainly olive-brassy shining, usually with crinkly golden hairs on dorsum; thoracic spiracles black, small; prosternum and propleura bare; post-alar declivity with a tuft of black and yellow hairs. Chaetotaxy; *ac* 2+2, *dc* 2+3, *ia* 1+2, *sa* 2–3, *pa* 2, *h* 3, *ph* 1, *prs* 1, *st* 1+1, *sc* 3+1–2, *n* 2.

Wings: hyaline, sometimes infuscated along veins; epaulet and basicosta black; stem-vein bare, very short setulae present on the base of third longitudinal vein above and below; subcostal sclerite brown, with fine yellow hairs; fourth longitudinal vein suddenly bending at a right angle; R_5 closed, with a short stalk; squamae yellow, bare; suprasquamal ridge bare. Halteres yellow.

Legs: black; claws and purvilli long; front tibia with 1 *pv* and a row of short *d*; mid tibia 3 *p*, 1 *v*, 1 *ad*; hind tibia with 2 *pd* and 2–3 *ad*; hind coxa bare behind.

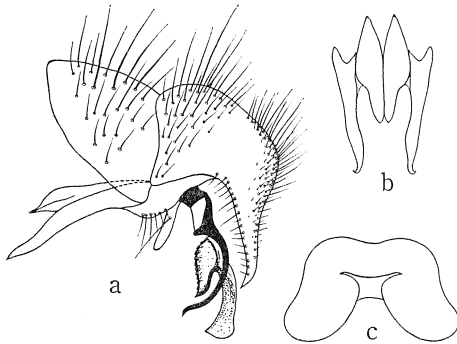


Fig. 6. *Pollenia japonica* Kano et Shinonaga ♂.
a: Lateral view of hypopygium, b: Caudal view of forceps, c: Fifth sternite.

Abdomen: mainly olive-brassy black, slightly pruinose, with a median narrow black stripe; marginal bristles on the first and second visible tergites fine, gradually becoming strong towards its lateral sides; marginal bristles on third and fourth tergites well-developed, sometimes fine; genital segments rather large, metallic black. Male genitalia shown in Fig. 6.

♀.—Head: eyes separated at vertex by slightly less than the width of one eye; parafrontalia and parafacialia silver-grey dusted, setulose; frontal stripe black, almost parallel-sided; *iv* and *ev* well-developed; two proclinate fronto-orbital bristles and one reclinate frontal bristles present. Abdomen flattened, without a median narrow black stripe. Wings: more infuscated than in male, with a broad longitudinal dark stripe along anterior margin.

Length: 5.5–9 mm.

Specimens examined: 2♂♂, Mt. Dando, Aichi Pref., 28. vii. 1964; 2♀♀, Ootani, Ishikawa Pref., 12. v. 1963; 1♀, Oirase, Aomori Pref., 6. ix. 1963; 1♀, Hikosan, Fukuoka Pref., 17. vii. 1961 (Kurahashi leg.).

Bionomics: *Pollenia japonica* Kano et Shinonaga is less common in Honshu and Kyushu. The adults are found on leaves and flowers of wild plants from March to September. It was observed by the present author that a group of female adults wander about vividly on the leaf mould beside a mountain path and lay eggs on a rotting leaflet. This may suggest that the larvae are likely to be parasitic in earthworm as does American *Pollenia rudis*. One of the sixty-six eggs which were obtained from the abdomen of a dissected female is illustrated in Fig. 7₂.

Subfamily CHRYSOMYIINAE

Tribe Chrysomyiini

Chrysomyia Rob.-Desvoidy

(1830, Ess. Myod. 2, p.444)

Syn. : *Somomyia* Rondani, 1861 (p. part)

Compsomyia Rondani, 1875

?*Callitroga* Brauer, 1883

Paralucilia Brauer et Bergestamm, 1891

Pycnosoma Brauer et Bergestamm, 1894

Paracompsomyia Hough, 1898

Psilostoma Surcouf, 1914

Microcalliphora Townsend, 1916

Achaetandrus Bezzi, 1927

Compsomyia Séguy, 1927 (nec Rondani)

Somomyia Séguy, 1927 (nec Rondani)

Cyaneosomyia Séguy, 1928

Pycnosomops Townsend, 1934

Type-species : *Chrysomyia regalis* Rob.-Desvoidy

The genus *Chrysomyia* has its close affinities to such genera as *Hemilucilia* Brauer, 1895; *Myiolucilia* Hall, 1948; *Chloroprocta* van der Wulp, 1896; *Callitroga* Brauer, 1883; and *Paralucilia* Brauer et Bergestamm of the New World Chrysomyiinae. Whether the genera are partly congeneric with the *Chrysomyia* or not, will be able to be exactly decided only by American authors. The genus *Chrysomyia* which is dominant in the tropical and subtropical zones of the Old World, partly invades the temperate regions of the Palearctics such as Japan and China, etc. The larvae usually develop in decaying animal matter. Such species as *C. albiceps* (Wiedemann), *C. bezziana* Villeneuve, *C. chloropyga* (Wiedemann) and *C. marginalis* (Wiedemann) are frequently found as the causative flies of myiasis in man and animals (Smit, 1931; Cuthbertson, 1933, 1934, 1938; Zumpt, 1951). Japanese species mentioned below are noticed as the vector of various infectious diseases throughout the southern parts of Japan because the larvae and adults live in lavatories and around garbage piles and the adults enter houses often.

Length 7–11 mm. Body robust, metallic green to blue, sometimes with purple reflection.

Head: eyes in male completely holoptic, sometimes separated widely by a distance equal to one-third to fourth-fifth the width of one eye, in female always widely separated; the facets of male in some species enlarged on upper anterior areas; parafacialia haired, sometimes only at the bases of antennae; fronto-orbital bristles usually developed in female, exceptionally absent in a few cases; face rather sunk between facialia; upper margin of epistome slightly projecting forward and downwards; antennae long, reaching to level of insertion of vibrissae; arista long-plumose; jowls one-third to a half eye-height, sparsely haired, giving the head its characteristic appearance; palpi well developed, slightly thickened distally. Thorax: all bristles on dorsum poorly developed; propleura, prosternum and post-alar declivity hairy; squamopleuron bare. Chaetotaxy; *ac* 0+1, *dc* 2+1–3, *ia* 0+1, *sa* 2, *pa* 2, *h* 2, *ph* 1, *st* 1+1, hypopleural bristles fine; prostigmatic bristles absent, sometimes present. Abdomen: broad, oval; posterior margins of the tergites generally dark-banded; male hypopygium sometimes strongly developed, but usually small and inconspicuous. Wings: stem-vein with a row of setulae on upper posterior side; third longitudinal vein bare above and below; lower lobe of squamae hairy on upper surface.

Distribution: Ethiopian, Oriental and Australian Regions, and a part of Palaearctic Region.

Key to the species of *Chrysomyia*

1. Prothoracic spiracle white; jowls clothed with white hairs
 *C. albiceps rufifacies*
- Prothoracic spiracle brown (2)
2. Parafacialia and jowls brilliant orange; jowls clothed with golden hairs
 *C. megacephala*
- Parafacialia and jowls dark brown; jowls clothed with black hairs..... *C. pinguis*

***Chrysomyia pinguis* (Walker)**

(Japanese name: Hohoguro-obikinbaë)

(1858, Trans. Ent. Soc. Lond. 4, p. 213; Hori, 1951, Kontyû 19, p. 25; 1955, Bull. Biogeograph. Soc. Jap. 16-19, p. 232; Kano & Sato, 1951d, Jap. J. Exp. Med. 21, p. 232; Kano, 1954, Nippon no Hae, p. 20; 1958, Bull. Tokyo Med. & Dent. Univ. 5, p. 469; Kano & Tanaka, 1959, Med. Zool., p. 261; Kano & Shinonaga, 1964, Tohoku Konchu Kenkyu 1, p. 6; 1964b, Kontyû 32, p. 132; 1965, Ill. Keys Adult Filth Flies Jap., p. 5; Zumpt, 1956, Lind. Fliegen pal. Reg. 64i, p. 89; Shiraki, 1958, Sanit. Ins., p. 1011; Fan, 1965, Key Common Synanthrop. Flies China, p. 203; Park, 1960, Stud. Flies Korea 1, p. 44; 1962, Kor. Jour. Zool. 5, p. 4)

♂ ♀.—Head: eyes in male holoptic, in female separated by a distance subequal to the width of an eye; facets greatly enlarged and demarcated from small facets of lower third; frontal stripe black, in male narrow, reduced to a line posteriorly, in female approximately twice the width of one of the parafrontalia, narrowing anteriorly; parafrontalia dull-grey dusted, black towards vertex; parafacialia bare; antennae brown, apical part of second and inside of third segment orange, the third segment about four times as long as second; arista brown, long-plumose; palpi orange.

Thorax: bluish-green shining, sometimes with purple reflection, covered with greyish dusting anteriorly; prothoracic spiracle dark brown. Chaetotaxy; *ac* 0+2, *dc* 2+4, *ia* 1+2, *prs* 1, *sa* 3.

Wings: hyaline, slightly infuscated at base; basicosta black; subcostal sclerite dark brown, with pubescence; squamae infuscated, the lower one setulose on upper surface. Halteres brown.

Legs: dark brown to black.

Abdomen: bluish green with purple reflection, the posterior margin of the tergites dark-banded; hypopygium inconspicuous; male genitalia characterized with the elongate inner forceps whose two halves connected by a distensible membrane.

Length: 8–12 mm,

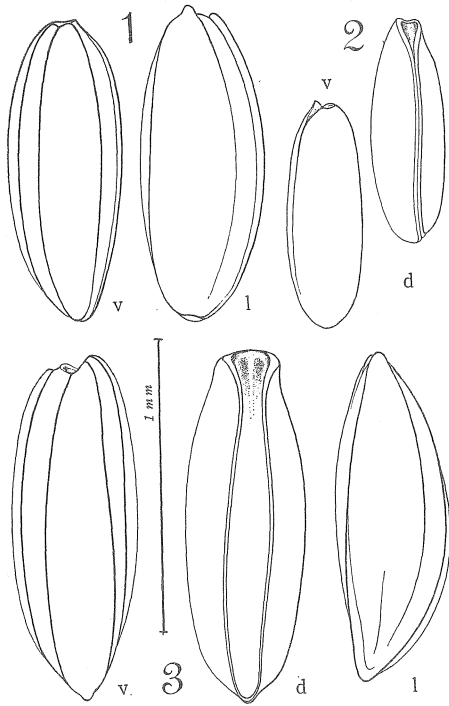


Fig. 7. Eggs. 1: *Dexopollenia flava* (Aldrich), 2: *Pollenia japonica* Kano et Shinonaga, 3: *Xanthotryxus mongol* Aldrich, v: Ventral view, l: Lateral view, d: Dorsal view.

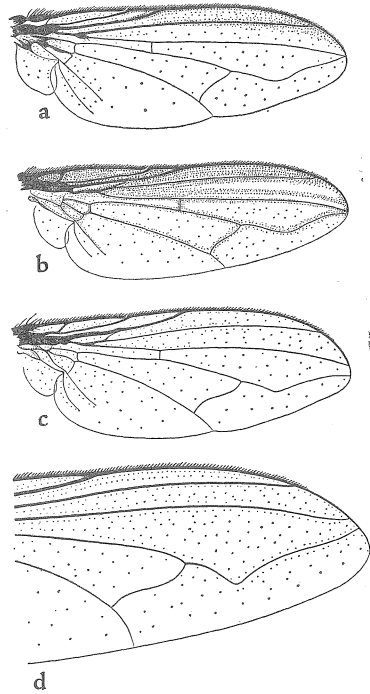


Fig. 8. Wings. a: *Pollenia japonica* Kano et Shinonaga, b: *Pollenia argenticincta* (Sen.-White), c: *Dexopollenia flava* (Aldrich), d: *Xanthotryxus mongol* Aldrich.

Bionomics: *C. pinguis* is common in southern parts of Japan as well as *C. megacephala*. However the present species might have the tendency for liking much milder climate than *C. megacephala* does. For example, *C. pinguis* is commonly found in the mountainous regions of Amami-Oshima Isls. and northern parts of Honshu where *C. megacephala* is rarely found. The larvae have been found breeding in carcasses and garbage piles. The descriptions and figures of larval stage were given by Kano (1954, 1958, 1959) and Ishijima (1967).

Geographical distribution: Japan (Honshu, Shikoku, Kyushu, Amami-Oshima Isls., Ryukyu), Korea, China, Formosa, Hainan Is., Thailand, Malay, Java, Ceylon and India.

Chrysomyia megacephala (Fabricius)

(1794, Syst. Ent. 4, p. 1784; S.-White, Aubertin & Smart. 1940, Fa. Brit. India, Dipt. 6, p. 138; Okada, 1941, Biogeographica 3, p. 264; James, 1947, Flies that cause Myiasis Man, p. 74; Takano, 1950, Icon. Ins. Jap., revised edit., p. 1694; Kano & Sato, 1951d, Jap. J. Exp. Med. 21, p. 232; Kano, 1958, Bull. Tokyo Med. Dent. Univ. 5,

p. 470; Kano & Tanaka 1959, Med. Zool., p. 261; Kano et al. 1964, Kontyû 32, p. 131; Kano, 1965, Icon. Ins. Jap. Colore Naturali Edita 3, p. 233; Kano & Shinonaga, 1965, Ill. Keys Adult Filth Flies Jap., p. 5; Hori, 1955, Bull. Biogeograph. Soc. Jap. 6-19, p. 232; Zumpt, 1956, Lind. Fliegen pal. Reg. 64i, p. 88; Shiraki, 1958, Sanit. Ins., p. 993; Park, 1960, Stud. Flies Korea 1, p. 45; Fan, 1965, Key Common Synanthrop. Flies China, p. 205)

Syn.: *Lucilia dux*: Matsumura (1906, Hakubutsu no Tomo 6, p. 13-16; 1932, Cons. Jap. Inj. Ins., p. 766), **syn. nov.**

This species is commonly found in Ryukyu Isls., Amami-Oshima Isls. and the southern parts of Kyushu, but rarely in Honshu.

Length: 7-11 mm.

Bionomics: the adults are oviparous, most frequently found on garbage and grasses around houses, and in lavatories. They often swarm on meat and on sweets in the market. The seasonal occurrence of adult flies was observed by Kano et al. (1964) in Ishigaki Is., Ryukyu, where they always emerge most abundantly from April to June. The larva of this species is normally a scavenger, most frequently occurs in lavatories in Amami-Oshima and Ryukyu Isls., but in Kyushu in carcasses and garbage piles. However it occasionally becomes a breeder in wound tissues of living animals (Patton, 1922; Leger & Couput, 1924; Sonan, 1927; Sen.-White et al., 1940). Also James (1947) and Reid (1953) have briefly reported on the general biology and pathogenesis. The descriptions and figures of larval stage were given by Kano (1951, 1954, 1959), Hennig (1952) and Ishijima (1967). The present species, which is known as "latrine fly" in Far East, is considered by Harris and Down (1946) to be the spreader of amoebiasis, hookworm, and other intestinal infections. The general biology has been carefully studied by Wijesundara in Ceylon (1957), and Thomas in China (1951).

Geographical distribution: Japan (south-western parts of Honshu, Shikoku, Kyushu, Amami-Oshima Isls., Ryukyu Isls., and Bonin Isls.), Formosa, Korea, Manchuria, China, Vietnam, Tailand, Malay, Ceylon, India, ?Iran, ?Egypt, Sumatra, Borneo, Java, Timor, Celebes, Aru Isls., Philippines, Micronesia (Volcano Isls., Mariana Isls., Caroline atolls, Tonga Isls., Marshall Isls., Gilbert Isls.), Polinesia (Hawaii Isls., Samoa Isls.), Melanesia (Fiji Isls., New Hebrides Isls., Solomon Isls.), Australia (Queensland, New South Wales), New Zealand, and Madagascar (Reunion Is., Mauritius Is., Seychelles Is.).

***Chrysomya albiceps rufifacies* (Macquart)**

(Japanese name: Hohojiro-obikinbaë)

(1843, Mem. Soc. Roy. Sci. Arts Lille, Année 1842, p. 303; James, 1947, Flies that cause Myiasis Man, p. 71; Kano, 1958, Bull. Tokyo Med. & Dent. Univ. 5, p.

471; Kano & Shinonaga, 1965, Ill. Keys Adult Filth Flies Jap. p. 5; Shiraki, 1958, Sanit. Ins., p. 996; Uéda, 1963, Ann. Rep. Jun. Coll. Ube 3, p. 139; Fan, 1965, Key Common Synanthrop. Flies China, p. 199)

The present subspecies is chiefly separated by a well developed prostigmatic bristle from *C. albiceps albiceps* (Wiedemann) which has been mostly considered as a distinct species. The most important feature for deciding the probable status of these forms may be the hypopygium of the two forms. The comparative morphology of the character however indicates that between two forms there are no difference of taxonomic importance to regard the forms as two distinct species, as shown in the drawings figured from both forms by Holdaway (1933). According to Zumpt (1956) and Ullerich (1963), it seems that there are different frequencies of genes which produce the feature said to be characteristic of *albiceps* and *rufifacies* among the populations. The frequency of occurrence of prostigmatic bristles is maximum in the population distributed in eastern extremity of the Old World and in Australia, and decreasing throughout India to Africa. The crossing experiment by Ullerich between *C. albiceps* from South Africa and *C. rufifacies* from Australia shows that there is nothing more than subspecific difference between them. The present author, therefore, considers *rufifacies* as a subspecies or a mere geographical race at present. *C. albiceps albiceps* is commonly found in the Ethiopian, Madagascan, Mediterranean and Indian regions. In India it is replaced by *C. albiceps rufifacies* which indigenously occurs in the combined Oriental and Australian Region. The latter subspecies is extremely common in Ryukyu Isls., but not inhabits in the main islands of Japan. Two specimens which were collected in Tokyo seem to be stowaways from the southern Pacific islands.

♂ ♀.—Head: eyes separated in male by a distance approximately equal to width of the third antennal segment, in female by slightly more than two-thirds the width of one eye; facets enlarged towards vertex, but not demarcated from smaller facets of lower one-third; parafrontalia in male narrowed, black on upper half, covered with silver dusting on lower half, which bearing upstanding white hairs and a few fine black bristles; male frontal stripe black, more or less obliterated for greater part of its length, reddish towards the bases of antennae, in female frontal stripe and one of parafrontalia approximately equal in the width, the former black, slightly grey-dusted, the latter without white hairs in female; parafacialia and jowls reddish yellow, thickly covered with silver dusting and white fine hairs; epistome and palpi orange; antennae dark brown, the third segment about three and a half times as long as second; arista brown, long-plumose.

Thorax: greenish blue, similar to *C. megacephala*; prothoracic spiracle white; scutum with obscure dark marks behind the transverse suture, two narrow longitudinal stripes also present anteriorly; prostigmatic bristles present.

Wings: hyaline; basicosta blackish brown to black; subcostal sclerite pubescent,

dark brown in colour; squamae white, the lower one sometimes slightly infuscated, bearing white or occasionally black hairs on its upper surface.

Legs: black.

Abdomen: similar to that of *C. megacephala*, greenish blue, with purple reflection, and also bearing a black longitudinal narrow strip in male; first visible tergite black in male, greenish in female; second to fourth tergites usually black-banded on posterior margins; hypopygium inconspicuous.

Length: 7–12 mm.

Bionomics: *C. albiceps rufifacies* is said to be one of the main pests of sheep in Australian Region as well as *C. albiceps albiceps* is so in the Ethiopian Region. In mild temperate climate this subspecies is comparatively harmless. A few investigatory works on the general biology have been done in India and Australia (Patton, 1922; Mackerras, 1933; Roy & Siddons, 1939; Zumpt, 1956; Norris, 1959). It is very similar to that of the western *C. albiceps albiceps*. James (1947) also reported briefly on the biology and pathogenesis. The larva seems to be primarily necrophagous and occasionally become predacious on the larvae of other necrophagous flies in the same carcass (Sen.-White et al., 1940). Because of the lack of domestic habits and the absence from human excrement the present species is of little medical importance. The larva of this Calliphoridae presents the image of one of the Fanniidae. Many spinoses on the segments are characteristic of this species. The immature stages are not as yet separable from those of *C. albiceps albiceps*.

Geographical distribution: Japan (Ryukyu), Formosa, China, Vietnam, Thailand, Malay, Ceylon, India, Pakistan (Baluchistan), Sumatra, Java, Celebes, Micronesia (Mariana Isls., Caroline Isls., Marshall Isls.), Polynesia (Hawaii Isls., Samoa Isls., Society Isls., Marquesas Isls., Tonga Isls.), Melanesia (Solomon Isls., New Hebrides Isls., Fiji Isls., New Caledonia Is.), Australia (Queensland, New South Wales, Victoria, Tasmania Is.) and New Zealand.

Tribe Phormiini

Members of this tribe inhabit Holarctic Realm, ecologically and chronologically replace the tribe Chrysomyiini mentioned above. The present tribe consists of four genera, *Boreellus* Aldrich et Shannon, *Phormia* Rob.-Desvoidy, *Protophormia* Townsend and *Protocalliphora* Hough.

Phormia Rob.-Desvoidy

(1830, Ess. Myod. 2, p. 465)

Syn. : *Euphormia* Townsend, 1919

Type-species : *Musca regina* Meigen

The present genus is monobasic.

Phormia regina (Meigen)

(Japanese name: Kurokinbaë)

(1826, Zweifl. Ins. 5, p. 58; Kano, 1950, Jap. J. Exp. Med. 20, p. 824; Kano & Sato, 1951d, Jap. J. Exp. Med. 21, p. 231; Kano, 1954, Nippon no Hae, p.20; Kano, 1958, Bull. Tokyo Med. & Dent. Univ. 5, p. 465; Kano & Shinonaga, 1964, Tohoku Konchu Kenkyu 1, p. 7; Kano, 1965, Icon. Ins. Jap. Colore Naturali Edita 3, p. 233; Kano & Shinonaga, 1965, Ill. Keys Adult Filth Flies Jap., p. 5; Hori, 1951, Kontyû 19, p. 25; Shiraki, 1958, Sanit. Ins., p. 1007; Park, 1960, Stud. Flies Korea 1, p. 52; Zumpt, 1956, Lind. Fliegen pal. Reg. 64i, p. 92; Fan, 1965, Key Common Synanthrop. Flies China, p. 209).

The present species is distributed throughout the boreal parts of Holarctic Realm. The occurrence in Hokkaido was only known in Japan before 1955. Then it has expanded into northern parts of Honshu. In 1965 many materials of this species were collected from Kanazawa (Kurahashi, 1965) and Okazaki, Central Japan. It is believed that it will continue to distribute to the wormer southern parts of Japan.

♂ ♀.—Head: eyes in male almost contiguous, in female separated by about the same width as one eye, with minute white hairs; frontal stripe black or blackish brown, in male obliterated at narrowest part of frons; parafrontalia, parafacialia and face silver-dusted; setulose area of parafacialia extending beyond level of antennae; parafrontalia in female covered with golden dusting, and with two reclinate fronto-orbital bristles; antennae brown, the third segment three times as long as second; arista plumose; palpi orange.

Thorax: bluish-green shining, with uniform dusting; prothoracic spiracle bright orange; metathoracic spiracle dark brown. Chaetotaxy; presutural and postsutural *ac* several distinct, but fine, usually 4+2, *dc* 4-5+5, *ia* 3+2, *st* 2-1+1.

Wings: hyaline, slightly infuscated towards base; basicosta brown; subcostal sclerite brown, with orange pubescence and several black hairs; squamae yellowish white, bare. Halteres brown.

Abdomen: bluish green shining, flattened.

Length: 7-10 mm.

Bionomics: *Phormia regina* is less common in Honshu, and occurs in spring and fall, though during the summer the species may be collected at high altitudes in Honshu and on plains in Hokkaido. *P. regina* is similar to *Protophormia terraenovae* in habits. Adults are found on carcasses and garbage, and commonly attracted to human and other mammalian dung (Coffey, 1966). Large numbers of just emaginated adults are very often found to rest on the walls near the breeding places, and often enter houses. The larva breeds in lavatories, garbage piles and carcasses, but it occasionally becomes parasitic under certain enviromental condition. Cases of myiasis of human and other animal open wound were reported by Zumpt (1956) and Hall

(1948). Also James (1947) summarized the general biology and pathogenesis. The descriptions and figures of immature stages were given by Hall (1948), Kano (1954, 1958, 1959) and Ishijima (1967).

Geographical distribution: Japan (Hokkaido, northern parts of Honshu), Korea, China, Mongolia, Siberia, Central Asia, Kokasus, Europe, and North America.

Protophormia Townsend

(1908, Smithsn. Misc. Coll. 51, p. 123)

Type-species : *Phormia terraenovae* Rob.-Desvoidy

The genus *Protophormia* is monobasic.

Protophormia terraenovae (Rob.-Desvoidy)

(Japanese name: Rurikinbaë)

(1830, Ess. Myod. 2, p. 467; Kano, 1950, Jap. J. Exp. Med. 20, p. 824; Kano & Sato, 1951d, Jap. J. Exp. Med. 21, p. 232; Kano, 1958, Bull. Tokyo Med. & Dent. Univ. 5, p. 468; 1965, Icon. Ins. Jap. Colore Naturali Edita 3, p. 233; 1965, Kano & Shinonaga, Ill. Keys Adult Filth Flies Jap., p. 5; 1965, Jap. J. Sanit. Zool. 16, p. 248; Zumpt, 1956, Lind. Fliegen pal. Reg. 46i, p. 93; Shiraki, 1958, Sanit. Ins., p. 1009; Fan, 1965, Key Common Synanthrop. Flies China, p. 207)

The present species is common in Hokkaido, but in Honshu, only a few specimens have hitherto collected from Niigata Pref. They seem to be occasional stowaways from Hokkaido. Recently it is reported by Fukushi (1967) that the species has been populated in Aomori City since a few years ago.

♂ ♀.—Head: eyes dichoptic, separated by one-fifth the width of one eye in male, in female separated by one and a quarter the width of one eye; frontal stripe black; parafrontalia, parafacialia and face grey-dusted; setulose area of parafacialia not exceeding the level of base of arista; antennae blackish brown, the third segment two and a half times as long as second; arista plumose; palpi orange.

Thorax: dark blue shining, without uniform thin dusting on the dorsum; prothoracic spiracle black; metathoracic spiracle dark brown. Chaetotaxy; *ac* absent or poorly developed, usually 0+2, *dc* 2-4+3-5, *ia* 1-2+2, *ph* 2, *h* 4-5, *prs* 1, *n* 2, *sa* 3-5, *st* 2+1, *sc* 3-4+1-2.

Wings: hyaline; basicosta black; subcostal sclerite brownish black, with several black hairs; squamae brown, bare. Halteres brown.

Legs: black shining.

Abdomen: dark blue shining, flattened; bristles poorly developed.

Length: 6-12 mm.

Bionomics: the general biology was given by Hall (1948). The larvae live on

carcasses and garbage piles, which also produce myiasis of human wound (Hall, 1948; Zumpt, 1965). James (1947) discussed briefly the biology and pathogenesis of this species. The descriptions and figures of immature stages were given by Hall (1948), Kano (1954, 1958, 1959), Zumpt (1965) and Ishijima (1967).

Geographical distribution: Japan (Hokkaido), Siberia, Central Asia, Kokasus, European Russia, Rumania, Hungary, Austria, Czechoslovakia, Germany, Denmark, France, Netherlands, England, Scotland, Iceland, Norway, Sweden, Lapland, Spitzbergen Isls., Greenland, Ellesmere Isls., Alaska, Canada, New Foundland, and U. S. A. as far south as central Texas and northern Georgia.

Protocalliphora Hough

(1899, Ent. News 10, p. 66)

Syn. : *Avihospita* Hendel, 1901

Apaulina Hall, 1948

Type-species : *Musca azurea* Fallén

Length 5–13 mm. Colour metallic green to blue.

Head: eyes separated by a quarter to one-eleventh the width of one eye in male, in female separated by a half to three-tenths the width of one eye; parafrofrontalia and parafacialia more or less setulose; facialia with bristles on lower half; arista long-plumose; *iv*, *ev* and *paf* each developed. Thorax: propleura and prosternum hairy; post-alar declivity bare, sometimes hairy. Chaetotaxy; *ac* 3–4+3–4, *dc* 3–4+3–4, *ia* 1+3, *h* 3–5, *ph* 3–5, *prs* 1, *n* 2, *sa* 3–6, *sc* 5–8+1–3, *st* 2+1, *pst* and *pp* developed. Abdomen: flattened, metallic green to blue, more or less grey- and white-dusted. Wings: hyaline; *R*₅ open; squamae usually bare on the upper surfaces. Legs: black; front tibia with a row of *ad* and 1–2 *pv*; mid tibia with 1–3 *ad*, 2–3 *pd*, 1–2 *pv* and 0–1 *av*; hind tibia with both rows of *ad* and *pd*, three *av* also developed.

Distribution: Holarctic Region.

Key to the species of *Protocalliphora*

1. Prothoracic spiracle blackish brown; *dc* 3–4+4; mid tibia with 1 *v*; first genital tergite with marginal bristles *P. azurea*
- Prothoracic spiracle brown; *dc* 3+3; mid tibia without *v*; first genital tergite with no marginal bristle *P. maruyamensis*

Protocalliphora azurea (Fallén)

(Japanese name: Tori-kinabae)

(1816, Vet. Ac. Handl. 37, p. 245; Hori, 1956, Kontyû 24, p.18; Shiraki, 1958, Sanit. Ins., p. 1005; Kano & Shinonaga, 1964, Tohoku Konchu Kenkyu 1, p. 7; 1965,

Ill. Keys Adult Filth Flies Jap., p. 5; 1966, Jap. J. Sanit. Zool. 17, p. 164; Fan, 1965, Key Common Synanthrop. Flies China, p. 210)

♂ ♀.—Head: eyes at narrowest part of frons separated by one-fifth the width of one eye in male, in female by two-fifths the width of one eye; frontal stripe black; parafrontalia and parafacialia silver-dusted, with numerous fine black hairs; two to four proclinate and one reclinate fronto-orbital bristles present in female; face silver-dusted; vibrissaria reddish brown; jowls black shining with long fine bristles, about one-third eye-height; antennae dark brown, the third segment about one and a half times as long as second; arista plumose; palpi orange.

Thorax: dark blue shining, with four inconspicuous dark longitudinal stripes, slightly silver-dusted anteriorly; prothoracic spiracle dark brown to black; metathoracic spiracle dark brown; pre-alar knob and squamopleuron bare; post-alar declivity with a few black hairs; suprasquamal ridge bare. Chaetotaxy; very variable, *ac* 3-4+3-5, *dc* 3-4+4, *ia* 1-2+3, *h* 5, *ph* 4, *pvs* 1, *sa* 3-5, *n* 2, *pa* 2, *st* 2+1, *sc* 6-8+1-2.

Wings: hyaline; epaulet black; basicosta black; subcostal sclerite dark brown, with black hairs; stem-vein setulose; first longitudinal vein setulose above on the half way from base to discal cross vein; squamae bare, light brown. Halteres brown.

Legs: black; front tibia with a row of *ad* and 2 *pv*; mid tibia with 3 *ad*, 2-3 *pd*, and 1 submedian *av* and *pv*; hind tibia with a row of *ad* and *pd*, 2-3 *av* also present.

Abdomen: flattened, dark blue; third and fourth visible tergites with fine marginal bristles; first genital segment blackish green, with a row of marginal bristles and other long hairs; second genital segment black.

Length: 8-13 mm.

Bionomics: *Protocalliphora azurea* is not so common in Japan as in Europe, and only found in mountainous regions of Honshu and Hokkaido. Adults are found on mountain flowers and blossoms. The larvae are recognized to be a ectoparasite of various species of birds, the majority of which belong to the Oscines of the order Passeriformes. Gregor & Povolny (1959) and Peus (1960) made the list of the scientific names of these birds. In Japan there is only one case of ectoparasite of the bird *Muscicapa cyanomelana* Temminck which is reported by Uchikawa (1966).

The descriptions and figures of larval stage are given by Engel (1920), Séguy (1929), E. B. Rohdendorf (1957), Zumpt (1965) and Ishijima (1967). The life history of larval stage was observed by Engel (1920), Séguy (1928, 1929, 1941), Löhrl (1949), Lindner (1957), E.B. Rohdendorf (1957) and Zumpt (1965).

Geographical distribution: Japan (Hokkaido, Honshu), Korea, China, Siberia (Ussuri), Europe (Hungary, Scandinavia, Urals) and North Africa.

Protocalliphora maruyamensis Kano et Shinonaga

(Japanese name: Maruyama-torikinbaë)

(1966, Jap. J. Sanit. Zool. 17, p. 166)

This species very closely resembles *P. azurea* in the morphology, differing from it in the colouration of the prothoracic spiracle and the shape of the male genitalia, especially the fifth sternite, forceps and phallosome. In external appearance, the body of *P. maruyamensis* is slender than that of *P. azurea*, and has greenish tinges which are also characteristic of this species.

Length 9–10 mm.

Bionomics: adults usually are found on tree trunks and stones which are exposed to sun light beside the mountain path.

Geographical distribution: Japan (Hokkido, Honshu, Shikoku).

Subfamily RHINIINAE

Key to the genera of Rhiniinae

(Insert to the key of 3 on Kontyû 32: 226)

- 3a. Arista bare or plumose; prostigmatic bristle present Tribe Cosmiini (3aa)
 3b. Arista pectinate, with hairs on dorsal side only; prostigmatic bristle absent
 Tribe Rhiniini, *Stomorphina* Rondani
 3aa. Arista bare or pubescent; abdomen usually testaceous yellow
 *Rhyncomyia* Rob.-Desvoidy
 3bb. Arista short- or long-plumose; abdomen usually green to blue, sometimes with
 coppery reflection *Isomyia* Walker

Tribe Rhiniini

Stomorphina Rondani

(1861, Dipt. Ital. Prodr. 4, p. 9)

Syn. : *Idia* Wiedemann, 1820 (praeocc.)*Stomatorrhina* Bezzi, 1906*Stomorphina* Malloch, 1926*Idiella* Brauer et Bergestamm, 1889*Idiellipsis* Townsend, 1917*Eudiella* Townsend, 1917Type-species : *Musca lunata* Fabricius

Following Senior-White et al. (1940), the author proposes to define the genus *Stomorphina* in broad senses in the present revision. It is difficult to reasonably divide this complex group including *Stomorphina* s. str., *Idiella*, *Rhinia* etc. at present. The

interpretation of division is different in respect author and remains to be confused. A perfect way of distinguishing this complex group is possible only if the hypopygium and the other external morphology are examined on a world-wide basis. The genus *Stomorhina* is well represented in the warmer parts of the Old World. Exceptionally *S. lunata* (Fabricius, 1805) also occurs on Bermuda Is., and is only one species which has been recorded from the Nearctic Region.

Length 4.5–10 mm.

Head: eyes bare, in male separated by one-sixth the width of one-eye to nil in which eyes touch each other for a short or long distance; in female frons at vertex about one-second to two-fifths of one eye; parafacialia with glossy spots, more or less setulose; face with a median carina more or less distinct; epistome strongly protruding; jowls glossy, either wholly or only in anterior parts. Thorax: usually black or olive to metallic coppery and green, more or less dusted; piliferous spots present especially on the dorsum; pleura partly dusted, with or without piliferous dots; propleura and post-alar declivity bare; prosternum hairy. Chaetotaxy; *ac* 0+0–2, *dc* 0+0–1, *ia* 0+0–2, *h* 1–3, *prs* and outer *ph* present, *n* 2, *sa* 2–3, *sc* 2–3+0, *pp* 1–2, *st* 1+1, *pst* absent. Abdomen: concolourous with thorax, or partly or wholly yellow and sometimes reddish; male fifth sternite with a deep indentation, without spines. Male genitalia with free inner and outer forceps; phallosomes globular. Wings: hyaline, often with apical fleck; R_5 open, closed or petiolate; lower squama lobulate or tongue-like. Legs: more or less brownish, sometimes blackish entirely; front tibia with several *ad* and 1–2 *pv*; mid tibia with 2 *pv*, 1 *pd*, 1 *ad* and 0–1 *av*; hind tibia with 3 to several *ad*, usually forming a kind of comb, with 1 to several *pd* and 1–2 *av*.

Key to the species of *Stomorhina*

1. Abdomen with definite yellow and black pattern; black stippling on meso- and sternopleura large (2)
- Abdomen yellow or reddish orange, usually darkened apically; black stippling on meso- and sternopleura small (3)
2. A large polished black spot present behind front coxae, on anterior parts of sternopleura and adjacent mesopleura (Fig. 9 a); basicosta brown; male second sternite without black hairs; small polished black spots at bases of abdominal hairs small; *never found in Japan* *S. discolor*
- Pleura wholly pollinose except for small polished black spots at bases of hairs and bristles; basicosta blackish; male second sternite with black hairs; small polished black spots at bases of abdominal hairs large; *common throughout Japan* *S. obsoleta*
3. R_5 open; lower squama produced lobe-like; *Ryukyu* *S. sternalis*
- R_5 closed, petiolate; lower squama not so produced; *Ryukyu* *S. xanthogaster*

Stomorhina xanthogaster (Wiedemann)

(Japanese name: Haraaka-tsumagurokinbae)

(1820, Nov. Dipt. Gen. p. 21; Fukumine, 1959, Ochanomizu Med. J. 7, p. 1802; Kano & Shinonaga, 1965, Ill. Keys Adult Filth Flies Jap., p. 6)

♂ ♀.—Head: eyes in male holoptic, in female one-fifth of head-width; frontal stripe dark brown to black, in male narrow, triangular, reduced to a line at narrowest part of frons, in female parallel-sided, about equal to the width of one of parafrontalia at the bases of antennae; parafrontalia and parafacialia dark-grey dusted, sparsely setulose, in female also with shining black spots; face shining black; facialia and anterior half of jowls metallic black, separated by reddish brown vibrissaria, posterior half of jowls densely covered with yellow dusting and yellow hairs; occiput thickly covered with golden hairs and yellow dusting except submarginal metallic band; antennae dark brown, the third segment about twice as long as second; arista brown, pectinated; palpi black.

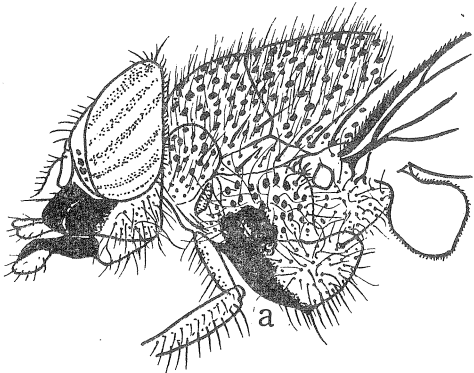


Fig. 9. *Stomorhina discolor* (Fabricius) ♂, lateral view of head and thorax.
a: Large polished black spot.

Thorax: dorsum and scutellum quite distinctly dark green with black spots, slightly white-dusted on anterior sides; pleura thoroughly with dense yellow dusting, and thickly covered with golden hairs except hypopleura; prosternum yellow-dusted, covered with golden hairs; prothoracic spiracle yellow; metathoracic spiracle dark brown; postalar declivity bare; suprasquamal ridge bare. Chaetotaxy; reduced on dorsum, *ac* 0+1, *dc* 0+1, *ia* 0+1, *h* 2-3, *ph* 1, *prvs* 1, *sa* 3, *pa* 2, *n* 2, *st* 1+1, *sc* 2-3+0, hypopleural and propleural

bristles present; prostigmatic bristles absent.

Wings: anteriorly and basally yellow-tinged, and with a small apical infuscation; *R*₅ closed, petiolate in line with final runing of fourth longitudinal vein; basicosta black; subcostal sclerite dark brown, pubescent; node of second and third longitudinal vein setulose above and below; stem-vein with yellow hairs; squamae deep yellow, bare. Halteres yellow.

Legs: brown to black, usually femora darkened, tarsi pale; coxae covered with yellow dusting; front tibia with a submedian *ad*; hind tibia with a conspicuous row of subequal *ad*.

Abdomen: elongate, flattened, reddish orange, in male with a black median stripe; third and fourth visible tergites darkened on posterior half, but this blacking with

variable extent; abdominal bristles poorly developed.

Length: 7–10 mm.

Bionomics: nothing is known.

Specimens examined: 1♂, Iriomote Is., Ryukyu, 10. xi. 1963 (Iha leg.); 1♀, Iriomote Is., Ryukyu, 4. i. 1953 (Shiraki leg.), Collection Nat. Inst. Agr. Sc. Nishigahara, Tokyo.

Geographical distribution: Japan (Miyako Is., Ishigaki Is., Iriomote Is.), Formosa, India, Ceylon, Malay, Celebes, New Guinea, Kei Isls., Aru Isls., Solomon Isls., New Britain, Hew Hebrides, New Caledonia, and Australia (North and South Queensland, Key Is.).

Stomorhina sternalis (Malloch)

(Japanese name: Koshiaki-tsumagurokinbaë)

(1926, Ann. Mag. Nat. Hist. 9, p. 508; Kano, Kaneko & Shinonaga, 1964, Kontyû 32, p. 132; Kano & Shinonaga, 1965, Ill. Keys Adult Filth Flies Jap., p. 6)

Syn.: *Rinia discolor*: Matsumura (1931, 6000 Ill. Ins. Jap.-Empire, p. 380; 1916, Thous. Ins. Jap. Additamenta 2, p. 402), **syn. nov.**

♂ ♀.—Head: eyes bare, subholoptic in male, in female narrowly separated; frontal stripe black; parafrofrontalia and parafacialia yellow-dusted, bare, sometimes sparsely setulose, with shining black spots; a very large one just before lower margin of parafacialia; face, vibrissaria and anterior parts of jowls shining black; medianae reddish; posterior parts of jowls densely covered with yellow dusting and yellow hairs; occiput yellow-dusted, and clothed with golden hairs except for metallic marginal band; antennae blackish brown about twice as long as second, arista brown, pectinate; palpi black.

Thorax: greenish-olivaceous, with black spots, three darker stripes visible on dorsum; scutellum green; pleura throughout yellow-dusted, and covered with yellow hairs except hypopleura; prosternum covered with yellow dusting and hairs; prothoracic spiracle yellow; metathoracic spiracle dark brown; post-alar declivity bare; suprasquamal ridge bare. Chaetotaxy; *ac* 0+1, *dc* 0+1, *ia* 0+1, *h* 1–2, *ph* 1, *prs* 1, *sa* 2, *pa* 2, *n* 2, *st* 1+1, *sc* 0+3, hypopleural and propleural bristles present; prostigmatic bristles absent.

Wings: yellow-tinged anteriorly and basally apically darkened; R_5 narrowly open; basicosta dark brown; subcostal sclerite brown, pubescent; node of second and third longitudinal veins with some black setulae; stem-vein with yellow and black hairs; squamae yellow. Halteres yellow.

Legs: front coxae brown, yellow-dusted, covered with yellow hairs and black bristles; mid and hind coxae black, slightly yellow-dusted, covered with yellow hairs and black bristles; femur black; tibia reddish testaceous; first tarsal joint of all legs

yellow, in male the next two joints also paler, in female and sometimes in both sexes the two apical joints darkened; front tibia with 2 *ad*, 1 *pv*; mid tibia 1 *ad*, 1 *pd*, 1 *p*; hind tibia 2 *pd*, 2–3 *ad*.

Abdomen: elongate flattened, reddish testaceous, metallic black on apical two visible segments, the darkening more or less reducing on anterior part of the third visible tergite, sometimes narrow median dark stripe visible; fourth visible tergite with complete row of marginal bristles.

Length: 7–8 mm.

Bionomics: nothing is known.

Specimens examined: 3♂♂, Mt. Yonaha, Okinawa Is., 8–9. iv. 1953 (Shiraki leg.), Collection Nat. Inst. Agr. Sc. Nishigahara, Tokyo.

Geographical distribution: Japan (Amami-Oshima Isls., Ishigaki Is., Iriomote Is.), Formosa, and Philippines.

Stomorhina obsoleta (Wiedemann)

(Japanese name. Tsumagurokinbaë)

(1830, Auß. Zweifl. Ins. 2, p. 355; Coquillett, 1898, Proc. U. S. Nat. Mus. 21, p. 333; Matsumura, 1916, Thous. Ins. Jap. Additamenta 2, p. 401; 1931, 6000 Ill. Ins. Jap.-Empire, p. 380; Zumpt, 1956, Lind. Fliegen pal. Reg. 64i, p. 122; James, 1962, Ins. Micronesia 13, p. 127)

Syn. : *Stomorhina discolor*: Kano (1959, Ill. Ins. Larv. Jap., p. 701; Kano & Shinonaga, 1964, Tohoku Konchu Kenkyu 1, p. 7; Kano, Kaneko & Shinonaga, 1964, Kontyû 32, p. 132; 1965, Kano, 1965, Icon. Ins. Jap. Colore Naturali Edita 3, p. 234; Kano & Shinonaga, 1965, Ill. Keys Adult Filth Flies Jap. p. 6), **syn. nov.**

S. discolor: Uéda (1963, Ann. Rep. Jun. Coll. Ube 3, p. 141), **syn. nov.**

It is the present form that has been identified as *Stomorhina discolor* Fabricius, 1794 by Japanese dipterists. Actually, *S. discolor* is distributed from India throughout Philippine Isls. to the south of Formosa, but has never been found in Japan. This confusion owes to misidentification made by early workers. The present species easily distinguished from *S. discolor* by male genitalic and other external characters given in the key.

Length: 5–7 mm.

Bionomics: *S. obsoleta* is very common in early summer and fall throughout Japan. Adults are usually found on wild flowers and blossoms, hovering about in small swarms under trees. The descriptions and figures of the larval stage were given by Kano (1959) and Ishijima (1967).

Geographical distribution: Japan (Honshu, Kyushu, Shikoku, Amami-Oshima Isls., Izu-shichito Isls., Bonin Isls., Ryukyu), China, and Manchuria.

Isomyia Walker

(1860, Proc. Linn. Soc. Lond. 4, p. 134)

Syn. : *Strongyloneura* Bigot, 1886*Thelychaeta* Brauer et Bergenstamm, 1891*Apollenia* Bezzi, 1912*Chloroidia* Townsend, 1917*Anna* Malloch, 1926*Pachycosmina* Séguy, 1934*Thelychaetopsis* Séguy, 1949Type-species : *Isomyia delectans* Walker

Length 5–15 mm. Colour all metallic green or blue, often with coppery reflection, and also rather variable within the species. According to Senior-White et al. (1940), the genus is diagnosed as follows:—

“Head: eyes subholoptic or at least frons considerably narrowed in male, female frons broad; *ev* developed in female; ocellar bristles strong, proclinate; a single row of frontal bristles completely developed in both sexes, in female some much shorter inwardly directed bristles present on inner margin of parafrontalia; arista biplumose nearly to tip; facial carina more or less prominent, separating antennae. Thorax: Chaetotaxy; *ac* 1+2 or 2+4, *dc* 2+4, *st* 1+1, Abdomen: fourth visible tergite with strong discals; male genital segments concolorous with abdomen, usually not very conspicuous, or well developed in a few cases such as *I. senomera*, *I. prasina* etc. Wings: stem-vein at base above with a row of black bristles, also below with or without a row of much shorter bristles lying in a hollow of the wing-membrane and being very difficult to see; third longitudinal vein above with bristles on the node or beyond it, also below on node; fourth longitudinal vein varying from evenly rounded and apically nearly parallel to the third longitudinal vein to quite sharply angled, but all intermediate stages occur. Legs: mid tibia in male with or without submedian *v*.”

Distribution: Ethiopian and Oriental Regions, reaching the Palaearctic R. in Japan and China.

Key to the species of *Isomyia*

1. Very large, more than 11 mm in length; lower squama produced lobe-like; post-alar declivity haired; prothoracic spiracle yellow *I. electa*
- Small to medium in size; lower squama not so produced, but tongue-like; post-alar declivity bare; prothoracic spiracle black (2)
2. Antennae dark brown; body dark green in colour, and small in size
..... *I. ryukyuensis* sp. nov.

- Antennae yellow; body light green, especially on thorax, and medium in size *I. senomera*
 — — Antennae yellow except for dark brown second segment; body light green, especially on thorax, and small in size *I. prasina*

Isomyia electa (Villeneuve)

(Japanese name: Oomidoribaë)

(1927, Rev. Zool. Afr. 15, p. 217)

Syn.: *Isomyia delectans*: Kano et Shinonaga (1965, Ill. Keys Adult Filth Flies Jap., p. 6), **syn. nov.**

The present form, which was reported from Ryukyu by Kano and Shinonaga (1965) at first, seems to be misidentified as *I. delectans*. Dr. A. C. Pont of British Museum (Nat. Hist.) kindly compared the two females of this form with the holotype and its syntype of *delectans*. His conclusion is that the form is distinct, and after fairly careful comparison he found such differences as shown in Table 1. On the other hand, the present author fortunately had the opportunity of examining the type specimens of *I. electa* so kindly lent him by Dr. habil. G. Morge. The result was that the types is quite in agreement with the form from Ryukyu on detailed comparison.

♂.—Head: eyes approximated, separated by the distance between posterior ocelli inclusive; frontal stripe narrow, reduced a fine line at narrowest part of frons, blackish brown to black; parafrontalia and parafacialia densely yellow or golden-dusted, distinctly setulose; face honey yellow, with slight trace of median carina between the bases of antennae; facialia golden-dusted; medianae, vibissaria and jowls golden-dusted, and covered with fine black hairs, posterior part of jowls and occiput also covered with yellow hairs; antennae orange, the third segment about two times as long as second; arista brown, long-plumose; palpi orange, flattened.

Thorax: green, with strong coppery reflexion; prosternum with golden hairs; pleura with yellowish gold hairs; upper sides of mesopleura and sternopleura also with a few black fine hairs; propleural, prostigmatic and hypopleural bristles developed; mesopleural bristles present; prothoracic spiracle yellow; metathoracic spiracle black; post-alar declivity with yellow hairs. Chaetotaxy; *ac* 2+4, *dc* 3+4, *ia* 1+4, *h* 3, *ph* 4-5, *prs* 1, *sa* 4, *pa* 3, *n* 2, *st* 1+1, *sc* 3+1.

Wings: slightly infuscated, especially along anterior margin; fourth longitudinal vein quite sharply angled; basicosta black; subcostal sclerite brown, pubescent; stem-vein with black hairs dorsally; node of second and third longitudinal veins with a few setulae; squamae yellow, lower one bare, broad and lobulate. Halteres yellow.

Legs: coxae and femora greenish black, yellow-dusted; tibiae and tarsi dark red except for distal segments of tarsi black; front tibia with a row of *ad* and *pv* on distal one-third; mid tibia with one *ad*, 2 *p* and 1 *pv*; hind tibia with 2 *pd* and 2 *ad*.

Abdomen: metallic green with coppery reflection; bristles and hairs well developed on postabdomen; first to third visible tergites with fine marginal bristles; fourth visible tergite with well developed marginal and discal bristles; sternites with well developed black bristles; second sternite with yellow hairs on anterior parts; genital segments metallic green, inconspicuous.

♀.—Head: eyes separated by a distance about one-fifth of head width; frontal stripe reddish black, parallel-sided, about three times as wide as the distance between posterior ocelli inclusive; parafrofrontalia with two proclinate and one reclinate fronto-orbital bristles. Abdomen: bristles poorly developed, distinctly erected discal bristles on fourth visible tergite; fourth visible tergite with a tuft of bristles and hairs along the posterior margin; sternites with a pair of black marginal bristles; second sternite large, covering the side margins of tergite, with yellowish golden hairs. Otherwise as described for male.

Length: 9–13 mm.

Bionomics: nothing is known.

Specimens examined: 1♂, Iriomote Is., Ryukyu, 9. v. 1963 (Kaneko & Shinonaga leg.); 1♂, Iriomote Is., Ryukyu, 8. viii. 1961; 7♀♀, Iriomote Is., Ryukyu, 29. vii–15. viii. 1961 (Uéda leg.).

Geographical distribution: Ryukyu (Iriomote Is., Ishigaki Is.), Formosa, and Malay.

Isomyia senomera (Séguy)

(Japanese name: Midoribaë)

(1949, Rev. Brasil. Biol. 9, p. 124; Peris, 1952, An. Estac. Exp. Aula Dei 3, p. 187; Zumpt, 1956, Lind. Fliegen pal. Reg. 64i, p. 111; Hori, 1964, Kontyû 32, p. 511; Kano & Shinonaga, 1964, Tohoku Konchu Kenkyu 1, p. 8; 1965, Ill. Keys Adult Filth Flies Jap., p. 6)

Syn.: *Strongyloneura prasina*: Hori (1955, Sci. Rep. Kanazawa Univ. 3, p. 31), **syn. nov.**

This species, which is one of the common Rhiniinæ, was originally described by Séguy based upon the specimen from Tokyo, Japan. Chorologically *I. senomera* replaces *I. prasina* mentioned below in Ryukyu, and is distributed throughout main islands of Japan except for Hokkaido. Hori (1955) redescribed *Strongyloneura prasina* Bigot basing upon one male specimen from Sendai City. The allotype is, however, exactly identical with *I. senomera* was confirmed by the same author in 1964.

Length: 7–10 mm.

Bionomics: the adults are frequently found on various flowering plants, especially in early summer and late fall. It is known to be oviparous.

Geographical distribution: Japan (Honshu, Shikoku, Kyushu),

Isomyia prasina (Bigot)

(Japanese name: Komidoribaë)

(1886, Bull. Soc. Ent. France 4, p. 14; Séguy, 1928, Encycl. Ent. A 9, p. 182; 1949, Rev. Brasil. Biol. 9, p. 118; Peris, 1952, An. Estac. Exp. Aula Dei 3, p. 189; Zumpt, 1956, Lind. Fliegen pal. Reg. 64i, p. 110; Hori, 1964, Kontyû 32, p. 511; Kano & Shinonaga, 1965, Ill. Keys Adult Filth Flies Jap., p. 6)

♂.—Head: eyes approximated, separated by the distance between posterior ocelli inclusive; frontal stripe narrow, reduced a fine line at narrowest part of frons, blackish brown to black; parafacialia and parafrontalia bare, densely yellow-dusted; face honey yellow, without median carina; facialia metallic black; medianae, vibrissaria and jowls covered with yellow dusting and hairs, a very large shining black spot present on jowls; occiput covered with yellow dusting and hairs except for submarginal metallic band; antennae yellow except for dark brown second segment, the third segment about two and a half times as long as second; arista brown, long-plumose; palpi yellow, flattened.

Thorax: yellowish light green, slightly with coppery reflection; pleura with sparse yellowish white hairs except for hypopleura; prosternum with white hairs; prostigmatic, propleural and hypopleural bristles present; thoracic spiracles black; post-alar declivity bare. Chaetotaxy; *ac* 2-3+4-6, *dc* 2-3+4, *ia* 1+3, *h* 2-3, *ph* 3-4, *prs* 1, *n* 2, *sa* 2-3, *pa* 2, *sc* 3+1, *st* 1+1.

Wings: slightly infuscated, especially along anterior margin; fourth longitudinal vein evenly rounded and apically nearly parallel to third longitudinal vein; basicosta brown; stem-vein with black hairs dorsally; node of second and third longitudinal veins with a few black setulae; squamae yellow, lower one bare, small, tongue-like. Halteres yellow.

Legs: coxae and femora metallic black, with greenish reflection; tibiae and tarsi brown; front tibia with 1 *p* on distal one-third; mid tibia with 1 *ad*, 2 *p* and 1 *pv*; hind tibia with incomplete rows of *pd* and *ad* including well-developed *ad* and *pd*.

Abdomen: characteristic, consisting of narrow preabdominal segments and developed postabdominal segments, metallic green, with strong coppery reflection; bristles developed on postabdomen and both sides of preabdomen.

♀.—Head: eyes separated by a distance about one-fifth of head-width; frontal stripe parallel-sided, blackish brown to black; parafrontalia with two proclinate and one reclinate fronto-orbital bristles. Abdomen: flattened, consisting of normal preabdominal segments.

Length: 5-6 mm.

Bionomics: nothing is known.

Specimens examined: 3 ♂♂, Ishigaki Is., Ryukyu, 12. ii. 1953 (Shiraki leg.); 1 ♀, Iriomote Is., Ryukyu, 5. xi. 1963 (Iha leg.), Collection Nat. Inst. Agr. Sc. Nishigahara,

Tokyo.

Isomyia ryukyuensis sp. nov.

(Japanese name : Ryukyu-midoribaë)

♂.—Head: eyes bare, subholoptic, separated by distance equal to one-eighth width of head; frontal stripe parallel-sided, subequal to the width of ocellar triangle, reddish black; parafrontalia and parafacialia silver-grey dusted, setulose, with about ten fine long parafrontal and parafacial bristles, which continued down to level of bases of antennae, the latter with a large shining dark spot on lower parts; face brown, with a trace of median carina between bases of antennae; facialia black, grey-dusted, a few setulae present above fine long vibrissae; vibrissaria and medianae dark brown; jowls black shining anteriorly, densely silver-dusted on posterior two-thirds, covered with fine black and yellow hairs; antennae dark brown, second segment paler apically, the third slightly more than one and a half times as long as second, with yellow pubescence; arista brown, long-plumose; palpi brown.

Thorax: dark green, with coppery reflection, especially on the disc of dorsum, thinly covered with silver white pruinosity; three dark metallic longitudinal stripes indicated on the dorsum with certain incidence of light; scutellum green; pleura covered with black hairs, but only a few yellow hairs present on posterior half of pteropleura and around the prothoracic spiracle; prosternum hairy; supra-spiracular convexity, supra-squamal ridge and post-alar declivity bare; pleurotergite setulose in part; thoracic spiracles black; metathoracic spiracle very small. Chaetotaxy; *ac* 2+4, *dc* 2-3+4, *ia* 1+3, *h* 3, *ph* 3, *prs* 1, *sa* 3, *pa* 2, *n* 2, *sc* 3+1, *st* 1+1, propleural and prostigmatic bristles present.

Wings: brownish hyaline, more or less infuscated along anterior margin; basicosta black; subcostal sclerite dark brown; stem-vein with black fine hairs dorsally; node of second and third longitudinal vein with a few black setulae above and below; fourth longitudinal vein evenly rounded; squamae yellow, bare, small, tongue-like. Halteres brown.

Legs: black, slightly reddish, especially on tibiae and tarsi; front tibia with 2 *p* and a row of short *ad*; mid tibia with 1 *ad*, 1 *pv* and 3-4 *pd*; hind tibia with incomplete row of *ad* and *pd*.

Abdomen: elongate oval, dark green, sparsely pruinose; obscure median dark stripe present; bristles well developed on both sides of abdomen and posterior margins of second to fourth visible tergites; first and second sternites visible, covered with fine long black hairs; third to fifth sternite hidden by the overlapping lateral margins of tergites; a characteristic tuft of black bristly hairs occurring on the lateral margin of second tergites; hypopygium inconspicuous.

♀.—Head: eyes separated at vertex by distance slightly less than one-third width of head; frontal stripe reddish black, slightly narrowing towards bases of antennae; parafrontalia with one reclinate and two proclinate fronto-orbital bristles; setulae on

parafrontalia longer than those in male. Abdomen: oval, flattened; abdominal bristles fine, no characteristic hairiness observed. Legs: femora with metallic green colouration; front tibia with a row of short *ad* and only 1 *p*.

Length 7–9 mm.

Holotype: 1♂, Mt. Yonaha, Okinawa Is., Ryukyu, 9. iv. 1953 (Shiraki leg.), Collection Nat. Inst. Agr. Sc. Nishigahara, Tokyo.

Paratypes: 1♀, Mt. Yonaha, Okinawa Is., Ryukyu, 11. iv. 1953 (Shiraki leg.), Collection Nat. Inst. Agr. Sc. Nishigahara, Tokyo. The holotype- and paratype-specimens are preserved in the collections of the Nat. Inst. Agr. Sc. Nishigahara, Tokyo.

Bionomics: unknown.

Habitat: Okinawa Is., Ryukyu.

Relationship: *I. ryukyuensis* sp. nov. somewhat resembles *I. confixa* Walker, *I. pseudoviridana* Peris and *I. tibialia* Villeneuve from the Oriental Region, but differs from them in having the characteristic tuft of black bristles on the ventral sides of second visible tergite.

Rhyncomyia Rob.-Desvoidy

(1830, Ess. Myod. 2, p. 424)

Syn. : *Rhyncomyiopsis* Townsend, 1917

Trichometallea Townsend, 1917

Type-species : *Musca ruficeps* Fabricius

The genus *Rhyncomyia* is well represented in the Ethiopian Region, and several species also occur in the southern parts of the Palaearctic Region and the Oriental Region. The present genus shows such primitive features such as the poorly developed arisal setae and the simplified shape of forceps and phallosome. Zumpt (1958) morphologically defined *Rhyncomyia* as follows:—

“Head: eyes normally bare, rarely haired, upper facets more or less enlarged; width of frons at the narrowest point varying from a narrow line to one-seventh of eye-length in male, in female it measures at vertex from one-third to two-thirds of eye-length. Chaetotaxy of female head complete; parafrontalia with hairs and a varying number of parafrontal bristles; parafacialia with setulae, or these are more or less reduced in number or totally wanting; in male, *ev*, *f* and *fo* are not developed, *paf* reduced in number, and also the hairs and setulae less numerous than in female sex; face with a more or less developed carina; epistome not or only slightly protruding. Thorax: of various colours, often bright metallic, more or less pruinose; *ac* 0–3 +1–7, *dc* 1–3+3–5, *ia* 0–1+2–4, *h* 2–4, *ph* 1–3, outer one always present, *prs* 1, *n* 2, *sa* 2–6, *sc* 3–4+0–3, *st* 1+1, *pst* and *pp* present; hypo- and mesopleural bristles developed; propleuron mostly bare, only in a few species haired in centre;

post-alar declivity and suprasquamal ridge bare; prosternum haired. Abdomen: of various colours like the thorax, with or without a distinct pattern; postabdomen composed of three segments, but the first genital segment is often strongly reduced; preabdomen in *forcipata*-group with modified sternites having protruding processes; forceps in most species of normal shape, but sometimes inner one fused or outer and inner forceps separately constructed; phallosome with spine, harpes broad and well sclerotized, vesicae membranous, with a dense denticulation. Wings: hyaline, or more or less brownish tinged, but not with a clearly demarcated anterior infuscation; stem-vein with black or pale bristly hairs; costal spine wanting, minute or well developed; R_5 normally open, rarely closed and short-petiolate; lower squama longer or as long as broad, rarely broader than long. Legs: front tibia with 3–5 *ad* and 1–2 *pv*; mid tibia with 1–5 *ad*, 1–2 *av*, 1–5 *pd* and 1–3 *pv*; hind tibia with 2 to several *ad* and *pd*, and also with 0–3 *av*."

Distribution: Ethiopian, Oriental and southern Palaearctic Regions.

Ryncomyia setypiga Villeneuve

(Japanese name: Muchihige-midoribaë)

(1929, Bull. Ann. Soc. Ent. Berg. 69, p. 62)

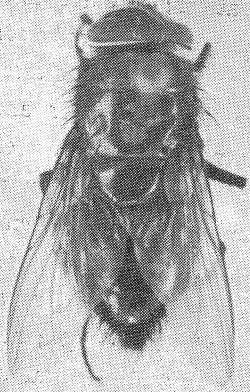
♂.—Head: eyes bare, closely approximated; frontal stripe narrow, black, brownish towards bases of antennae; parafrontalia and parafacialia yellow-dusted, sparsely setulose; face, facialia and medianae honey yellow; anterior parts of jowls dark brown, posterior parts yellow-dusted, clothed with fine yellow hairs; post-jowls sometimes with some black hairs; occiput yellow-haired; antennae brown, the third segment slightly darkened, about one and a half times as long as second; arista dark brown, bare or almost so; palpi yellow.

Thorax: olivaceous green, brownish-grey dusted sparsely; pleura with white hairs; prostigmatic, propleural and hypopleural bristles present; post-alar declivity and suprasquamal ridge bare; prothoracic spiracle white; metathoracic spiracle dark brown. Chaetotaxy; *ac* 2+4, *dc* 2+4, *ia* 1+4, *sa* 3, *pa* 2, *h* 2, *ph* 2–3, *prs* 1, *n* 2, *sc* 3+1, discals fine, *st* 1+1.

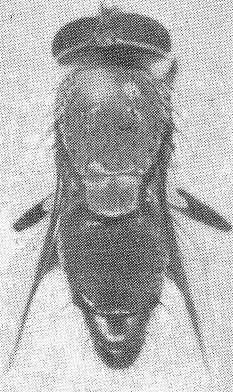
Wings: hyaline, slightly infuscated along anterior margin; R_5 open; fourth longitudinal vein quite sharply angled; basicosta brown; stem-vein with black hairs posteriorly; node of second and third longitudinal vein with a few black hairs above and below; squamae brown, bare on above surfaces, lower squama narrow, tongue-like. Halteres yellow.

Legs: coxae and femora metallic greenish black, slightly grey-dusted, but mid and hind femora paler apically; tarsi and tibia brown; front tibia with two fine *ad* and 1 *pv*; mid tibia with 1 *ad*, 2 *p*, 1 *pd*; hind tibia 2 *ad* and 2 *pd*.

Abdomen: testaceous yellow; discontinuous median dark stripe present, second



A



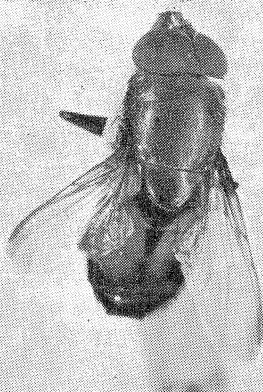
B



C



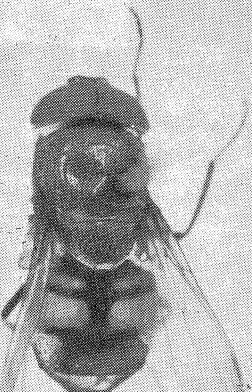
D



E



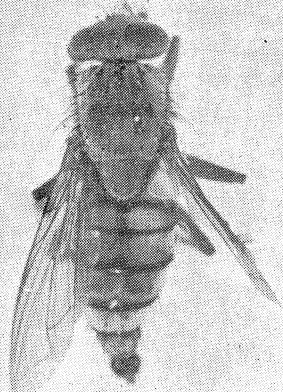
F



G



H



I

visible tergite darkened on posterior margin; third tergite broadly dark banded on posterior margin; fourth tergite black, densely yellowish-grey dusted, except for black median stripe; bristles developed on posterior margins of the third and fourth visible tergites, and on the genital segments; genital segments prominent, metallic dark green, with coppery reflection; sternites brown except for dark fifth sternite, black-haired; fifth sternite with spinulae along the inner border of the lateral branches.

♀.—Head: eyes separated by distance equal to a quarter width of head; frontal stripe parallel-sided, slightly becoming broad towards bases of antennae; reddish brown, about two times as wide as the distance between posterior ocelli inclusive; parafacialia bare, or almost so; dark brown parts of jowls absent in female. Thorax: metathoracic spiracle brown. Wings: squamae white. Legs: brown except for coxae; front tibia with 1 *pv*, 2–3 *ad*; mid tibia with 1 *ad*, 1 *v*, 2 *p* and 1 *pv*; hind tibia 2 *ad* and 2 *av*. Abdomen: testaceous yellow, covered with yellowish-grey dusted; second visible tergite with three broad black spots; third tergite with broad median and marginal dark stripes; fourth tergite black, densely yellowish-grey dusted.

Length: 6–7 mm.

Bionomics: nothing is known.

Specimens examined: 1♂ 1♀, Iriomote Is., Ryukyu, 19. i. 1953 (Shiraki leg.), Collection Nat. Inst. Agr. Sc. Nishigahara, Tokyo.

Geographical distribution: Ryukyu (Iriomote Is.) and Formosa.

Additional Note

Polleniopsis (Polleniopsis) chosenensis Fan

(Japanese name: Chosen-kohuki-kurobaë)

(1965, Key Common Synanthrop. Flies China, p. 169)

This species is closely related to *Polleniopsis (Polleniopsis) horii*, but differs from it in the shape of forceps and the fifth sternite of male. These slight differences between the morphology of two forms may be regarded as the intraspecific variation in the further detail examinations of examples from different localities.

Length: 8–10 mm.

Bionomics: *Polleniopsis (Polleniopsis) chosenensis* Fan is very common in Japan. The adults are usually found on the flowering plants in mountainous regions in summer. It is known to be viviparous.

Geographical distribution: Japan (Honshu), and Korea.

Fig. 10. A: *Isomyia electa* (Villeneuve), ♂, B: *Isomyia senomera* (Séguy), ♂, C: *Isomyia prasina* (Bigot), ♂, D: *Isomyia ryukyuensis* sp. nov., ♀, E: *Stomorhina xanthogaster* (Wiedemann), ♂, F: *Stomorhina sternalis* (Malloch), ♂, G: *Stomorhina obsoleta* (Wiedemann), ♂, H: *Rhyncomyia setypiga* Villeneuve, ♂, I: *Bengalia latro* de Meijère, ♂, (photographed by S. Nakatani).

Mufetiella grisescens (Villeneuve)

(1933, Bull. Ann. Soc. Ent. Belg. 73, p. 196)

The *Mufetiella* was erected by Villeneuve basing on the *Calliphora grisescens* from Japan, which may be considered to be congeneric with *Polleniopsis* according to the generic diagnosis represented by Townsend (1935, 1937). Unfortunately the author is out of advantage of the opportunity to examine the type specimen of *M. grisescens*. He however thinks that it may be one of common forms of *Polleniopsis* such as *P. chosenensis* and *P. horii*. This opinion will be supported by the comparison of Japanese materials with the holotype probably preserved in the U. S. National Museum, Washington.

Length: 5–8 mm.

Geographical distribution: Japan and China.

Lucilia bufonivora chini Fan

(Japanese name: Kaeru-kinbaë)

(1965, Key Common Synanthrop. Flies China, p. 169)

Japanese materials agree with the original description and figures by Fan in the important points of the external and genitalic morphology. This form is similar to both of American *L. elongata* and European *L. bufonivora*. The morphological differences among three forms show nothing more than subspecific importance.

Length: 5–10 mm.

Geographical distribution: Japan and China.

Summary of Revised Classification of Japanese Calliphorid Flies

Omitting the three misidentified or unrecognizable species, *Polleniopsis allapsa* Villeneuve, *Lucilia silvarum* (Meigen), and *Mufetiella grisescens* Villeneuve, the Japanese calliphorid species tabulate as follows:—

Family CALLIPHORIDAE**Subfamily CALLIPHORINAE****Tribe Calliphorini***Calliphora* Rob.-Desvoidy*C. lata* Coquillett, 1899*C. loewi* Enderlein, 1903*C. subalpina* (Ringdahl, 1931)*C. vicina* Rob.-Desvoidy, 1830

- C. vomitoria* (Linné, 1758)
Aldrichina Townsend
A. grahami (Aldrich, 1930)
Triceratopyga Rohdendorf
T. calliphoroides Rohdendorf, 1931
Polleniopsis Townsend
P. (Polleniopsis) chosenensis Fan, 1965
P. (Polleniopsis) dandoensis Kurahashi, 1964
P. (Polleniopsis) hokurikuensis Kurahashi, 1964
P. (Polleniopsis) horii Kurahashi, 1964
P. (Melindopsis) menechma Séguy, 1934
Onesia Rod.-Desvoidy
O. hokkaidensis (Baranov, 1939)
O. japonica Kurahashi, 1964
O. subalpina Kurahashi, 1964
Melinda Rob.-Desvoidy
M. pruinosa (Enderlein, 1933)
M. pusilla (Meigen, 1826)
Paradichosia Sen.-White
P. io Kurahashi, 1965
P. itoi (Kano, 1962)
P. japonica Hori, 1961
P. nigra Kurahashi, 1965
P. okazakii (Kano, 1962)
P. scutellata Sen.-White, 1923

Tribe Luciliini

- Lucilia* Rob.-Desvoidy
fumicosta-group
L. ampullacea Villeneuve, 1922
L. bazini Séguy, 1934
L. papuensis Macquart, 1842
L. porphyrina (Walker, 1857)
L. snyderi James, 1962
cluvia-group
L. caesar (Linné, 1758)
L. illustris (Meigen, 1826)
richardsi-group
L. bufonivora chini Fan, 1965
L. cuprina (Wiedemann, 1830)

L. sericata (Meigen, 1826)

Hemipyrellia Townsend

H. ligurriens (Wiedemann, 1830)

Tribe Bengaliini

Bengalia Rob.-Desvoidy

B. latro de Meijère, 1910

Tribe Polleniini

Xanthotryxus Aldrich

X. mongol Aldrich, 1930

Dexopollenia Townsend

D. flava (Aldrich, 1930)

Pollenia Rob.-Desvoidy

P. argenticincta (Sen.-White, 1923)

P. japonica Kano et Shinonaga, 1966

Subfamily CHRYSOMYIINAE

Tribe Chrysomyiini

Chrysomyia Rob.-Desvoidy

C. albiceps rufifacies (Macquart, 1843)

C. megacephala (Fabricius, 1794)

C. pinguis (Walker, 1858)

Tribe Phormiini

Phormia Rob.-Desvoidy

P. regina (Meigen, 1826)

Protophormia Townsend

P. terraenovae (Rob.-Desvoidy, 1830)

Protocalliphora Hough

P. azurea (Fallén, 1816)

P. maruyamensis Kano et Shinonaga, 1966

Subfamily RHINIINAE

Tribe Rhiniini

Stomorhina Rondani

S. obsoleta (Wiedemann, 1830)

S. sternalis (Malloch, 1926)

S. xanthogaster (Wiedemann, 1820)

Tribe Cosmiini

Isomyia Walker

I. electa (Villeneuve, 1927)

I. ryukyuensis Kurahashi, 1967

I. senomera (Séguy, 1949)

I. prasina (Bigot, 1886)

Rhyncomyia Rob.-Desvoidy

R. setypiga Villeneuve, 1929

The author's revision of the Calliphoridae of Japan was commenced four years ago and ends in the present paper. By any means, it was not complete. The calliphorid flies which have been recorded from Japan up to the present are assorted to twenty genera and fifty four species. Some new species are sure to be discovered in the future. If a higher systematics should appear, ours would again receive some modification.

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Table 1. Morphological differences between *Isomyia electa* and *I. delectans*

| <i>Isomyia electa</i> | | <i>Isomyia delectans</i> | | |
|--|--|--|---|--|
| Kurahashi's specimens 6 ♀♀ (Ryukyu) | Type-specimen 1 ♀ (Tapani, Formosa) | Type-specimen 2 ♀ (Kosempo, Formosa) | Type-specimen 1 ♀ (Makassar, Celebes) | Type-specimen 2 ♀ (Makassar, Celebes) |
| Body less brassy, green with coppery reflection | less brassy green | | more brassy green | |
| Mesonotum hardly white-dusted only at neck | hardly white-dusted only at neck | | ?(too damaged) | densely white-dusted before suture and a little behind-suture |
| Mesopleural and sternopleural ground-setulae almost entirely pale | almost entirely pale | | Mesopleural ground-setulae entirely, and sternopleural ones mainly black | |
| Prothoracic spiracle yellow | yellow | | brown | |
| Pteropleura with only one black bristle amongst golden hairs | only one black bristle | one strong and two fine black bristles | four black bristles | four to six black bristles |
| Post-alar declivity pale-haired medially | with 2+4 pale-haired medially | | pale-haired almost all over, much more numerous | (obscured) |
| <i>Ac</i> 2+4 | | | ?(Mesonotum almost wholly destroyed or damaged) | 1+2 |
| Wings with weak apical cloud | | | without | |
| Lower squama lobulate | lobulate | | lobulate | |
| Front tibia yellow, mid and hind tibia brownish | Front tibia yellow, mid and hind tibiae brownish | | Tibiae dark brown | |
| Mid tibia with 1-2 <i>ad</i> | 1 <i>ad</i> | ?(damaged) | 1 <i>ad</i> | |
| Hind tibia with 2 <i>pd</i> | 2 <i>pd</i> | | 4 <i>pd</i> | |

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