

Notes on Rachiceridae (Diptera)^{1,2}

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Abstract

This paper discusses the fossil genera and sexual dimorphism in Rachiceridae, the genera *Paleorachicerus* (= *Electra*) and *Gymnorhachicerus*, and describes or redescribes 15 species of *Rachicerus* from the Oriental and Australasian regions. Seven new species are found from New Guinea (2 species), Nepal (1), Laos (3), and Japan (Yaeyama Islands) (1).

INTRODUCTION

This paper deals with the additions to NAGATOMI (1970) on Rachiceridae. It describes 7 new and 1 undetermined species and redescribes 9 species, including *Paleorachicerus relictus* and *Gymnorhachicerus pilosus*, from the Oriental and Australasian regions. The localities of new species are as follows: New Guinea (2 species), Nepal (1), Laos (3), and Japan (Yaeyama Islands) (1). The fossil genera of Rachiceridae are also discussed according to HENNIG (1938, 1967).

For female genitalia of *Rachicerus galloisi* SEGUY (from Japan) see NAGATOMI & IWATA (1976) and for male genitalia of *galloisi* and *R. maai* NAGATOMI (from South China) see NAGATOMI (in preparation). For geographical distribution of Rachiceridae see NAGATOMI (in press).

In the descriptions of this paper, as well as NAGATOMI (1970), (*a*) several parts of head are measured and (*b*) the relative length of each segment of legs is given, although these may be insignificant and may even be harmful to understanding the taxon because the data are mostly based on a single specimen and the range of variation is uncertain and (*b*) is not so useful as a specific character in many species.

I. FOSSIL GENERA OF RACHICERIDAE

HENNIG (1967) recognized the following 3 monotypic fossil genera from the Baltic amber: *Electra formosa* LOEW, 1850, *Chrysothemis speciosa* LOEW, 1850 and *Lophyrophorus flabellatus* MEUNIER, 1902.

1. This study was partly done during my stay at the Bishop Museum, Honolulu, Hawaii (from November, 1978 to March, 1979) supported by a grant from the Ministry of Education, Japanese Government.
2. Partly results of Kyushu University Scientific Expedition to the Nepal Himalaya. Diptera 2.
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These 3 fossil genera differ from the living genus *Rachicerus* in the following points: in ♀ antennal flagellum without any lower process (in ♀ of *Rachicerus*, antenna pectinate or serrate) and in ♂ each segment of antennal flagellum with bifurcate lower process (in ♂ of *Rachicerus*, the lower process not bifurcate but simple).

HENNIG (1967: 7) remarked that "Nimmt man an, dass im Bernstein tatsächlich nur 2 Arten aus der Familie Rachiceridae vorkommen, dann wäre daraus zu schliessen, dass *Lophyrophorus flabellatus* MEUNIER mit *Chrysothemis speciosa* LOEW identisch ist. Mindestens vorläufig dürfte es aber besser sein, den Namen LOEWS als nomen dubium zu betrachten und die vorliegenden Exemplare mit dem besser begründeten und allgemeiner bekannten Namen *Lophyrophorus flabellatus* MEUNIER zu bezeichnen."

HENNIG (1967: 11) concluded that "*Electra formosa* unterscheidet sich demnach von *Lophyrophorus flabellatus* (?=*Chrysothemis speciosa*) in beiden Geschlechtern durch die etwas geringere Zahl der Fühlrglieder (die aber bei beiden Arten im männlichen Geschlecht grösser ist als im weiblichen), die schmalere Stirn, die schmalere und längere Gabel des Radialsektors und geringfügige Unterschiede in der Form der Diskoidalzelle. Beim ♂ von *Electra formosa* sind die inneren Anhänge der Geisselglieder des Fühlers viel kürzer als die äusseren, während sich die beiden Anhänge beim ♂ von *Lophyrophorus flabellatus* in die Länge kaum unterscheiden." But it is probable that the number of segments in the antennal flagellum, the width of the front, the length and width of the 2nd submarginal cell and the form of the discal cell (in both sexes) and the difference in length between the inner and outer lower processes in the antennal flagellum (in ♂) are not of more than specific importance.

Electra LOEW, 1850 is preoccupied by *Electra* LAMOUROUX, 1816 or *Electra* STEPHENS, 1829 and *Paleorachicerus* NAGATOMI, 1970 is proposed as a new name for *Electra* LOEW. *Chrysothemis* (not *Chrysotemis*) is not preoccupied by another name but may be "nomen dubium." If *Paleorachicerus* is identical with *Lophyrophorus*, the name of the former becomes invalid.

II. SEXUAL DIMORPHISM IN RACHICERIDAE

In both sexes of the living genus *Rachicerus*, the antennal flagellum has a lower process which is not bifurcate but simple, although the lower process is shorter in ♀ than in ♂. The sexual dimorphism of antennal flagellum is more conspicuous in the fossil genera as mentioned above according to HENNIG (1938, 1967), where the lower process is entirely absent in ♀ but present and bifurcate in ♂.

III. PALEORACHICERUS (=ELECTRA) AND GYMNORHACHICERUS

FREY (1954) put his *relicta* (from Philippines) into the fossil genus *Electra* and described a new genus and species, *Gymnorhachicerus pilosus* (from Burma) whose metapleura is bare. The validity of these two treatments is discussed below.

Genus *Paleorachicerus* NAGATOMI

Electra LOEW, 1850, *Progr. K. realsch. Meseritz*, 1850: 39 (preoccupied by *Electra* LAMOUROUX, 1816 and *Electra* STEPHENS, 1829). Type-species: *Electra formosa* LOEW, 1850 (by monotypy).

Paleorachicerus NAGATOMI, 1970, *Pacif. Insects*, 12: 420 (new name for *Electra* LOEW). Type-species: *Electra formosa* LOEW, 1850 (automatic).

The following accounts are learned from the literature (FREY, 1954; HENNIG, 1967).

FREY (1954: 3-4) described "*Electra*" *relicta* on the basis of 1♂, 1♀ from the Philippines. In ♀, the antenna is 2+21 segmented and the flagellum has no lower process. In ♂, the antennal flagellum is broken off and it remains unknown whether or not the flagellum has a bifurcate lower process. In *Lophyrophorus* (?=*Chrysothemis*) (♂), the inner lower process is nearly as long as the outer but in "*Electra*" (♂), the inner one is much shorter than the outer and more or less rudimentary.

In the original description of "*Electra*" *relicta* FREY, "♂. Stirn... , nach vorn etwas verbreitert, etwa 1 1/2 mal so lang wie die Breite eines Auges." and "♀. Stirn etwa gleich breit wie beim ♂."

It is uncertain that *relicta* belongs to a true fossil genus (= "*Electra*" or *Lophyrophorus*).

Paleorachicerus relictus (FREY)

Electra relicta FREY, 1954, *Notul Ent.*, 34: 3. Type-locality: St. Cruz, Scyte (Leyte), Philippines.

I have seen 1♂ (holotype), 1♀ (paratype) of *relictus* at the Zoological Museum of the University, Helsinki and have made some notes given below.

Male. Head (antennal segment 3 lacking): head dark brownish to blackish; area above antenna (except mid line) and lateral margin of face whitish to pale brownish; antennal segment 2, palpus and proboscis pale brownish; front narrower than one eye; upper part of front, vertex, ocellar triangle, occiput, cheek, antennal segments 1-2, and proboscis with black hairs; pile on palpus appears to be whitish.

Thorax: castaneous, but humeral callus, scutellum, upper margin of mesopleura pale brownish or nearly whitish; pro- and anterior part of metapleura with black hairs; mesonotum (including humeral callus) and scutellum with pale pile; halter pale brownish.

Legs (fore leg except coxa lacking): pale brownish; coxa, trochanter, mid femur (except base and apex), hind femur (except base), and hind tibia (except base) castaneous; hairs on coxa and femur are black but those on base of femur appear to be pale; hairs on ventral surface of femur not brush-like.

Wing: wing without darkened part; vein R₂₊₃ ending on costa; vein M₂ probably complete (wing crumpled in the specimen examined).

Abdomen: wholly castaneous; above and below with black hairs.

Female. Similar to ♂. Antennal flagellum without lower process; antenna 2+21 (or 22) segmented (last segment of flagellum may possibly be lacking); antennal seg-

ment 2 and flagellar basal 2-4 joints yellowish brown; fore femur darkened (except base and knee) and with black hairs (this may be so in ♂); vein M_2 complete (this may be so in ♂).

Genus *Gymnorhachicerus* FREY

Gymnorhachicerus FREY, 1954, *Notul. ent.*, 34: 7. Type-species: *Gymnorhachicerus pilosus* FREY, 1954 (by original designation).

The genus *Gymnorhachicerus* is peculiar in having the metapleura bare. No other striking difference has been found between *Gymnorhachicerus* and *Rachicerus*, although the male genitalia of the former have not been examined.

In *Gymnorhachicerus pilosus* (♂), the front is wider than one eye, proboscis much shorter than the face, vein R_4 making nearly right angle with vein R_5 which is over 2 times as long as vein R_4 , and the petiole of the 4th posterior cell and that of the anal cell are long.

Gymnorhachicerus is retained for the present, although it is still necessary to find whether or not the difference between *Gymnorhachicerus* and *Rachicerus* is significant.

Gymnorhachicerus pilosus FREY (Fig. 1)

Gymnorhachicerus pilosus FREY, 1954, *Notul. ent.*, 34: 7. Type-locality: Kambaiti (1800 m), Burma.

Frey described this species, based on 4 ♂ from Kambaiti (1800 m), Burma. The following notes are based on one paratype borrowed from the Zoological Museum of the University, Helsinki.

Male. Head: shining black; antenna and palpus dark brownish to blackish; proboscis may be yellowish brown; area above antenna whitish gray pollinose; head and its appendages covered with blackish pile which is absent on front (except upper part), face, and eye; front with numerous (over 10 in number) longitudinal grooves; eye with a shallow shining black incision at lower portion of front; width of front at broadest point (except shining black incision at eye) 1.5 times distance from antenna to median ocellus, and 1.1 times width of front at median ocellus, which is 2.4 times width of ocellar triangle; antenna is 2+19 segmented and its total length 5.6 times distance from antenna to median ocellus; in antenna, segment 1 about as wide as long, longest ones of lower processes 2.3 times as long as width of segment 2 (of antenna), and last segment of flagellum 1.8 times as long as wide.

Thorax: dark brownish to blackish and shining; metapleura and postscutellum more or less pale gray pollinose; mesonotum and scutellum pale pilose; pro- and upper and posterior parts of mesopleura with black hairs; halter yellowish brown.

Legs: yellowish brown but apical portion of hind tibia and last segment of tarsus darkened; coxa and femur pale pilose; legs without dense and brush-like hairs; relative length of segments (except coxa and trochanter) of fore leg 200-195-100-33-19-14-33, of mid leg 214-219-105-33-24-17-29, of hind leg 267-310-119-43-26-17-33 and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments

1-3, 36-31-19-17-14 (tarsal segment 1, 0.15, segment 2, 0.4, segment 3, 0.55 times as wide as long).

Wing: membrane tinged with brown; stigma not distinctly marked; thickening of costa, becoming very narrow beyond end of R_5 ; vein R_{2+3} ending on costa; vein M_2 complete.

Abdomen: dark brownish to blackish and shining (abdomen with a reddish brown tinge in specimen on hand); above and below covered with black pile which is absent on anterior part of segment 2 and becomes short and inconspicuous on sternum 1.

Length: body (without antenna) 4.8 mm; wing 4.8; fore basitarsus 0.5.

IV. *RACHICERUS* FROM AUSTRALASIAN REGION

Six species of *Rachicerus* are now known from New Britain (1 species), New Guinea (4), and the Molucca Is. (1) and they may be separated from one another as shown in the key. But the relation between *bilineus*, *tenuiculus* and *tenuis* has to be reexamined when more material is available. *Rachicerus* is not found from Australia, Tasmania and New Zealand.

(1) vein M_2 is absent or rudimentary, (2) vein R_{2+3} ends on R_1 before wing margin, and (3) hairs on ventral surface of femur are not brush-like. These characters are common to the 6 species, although (2) and (3) are not confirmed in *bilineus*.

Key to species of *Rachicerus* known from New Britain, New Guinea, and Molucca Is.

1. Mesonotum (except stripes or spots, if present) and scutellum pale brownish, yellowish brown, or orange yellow; legs entirely or largely yellowish brown ... 2
- Mesonotum (except humeral callus) and scutellum dark brownish to blackish; coxa (except hind leg), femur, hind tibia (except basal portion), and hind tarsal segments 4-5 (or 3-5) dark brownish to blackish; pleura and abdomen (except anterior part of segment 2) dark brownish to blackish; antenna 2+21 segmented (1 ♀; SE New Guinea)..... *steffani*
- 2(1). Abdomen yellowish brown or orange yellow 3
- Abdomen dark brownish to blackish (usually segments 1-2 and sometimes sternum 3 and genitalia not so); pleura and legs yellowish brown; antenna 2+14-20 segmented (5 ♂; NE and SE New Guinea)..... *fluidus* NAGATOMI, 1970
- 3(2). Mesonotum with a pair of blackish stripes but with no spots on either side at the front 4
- Mesonotum with 1 black spot on each side at the front (besides 2 black stripes); legs entirely yellowish brown; abdomen yellowish brown, "with a slender black band at the base"; antenna 2+nearly 20 segmented (1 ♀, Batjan, Molucca Is.) (after original description) *bilineus* (WALKER, 1861)
- 4(3). Each of abdominal terga 2-4 with a blackish posterior band; front at broadest point narrower than one eye at greatest point (in ♀; ♂ unknown) 5
- Abdominal terga 2-4 without posterior blackish band; front at broadest point

- wider than one eye at greatest point; in hind leg femur and tibia may have a dark brownish tinge; antenna 2+23 (1 ♂) and 2+18 (1 ♀) segmented (1 ♂, 1 ♀; NE New Guinea) *samuelsoni*
- 5 (4). Hind tibia (except apex) distinctly dark brownish to blackish; antenna 2+probably 17 or so segmented (1 ♀; New Britain)..... *tenuiculus* NAGATOMI, 1970
Hind tibia entirely yellowish brown; antenna 2+16-17 segmented (1 ♀; New Guinea) *tenuis* NAGATOMI, 1970

Rachicerus fluidus NAGATOMI

Rachicerus fluidus NAGATOMI, 1970, *Pacif. Insects*, 12: 437. Type-locality: Wau, Morobe District, NE New Guinea.

An addition to the original description is given below, based on new material (4 ♂) from SE New Guinea.

Male. Head: antenna 2+14-20 segmented (including holotype); antenna yellowish brown but in flegellum, joints 6 (or 5) to apex (except lower processes), apices of lower processes on joints 3 (or 2) to apex, and whole surfaces of last 2-4 joints (i. e., including lower processes) dark brownish; area above antenna and face (at least upper part) whitish gray pollinose; total width of head 4-6 times width of face at lowest portion from a direct frontal view; width of front at broadest point 1.1-1.2 distance from antenna to median ocellus and 1.5-1.6 width of front at median ocellus which is 1.9-2.2 width of ocellar triangle; antenna is 2+16-20 segmented (excluding holotype) and its total length is 3.5-3.8 distance from antenna to median ocellus; in antenna, segment 1, 0.9-1.2 times as wide as long, longest ones of lower processes 2.5-3.2 times as long as width of segment 2 (of antenna), and last segment 2.0-2.5 times as long as wide (based on 4 specimens).

Thorax: mesonotum has a pair of dark brownish to blackish stripes extending to neither anterior nor posterior margin in better preserved specimens (it is probable that original description is based on mere outward form and is not substantial in this respect); in one specimen meso- and sternopleura are dark brownish but this may possibly be due to bad (stained) condition.

Legs: tarsal segments 4-5 often not infuscated at all; pile on ventral surface of femur not brush-like; relative length of segments (excluding coxa and trochanter) of fore leg 168 (162-172): 171 (163-181): 100: 28 (26-30): 19 (19-20): 13 (12-14): 21 (20-22), of mid leg 192 (184-197): 193 (190-200): 96 (90-102): 31 (30-32): 20 (19-22): 13 (12-14): 21 (20-22), of hind leg 241 (228-249): 274 (264-295): 119 (116-122): 48 (45-54): 25 (23-27): 15 (14-16): 22 (21-23) and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 38 (36-41): 30 (27-32): 21 (19-22): 14 (13-15): 14 (13-14) (tarsal segment 1, 0.15-0.2, segment 2, 0.25-0.3, segment 3, 0.5-0.55 times as wide as long) (based on 4 specimens).

Wing: vein M_4 directly arising from discal cell in type specimen (see Fig. 14 by Nagatomi, 1970: 439), but from 2nd basal cell in 4 additional ones.

Abdomen: genitalia not yellowish brown but dark brownish to blackish in 4 additional specimens; sometimes segments 1-2 are concolorous with rest of abdomen (i. e., abdomen wholly dark brownish to blackish) but it is uncertain whether this is due

to individual variation or to abnormal condition.

Length: body (without antenna) 3.7-5.6 mm; wing 3.6-4.9; fore basitarsus 0.5-0.7.

Female. Unknown.

Distribution: NE and SE New Guinea.

Specimens examined: ♂ (type), Wau, Morobe District, 1250 m, NE New Guinea, 14. i. 1963, J. SEDLACEK; 4 ♂, Mamai Pltn., E of Port Glasgow, 150 m, SE New Guinea, 3-13. ii. 1965, R. STRAATMAN.

Rachicerus samuelsoni sp. nov. (Figs. 2 & 3)

This species (at least 1 ♀ on hand) runs to couplet 14 of the key by NAGATOMI (1970: 423) but is quite different from either *brevicornis* or *rusticus*. It may fall into couplet 23 but is distinct from *guttatus* and *plagosus*. It seems to be most similar to *tenuis* or its relatives (couplets 26 and 27) but may be distinguished from them as shown in the key to species of New Guinea and New Britain in this paper.

Male. Head: shining black; palpus, proboscis, antennal segments 1-2, flagellar joints 1-2 (or 1-3), and lower processes (except apices) on basal 10 (or so) flagellar joints yellowish brown; area above antenna, occiput, cheek, and face pale or whitish gray pollinose; ocellar triangle, vertex, occiput, cheek, antennal segments 1-2, palpus, and proboscis pale yellowish pilose; width of front at broadest point is 1.2 times distance from antenna to median ocellus and 1.7 times width of front at median ocellus, which is 2.2 times width of ocellar triangle; antenna is 2+23 segmented and its total length is 4.2 times distance from antenna to median ocellus; in antenna, segment 1 about as wide as long, and longest ones of lower processes 2.4 times as long as width of segment 2 (of antenna), and last segment 3 times as long as wide.

Thorax: yellowish brown; mesopleura except postero-lower part and sternopleura except posterior part may have a dark brownish tinge; mesonotum has a pair of blackened stripes which do not extend to posterior margin of mesonotum and which run transversely and connect with humeral calli at their anterior portions; mesonotum, scutellum, pro-, postero-upper part of meso-, and metapleura (except posterior part) pale yellowish pilose; halter yellowish brown.

Legs: yellowish brown; hind femur (except base and apex) and hind tibia (except base) have a dark brownish tinge; coxa and femur have pale yellowish pile which is not brush-like on ventral surface of femur; relative length of segments (excluding coxa and trochanter) of fore leg 180-180-100-28-20-16-24, of mid leg 208-212-100-32-20-16-24, of hind leg 260-296-124-?-?-?-? and in hind leg viewed from the side relative width of femur, tibia, and tarsal segment 1, 40-28-20 (tarsal segment 1, 0.15 times as wide as long).

Wing: membrane tinged with brown; stigma not marked; veins dark brown; thickening of costa ending beyond apex of vein M_1 ; vein R_{2+3} ending on R_1 ; vein M_2 entirely absent in specimen on hand.

Abdomen: yellowish brown; segments 6-7, genitalia, and posterior part of tergum 5 dark brownish to blackish; abdomen above and below clothed with pale yellowish recumbent pile which becomes black on segments 6-7 and genitalia and becomes partly so in middle parts of terga 3-5.

Length: body (without antenna) 7.7 mm; wing 7.4; fore basitarsus 0.9.

Female. Similar to ♂ except as follows: Head: yellowish brown parts of antennal flagellum may be limited to the following: whole surfaces (including lower processes) of joints 1-2 and those of lower processes on joints 3-5 (or 3-6); front with 3 longitudinal grooves of which the median one extends to median ocellus and the lateral ones run opposite sides of the ocellar triangle (this may be so in ♂); width of front at broadest point is 1.1 times distance from antenna to median ocellus and 1.4 times width of front at median ocellus which is 2.3 times width of ocellar triangle; antenna is 2+18 segmented and its total length is 3.6 times distance from antenna to median ocellus; in antenna, segment 1 about as wide as long, longest ones of lower processes 1.2 times as long as width of segment 2 (of antenna), and last segment 1.5 times as long as wide.

Thorax: of a pair of blackened stripes, the anterior portions running transversely (opposite humeral calli) become obscure in specimen on hand.

Legs: as in ♂; relative length of segments of fore leg 166-172-100-28-17-14-21, of mid leg 193-197-97-31-21-14-21, of hind leg 245-290-117-48-28-14-24 and in hind leg viewed from the side relative width of femur, tibia, and tarsal segment 1, 34-24-17 (tarsal segment 1, 0.15 times as wide as long).

Wing: base of vein M_2 present in specimen on hand.

Abdomen: segment 8 blackened and terga 6-7 with a dark brownish tinge (rest of abdomen yellowish brown); pile on abdomen entirely pale yellowish.

Length: body (without antenna and ovipositor) 7.5 mm; wing 8.6; fore basitarsus 1.0.

Distribution: NE New Guinea.

Holotype: ♂, Mt. Missim (1300 m), 7-21. xii. 1966, G. A. SAMUELSON.

Paratype: ♀, Mt. Missim (1500-1800 m), 7. i. 1970, M. SEDLACEK.

Holotype and paratype are in Bishop Museum, Honolulu, Hawaii.

This species is dedicated to Dr. G. A. SAMUELSON.

Rachicerus steffani sp. nov. (Fig. 4)

This species runs to lower branch of couplet 44 of the key by NAGATOMI (1970: 430), but may easily be separated from *pullus* by having vein R_{2+3} ending on R_1 before wing margin, vein M_2 incomplete, hind coxa, basal portion of hind tibia, and anterior part of abdominal segment 2 yellowish brown, etc.

Female. Head: shining black; antenna yellowish brown but segments 1-2 and flagellar joints 6-21 (except lower processes) dark brownish to blackish; palpus dark brownish to blackish; proboscis appears to be largely yellowish brown; area above antenna, occiput, cheek, and face pale or whitish gray pollinose; ocellar triangle, vertex, occiput, and cheek pale or pale yellowish pilose; antennal segments 1-2, palpus, and proboscis with black hairs; front with numerous (9 or so) longitudinal grooves; width of front at broadest point 1.2 times distance from antenna to median ocellus and 1.4 times width of front at median ocellus which is 2.4 times width of ocellar triangle; antenna is 2+21 segmented and its total length is 2.7 times distance from antenna to median ocellus; in antenna, segment 1 about as wide as long, longest ones of lower processes 1.7 times as long as width of segment 2 (of antenna), and last segment as

long as wide.

Thorax : dark brownish to blackish, but humeral callus, pro- (except area between coxae), upper margin of meso-, and hypopleura pale brownish to yellowish brown; metapleura may have a yellowish brown tinge; mesonotum may have 3 indistinct narrow darker stripes which are connected with one another before scutellum; metapleura and postscutellum pale gray pollinose; mesonotum, scutellum, pro-, antero-lower and postero-upper parts of meso-, ptero- (before spiracle), and metapleura (except posterior part) pale or pale yellowish pilose; halter yellowish brown.

Legs: dark brownish to blackish but with following pale brownish to yellowish brown or nearly whitish parts: tibiae and tarsi of fore and mid legs, hind coxa, basal lesser half of hind tibia, and hind tarsus (hind tarsal segments 3-5 or 4-5 darkened); apex of each femur brownish; pile on coxa and femur appears to be chiefly black and is not brush-like on ventral surface of femur; relative length of segments (excluding coxa and trochanter) of fore leg 167-173-100-27-17-13-23, of mid leg 187-200-90-30-17-10-23, of hind leg 243-283-120-50-23-13-23 and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 33-27-20-13-10 (tarsal segment 1, 0.2, segment 2, 0.3, segment 3, 0.4 times as wide as long).

Wing: membrane tinged with brown; stigma is not marked, but basal portion of marginal cell, 1st basal cell along vein Rs, 2nd submarginal cell and its neighborhood, etc. may be somewhat darker; veins dark brown; thickening of costa ending at apex of vein M_1 ; vein R_{2+3} ending on vein R_1 before wing margin; vein M_2 incomplete (only its base present).

Abdomen: dark brownish to blackish but anterior part (before sensory pits) of tergum 2 and that of venter (whose posterior margin is located behind a transverse line of sensory pits in sternum 2) yellowish brown (in sternum 2 there may be a yellowish brown longitudinal median line extending to posterior margin); abdomen above and below clothed with black pile which becomes pale in color on segment 8 and cercus.

Length: body (without antenna and ovipositor) 7.4 mm; wing 7.6; fore basitarsus 1.1. Male. Unknown.

Distribution: SE New Guinea.

Holotype: ♀, Central Dist., 3.2 km S. Vanapa R., Brown Rd., 20-22. v. 1965, W. A. STEFFAN & Y. M. HUANG; deposited in Bishop Museum, Honolulu, Hawaii.

This species is dedicated to Dr. W. A. STEFFAN.

V. *RACHICERUS* FROM JAVA AND SUMATRA

The numbers of the known *Rachicerus*-species from Java and Sumatra are 3 and 5 respectively. These species were described by SNELLEN VAN VOLLENHOVEN (1863) (1 species from Java), OSTEN SACKEN (1881) (1 from Sumatra), WANDOLLECK (1897) (1 from Sumatra), DE MEIJERE (1915) (1 from Simeuluë Is., Sumatra), EDWARDS (1919) (1 from Sumatra), and NAGATOMI (1970) (2 from Java and 1 from Sumatra). During my short stay at Leiden and Genova I was able to make some notes given below on the types of *fulvicornis* SNELLEN VAN VOLLENHOVEN, and *zonatus* OSTEN SACKEN.

Rachicerus fulvicornis (SNELLEN VAN VOLLENHOVEN)

Antidoxion fulvicornis SNELLEN VAN VOLLENHOVEN, 1863, *Versl. Meded. K. Akad. Wetensch. Afd. Natuurk.*, 15: 1. Type-locality: Java.

The following notes are based on the type of *fulvicornis* deposited in Rijksmuseum van Natuurlijke Historie, Leiden, Holland.

Female. Head (antennal segment 3 and flagellum lacking): yellowish brown or reddish yellow, but ocellar triangle, cerebrale, areas before and alongside ocellar triangle shining blackish.

Thorax: thorax yellowish brown or reddish yellow, but mesonotum with blackish parts as follows: lateral part of mesonotum between humeral callus and transverse suture and a pair of broad stripes which begin alongside humeri but disappear near scutellum (this stripe is not connected with anterior margin of mesonotum).

Legs (tarsal segments 3-5 of mid leg and tarsal segment 5 of hind leg lacking): yellowish brown or reddish yellow, but base of hind femur and that of hind tibia darkened.

Wing: membrane tinged with brown, but proximal half of wing more transparent; stigma and areas before and behind stigma darker, and this darker area extending to base of 4th or 5th posterior cell; vein R_{2+3} ending on costa; vein M_2 complete.

Abdomen: abdomen yellowish brown or reddish yellow but dorsum with blackish parts as follows: in tergum 1, median transverse band; in tergum 2, anterior border (which does not extend to lateral margin) and median transverse band (which is paler); in each of terga 3-6, anterior border and broad median longitudinal stripe.

Pile on body and legs: pile is pale brownish but may become partly black in middle portion of abdominal dorsum.

Rachicerus zonatus OSTEN SACKEN

Rachicerus zonatus OSTEN SACKEN, 1881, *Annali Mus. civ. Stor. nat. Giacomo Doria*, 16: 408. Type-locality: Mt. Singalang, Sumatra.

The following notes are based on the type of *zonatus* deposited in Museo Civico di Storia Naturale, Giacomo Doria, Genova, Italy.

Female. Agrees well with the original description. Thorax: halter dark brownish to blackish with stem brownish.

Legs: pile on legs short; hairs on ventral surfaces of femur and tibia not brush-like.

Wing (right wing and apical part of left wing lacking): marginal cell near base darkened, and a band from this darkened part to base of discal cell, apical portions of discal and subcostal cells also darkened.

VI. *RACHICERUS* FROM PHILIPPINES

One species of *Paleorachicerus* (= *Electra*) and 3 species of *Rachicerus* are known

from the Philippines (see FREY, 1954 and NAGATOMI, 1970). *Rachicerus pauciarticulatus* FREY and *R. robustus* FREY are redescribed below.

Rachicerus pauciarticulatus FREY

Rachicerus pauciarticulatus FREY, 1954, *Notul. ent.*, 34:7. Type-locality: St. Thomas, Luzon, Philippines.

I have seen the type of *pauciarticulatus* and have made some notes on it at Zoological Museum of the University, Helsinki.

Female. Head: shining black, area above antenna whitish gray pollinose; antenna, palpus and proboscis dark brownish (in antenna apex of segment 2 and base of flagellar joint 1 may be pale brownish); ocellar triangle, vertex, occiput, cheek, palpus, proboscis, and antennal segments 1-2 with black hairs; front wider than one eye; antenna 2+13 segmented.

Thorax: dark brownish to blackish; humeral and posterior calli pale brownish; pro-, postero-upper part of meso-, and anterior part of metapleura, mesonotum and scutellum with black hairs; halter pale brownish.

Legs: dark brownish to blackish; tibia (except apical portion of hind tibia), basitarsus (except apex of hind basitarsus), and basal portion of hind femur pale brownish; coxa and femur with chiefly black hairs; pile on ventral surfaces of femur and tibia not brush-like.

Wing: membrane tinged with brown and without darker parts; vein R_{2+3} ending on costa and vein M_2 complete.

Abdomen: dark brownish to blackish; above and below with black hairs.

Rachicerus robustus FREY

Rachicerus robustus FREY, 1954, *Notul. ent.*, 34:6. Type-locality: Port Bange, Philippines.

The description given below is based on 2 ♂ which appear to belong to *robustus*.

Male. Head: shining black; palpus, proboscis, and antenna dark brownish to blackish but in flagellum almost whole surface of joint 1 and basal portions of lower processes yellowish brown to brownish; area above antenna is whitish gray pollinose, and face may be more or less so; ocellar triangle, vertex, occiput, cheek and antennal flagellum pale pilose, and antennal segments 1-2, palpus, and proboscis black haired; eye with a deep shining black (or reddish brown) incision; width of front at broadest point 1.0-1.1 times distance from antenna to median ocellus and 1.3 times width of front at median ocellus which is 2.2-2.3 times width of ocellar triangle (based on 2 specimens); antenna 2+24 segmented and its total length 4.0 times distance from antenna to median ocellus; in antenna, segment 1, 1.1-1.2 times as wide as long, longest ones of lower processes 2.2-2.7 times as long as width of segment 2 (of antenna), and last segment of flagellum 1.7 times as long as wide (based on 1 specimen).

Thorax: dark brownish to blackish, but humeral callus and upper margin of mesopleura pale brownish; mesonotum, scutellum, and antero-lower, postero-upper and

posterior parts of mesopleura pale pilose and pro- and metapleura with black hairs which are intermixed with pale ones on the latter; halter brownish to dark brownish.

Legs: dark brownish to blackish; often posterior surfaces of fore tibia and fore basitarsus, those of mid tibia and mid basitarsus may become paler; coxa and femur have pale pile which is dense, erect, and brush-like on ventral surfaces of mid and hind femora (as well as those of mid and hind tibiae) and which may become partly black; relative length of segments (excluding coxa and trochanter) of fore leg 197 (188-205): 194 (188-200): 100: 32 (31-32): 19 (18-19): 15 (14-16): 30 (28-32), of mid leg 221 (200-241): 202 (194-209): 97 (94-100): 32 (31-32): 19 (18-19): 14 (14): 29 (25-32), of hind leg 265 (253-277): 282 (269-295): ? (?-132): ? (?-45): ? (?-23): ? (?-18): ? (?-34) and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 47 (44-50): 34 (31-36): ? (?-23): ? (?-14): ? (?-14) (tarsal segment 1, 0.2, segment 2, 0.3, segment 3, 0.6 times as wide as long) (based on 2 specimens).

Wing: membrane tinged with brown; stigma (basal portion of marginal cell may be paler), area above stigma (=apices of costal and subcostal cells), and a spot from stigma to base of 4th posterior cell darker than rest of membrane; veins dark brown; thickening of costa ending beyond apex of vein M_2 ; vein R_{2+3} ending at apex of vein R_1 ; vein M_2 complete.

Abdomen: dark brownish to blackish; pile on dorsum chiefly pale and that of venter chiefly black.

Length: body (without antenna) 8-10 mm; wing 6-8; fore basitarsus 0.8-1.1.

Female. Unknown.

Distribution: Philippines.

Specimens examined: 2 ♂, Tawi Tawi, Tarawakan, north of Batu Batu, 5 & 12. xi. 1961, Noona Dan Exp., 1961-62.

During my short stay at the Zoological Museum of the University, Helsinki, I made some notes on the type (♂) of *robustus*. The notes are given below and differ from the description above but the differences are probably due to individual variation.

Male. Head: antenna 2+30 segmented; antennal segment 2 and lower processes of joints 1-2 (or 1-4) (except apices) of flagellum pale brownish; ocellar triangle, vertex, occiput and cheek black haired.

Thorax: hairs on mesonotum and scutellum black.

Legs: legs are dark brownish to blackish but mid and hind tarsi may be brownish; hairs on coxa and femur are black but those on ventral surface of femur (as well as tibia) appear to be pale.

Abdomen: hairs on dorsum (as well as venter) black.

VII. *RACHICERUS* FROM NEPAL AND BURMA

As to Rachiceridae, no species from Nepal and 1 *Gymnorhachicerus* and 1 *Rachicerus* from Burma are known (see FREY, 1954). One new species of *Rachicerus* from Nepal is described and *Rachicerus maculipennis* FREY from Burma is redescribed below.

Rachicerus lepidus sp. nov. (Fig. 5)

This species runs to couplet 34 of the key by NAGATOMI (1970: 428) and is similar to *bicolor* BRUNETTI, 1912 from Ceylon but may be separated from the latter by having abdominal segment 1 blackish, each of terga 2-3 with a median transverse blackish band, fore and mid coxae blackish, etc.

Male. Head (apical portion of antennal flagellum lacking): shining black; antenna dark brownish to blackish but lower processes (whose apical portions may be somewhat darkened) yellowish brown; palpus and proboscis yellowish brown to brownish; area above antenna, occiput (except cerebrale), cheek and face whitish gray pollinose; ocellar triangle, vertex, and occiput pale pilose and antennal segments 1-2, palpus and proboscis black haired; shining incision at eye not shallow; width of front at broadest point 1.3 times distance from antenna to median ocellus and 1.5 times width of front at median ocellus which is 2.1 times width of ocellar triangle; antenna is 2+ over 19 segmented; in antenna, segment 1, 1.3 times as wide as long, and longest ones of lower processes 1.9 times as long as width of segment 2 (of antenna).

Thorax: dark brownish to blackish; humeral callus and upper margin of mesopleura yellowish brown to pale brownish; pro- and metapleura, and postscutellum may have whitish gray pollen; mesonotum, scutellum, pro-, meso- (at antero-lower, postero-upper, and posterior parts), sterno- (at posterior part), ptero- (before spiracle), and metapleura (at anterior part) pale pilose; halter yellowish brown.

Legs: coxa dark brownish to blackish but remainder of legs yellowish brown; coxa and femur pale pilose; pile on ventral surfaces of femur and tibia not brush-like; relative length of segments (excluding coxa and trochanter) of fore leg 160-160-100-30-22-14-26, of mid leg 184-184-100-34-20-12-24, of hind leg 248-268-116-44-22-14-26 and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 32-28-16-12-12 (tarsal segment 1, 0.15, segment 2, 0.3, segment 3, 0.55 times as wide as long).

Wing: membrane evenly tinged with brown and without darkened part; stigma not marked; thickening of costa becoming very narrow beyond end of R_5 ; vein R_{2+3} ending on costa and vein M_2 complete.

Abdomen: abdomen yellowish brown but the following parts dark brownish to blackish: segments 1 and 5-7, a median transverse band (which may not extend to lateral margin) in each of terga 2-3, posterior part of tergum 4, and genitalia except base; terga 1-4, sterna 1-3 and genitalia with chiefly pale pile but terga 5-7 and sterna 4-7 black haired.

Length: body (without antenna) 7.5 mm; wing 7.1; fore basitarsus 1.0.

Female. Unknown.

Distribution: Nepal.

Holotype: ♂, between Thirkupa (2600 m) and Papun (2100 m), Nepal Himalaya, 10. vii. 1972, Pemba NORBU; deposited in Kyushu University, Fukuoka.

Rachicerus maculipennis FREY

Rachicerus maculipennis FREY, 1954, *Notul. ent.*, 34: 6. Type-locality: Kambaiti (1800 m), Burma.

I have seen the type of *maculipennis* and have made some notes on it at the Zoological Museum of the University, Helsinki.

Male. Head: shining black; palpus, proboscis and antennal segments 1-2 blackish; antennal flagellum dark brownish but in lower processes, joint 1 and bases on joints 2-14 (or 15) yellowish brown; ocellar triangle, vertex, area above antenna, occiput and face with whitish gray pollen; lower occiput, cheek, palpus, proboscis and antennal segments 1-2 with black hairs but upper occiput and vertex with pale pile; palpus much shorter than face, and proboscis much shorter than palpus; front and face much wider than one eye; antenna 2+18 segmented.

Thorax: dark brownish; pleura, scutellum, and postscutellum with whitish gray pollen; hairs on pro- and anterior part of metapleura black; mesopleura with pale pile at antero-lower, postero-upper and posterior parts; mesonotum and scutellum short pale pilose; halter yellowish brown (but upper part of stem may be darkened).

Legs (tibia and tarsus of hind leg lacking): coxa same as pleura; femur is dark brownish but fore femur may be brownish rather than dark brownish and apices of fore and mid femora yellowish brown; tibia and tarsus pale brownish; pile on fore and mid coxae pale or chiefly so and that on hind coxa black or chiefly so; pile on femur short and black; pile on ventral surfaces of femur and tibia not brush-like.

Wing: membrane tinged with brown; stigma and areas above and below it darkened and this region not very demarcated but extending to upper portion of 4th posterior cell; vein R_{2+3} ending on costa and vein M_2 complete.

Abdomen: dark brownish; hairs on abdomen chiefly black (those on anterior parts of terga 1-2 pale and on genitalia chiefly so).

VIII. *RACHICERUS* FROM LAOS

No species of *Rachicerus* has hitherto been recorded from Laos, but 3 new species are described below.

Key to species of *Rachicerus* known from Laos

1. Wing membrane evenly almost hyaline and stigma not marked 2
- Apical about half of wing darkened and a region at and near stigma more infuscated; body dark brownish to blackish, but lower processes (except apices) of antennal flagellum, humeral callus, and halter pale brownish or yellowish brown (last several joints of flagellum may be whitish) and tibia and basitarsus (mid leg except coxa is lacking in specimen on hand) partly so; antenna 2+29 segmented (1 ♂)
- *anachoreticus*
2. Legs except base of hind tibia yellowish brown; body dark brownish to blackish

but pro-, sterno-, ptero-, hypopleura, humeral callus, halter, palpus and proboscis yellowish brown and antenna largely so; antenna 2 + probably 15 or so segmented (3 ♂) *amorusus*
 Coxa, tarsal segments 2-5, hind femur, and apical portion of hind tibia dark brownish to blackish; body is dark brownish to blackish but humeral callus, upper half of pteropleura, halter, and lower processes of antennal flagellum are pale brownish to yellowish brown and palpus and proboscis may be so (last 2 joints of flagellum may be whitish); mesonotum brownish but a pair of stripes and lateral borders darkened; antenna 2+24 segmented (1 ♂) *quatei*

Rachicerus amorusus sp. nov. (Fig. 6)

This species runs to couplet 49 of the key by NAGATOMI (1970: 431-432) and appears to be distinguished from *galloisi* of Japan by having sterno-, ptero-, and hypopleura, antennal segments 1-2 and flagellar joints 1-4 (or 1-5) (besides lower processes), and apical over half (or at least half) of hind tibia yellowish brown.

Male. Head: shining black; palpus, proboscis, and antenna are yellowish brown, but antennal flagellum from joints 5-6 to apex (except lower processes) may be darkened; area above antenna pale gray pollinose and face and occiput (except cerebrale) more or less so; ocellar triangle, vertex, occiput, cheek, antenna, palpus, and proboscis pale pilose; shining black incision at eye shallow and inconspicuous; width of front at broadest point 0.9-1.0 times distance from antenna to median ocellus and 1.3-1.4 times width of front at median ocellus which is 1.7-2.1 times width of ocellar triangle; antenna is 2 + over 11 (probably 2 + 15 or so) segmented; in antenna, segment 1, 0.9-1.2 times as wide as long, and longest ones of lower processes 2.0-2.1 times as long as width of segment 2 (of antenna) (based on 3 specimens).

Thorax: brownish to dark brownish; humeral and posterior calli, pro-, sterno-, ptero-, hypo-, and anterior and upper parts of mesopleura yellowish brown; mesonotum, scutellum, pro-, postero-upper part of meso-, ptero- (before spiracle), and metapleura (except posterior part) pale pilose; halter yellowish brown.

Legs: yellowish brown but in hind leg basal lesser half (or at most half) of tibia and often tarsal segments 4-5 darkened; coxa and femur pale pilose; in mid and hind legs, hairs on ventral surfaces of femora and tibiae may be dense and brush-like; relative length of segments (excluding coxa and trochanter) of fore leg 176 (172-180): 173 (163-180): 100: 30 (28-31): 20 (20-21): 14 (13-15): 25 (24-25), of mid leg 196 (194-198): 189 (183-193): 92 (90-94): 32 (31-33): 22 (21-23): 14 (13-15): 25 (25), of hind leg 241 (233-250): 257 (248-263): 114 (109-118): 47 (46-50): 25 (24-27): 16 (15-17): 25 (24-25) and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 42 (39-45): 28 (26-30): 20 (19-21): 15 (15): 13 (13) (tarsal segment 1, 0.2, segment 2, 0.3, segment 3, 0.5 times as wide as long) (based on 3 specimens).

Wing: membrane tinged with brown; stigma not distinctly marked; veins dark brown; thickening of costa ending beyond apex of M_1 ; vein R_{2+3} ending at apex of R_1 ; vein M_2 complete.

Abdomen: dark brownish to blackish; sternum 2 or sternite 2-3 may have a brownish

tinge; abdomen above and below clothed with pale pile (anterior part of segment 2 bare).

Length: body (without antenna) 4.4-5.6 mm; wing 3.9-5.2; fore basitarsus 0.6-0.75.

Female. Unknown.

Distribution: Laos.

Holotype: ♂, Ban Van Eue, Vientiane Prov., 15. i. 1967, native collector.

Paratypes: 2 ♂, data same as type but 15-31. v. 1965 & 15. ix. 1967 respectively.

Holotype and paratypes are deposited in Bishop Museum, Honolulu, Hawaii.

Rachicerus anachoreticus sp. nov. (Fig. 7)

This species runs to couplet 35 of the key by NAGATOMI (1970:428) and may easily be separated from *bifidus* from N. Borneo by having darkened apical part of wing more extensive than in *bifidus* in area (including whole surfaces of discal, 4th and 5th posterior cells) and a region at and near stigma more infuscated than the rest of darkened part. The tibia and basitarsus are also different in coloration between these two species.

Male. Head: shining black; palpus and proboscis appears to be brownish to dark brownish; antenna dark brownish to blackish, but last 2 flagellar joints and last several (8-10) lower processes (except darkened bases) whitish and remaining lower processes (except darkened apices) yellowish brown to brownish; area above antenna pale or whitish gray pollinose and occiput, cheek, and face more or less so; front with a pair of indistinct longitudinal grooves running opposite ocellar triangle; vertex and upper occiput with comparatively long pale pile (which may be present on ocellar triangle); lower occiput, cheek, antennal segments 1-2, palpus, and proboscis with black hairs; eye with a deep shining black incision; width of front at broadest point 1.1 times distance from antenna to median ocellus and 1.3 times width of front at median ocellus which is 2.3 times width of ocellar triangle; antenna is 2+29 segmented and its total length is 5.1 times distance from antenna to median ocellus; in antenna, segment 1, 1.2 times as wide as long, longest ones of lower processes 1.6 times width of segment 2 (of antenna), and last segment 2.4 times as long as wide.

Thorax: dark brownish to blackish but humeral callus and upper margin of mesopleura pale brownish; posterior callus may be paler than rest of thorax; mesonotum, scutellum, postero-upper and antero-lower parts of meso-, and pteropleura (before spiracle) with pale pile which is longer on scutellum; pro- and metapleura (except posterior part) with black hairs; halter yellowish brown.

Legs (mid leg except coxa and trochanter lacking): coxa and femur dark brownish to blackish; trochanter yellowish brown; tibia and tarsus largely darkened but in fore leg knee and dorsal surfaces of tibia and basitarsus and in hind leg base and anterior surface of tibia pale brownish to yellowish brown; coxa and femur with pale pile which is short on the latter; hairs on ventral surfaces of hind femur and tibia (probably as well as those on mid femur and tibia) dense and brush-like; relative length of segments (excluding coxa and trochanter) of fore leg 186-175-100-25-21-14-25, of mid leg ?, of hind leg 243-264-129-39-25-18-25, and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 43-32-25-18-14 (tarsal segment 1, 0.2, segment

2, 0.45, segment 3, 0.6 times as wide as long).

Wing: membrane faintly tinged with yellowish brown to brown but apical about half of wing (area distad from base of 1st submarginal cell) darkened and a region at and near stigma more infuscated but its border obscure (area above stigma darkened; in marginal cell basal about half paler); veins dark brown but those in basal half of wing largely yellowish brown to brown; vein R_{2+3} ending on costa and vein M_2 complete.

Abdomen: dark brownish to blackish; abdomen with pale pile which is comparatively long on dorsum and becomes black on sterna 5-7 and basistyle (anterior part of segment 2 bare).

Length: body (without antenna) 7.6 mm; wing 7.4; fore basitarsus 1.0.

Female. Unknown.

Distribution: Laos.

Holotype: ♂, Ban Van Eue, Vientiane Prov., 15. v. 1967, native collector; deposited in Bishop Museum, Honolulu, Hawaii.

Rachicerus quatei sp. nov. (Fig. 8)

This species runs to couplet 39 of the key by NAGATOMI (1970: 429) but does not fall into either couplet 40 or 47, because coxa and hind femur are dark brownish to blackish but fore and mid femora are yellowish brown. It may possibly run to couplet 5 but is quite different from *fluidus*.

Male. Head: shining black; palpus and proboscis yellowish brown to brownish; antenna dark brownish to blackish but lower processes yellowish brown and last 2 flagellar joints wholly whitish yellow (antennal segments 2 may be largely yellowish brown and apices of lower processes may be darker); area above antenna whitish gray pollinose and occiput, cheek, and face more or less so; front with 4 pairs of longitudinal grooves of which the outer pair run opposite sides of ocellar triangle; ocellar triangle, vertex, occiput, and cheek pale pilose and antennal segments 1-2, palpus, and proboscis black haired; shining black incision at eye not so deep; width of front at broadest point 1.1 times distance from antenna to median ocellus and 1.6 times width of front at median ocellus which is 2.0 times width of ocellar triangle; antenna is 2+24 segmented and its total length is 5.1 times distance from antenna to median ocellus; in antenna, segment 1 about as wide as long, longest ones of lower processes 2.4 times width of segment 2 (of antenna), and last segment 2.0 times as long as wide.

Thorax: mesonotum brownish, but humeral callus pale brownish and the following parts darkened: lateral border tapering posteriorly between humeral and posterior calli, a pair of longitudinal stripes starting alongside humeral callus and connecting with each other before scutellum, and possibly a thin median stripe; scutellum and pleura dark brownish to blackish but pro- (except area between coxae) and upper half of pteropleura pale brownish or yellowish brown (sides of scutellum and posterior margin of metapleura may also be so); mesonotum, scutellum, pro-, postero-upper part of meso-, ptero- (before spiracle), and metapleura (except posterior part) pale pilose; halter yellowish brown.

Legs: yellowish brown, but coxa, tarsal segments 2-5, hind femur, and apical 1/2-

1/3 of hind tibia dark brownish to blackish (in hind femur ventral surface, except apical portion, may be yellowish brown); coxa and femur pale pilose; in mid and hind legs, hairs on ventral surfaces of femora and tibiae dense and brush-like; relative length of segments (excluding coxa and trochanter) of fore leg 171-171-100-36-21-18-25, of mid leg 196-189-100-39-25-14-21, of hind leg 250-232-129-54-29-18-25 and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 36-25-21-14-11 (tarsal segment 1, 0.2, segment 2, 0.3, segment 3, 0.4 times as wide as long).

Wing: membrane tinged with brown; stigma not marked; veins dark brown; thickening of costa ending beyond apex of vein M_2 .

Abdomen: dark brownish to blackish (anterior part [before sensory pits] of tergum 2, posterior border of tergum 4, etc, may be tinged with reddish brown); abdomen above and below clothed with pale pile (which may become black on segments 6-7, and genitalia) (anterior part of segment 2 bare).

Length: body (without antenna) 9 mm; wing 7; fore basitarsus 1.0.

Female. Unknown.

Distribution: Laos.

Holotype: ♂, Prabang 300 m, Luang, 4-5. vi. 1960, L. W. QUATE; deposited in Bishop Museum, Honolulu, Hawaii.

This species is dedicated to Dr. L. W. QUATE.

IX. *RACHICERUS* FROM YAEYAMA ISLANDS

The Yaeyama Islands are located between Miyako Island and Formosa. As new to this region, the following 3 species of *Rachicerus* are recorded: *sakishimanus* (♂), new to science; *galloisi* SÉGUY, 1948 (♂, ♀), widely distributed in Hokkaido, Honshu, and Kyushu; one unnamed one (♀) (it is feared that this species is the female of *sakishimanus*).

Key to species of *Rachicerus* known from Japan

1. Thorax and abdomen largely dark brownish to blackish and humeral callus distinctly paler than other parts of mesonotum 2
- Thorax and abdomen largely yellowish brown and humeral callus concolorous with other parts of mesonotum; legs wholly yellowish brown (4 ♀; South-West Islands [Iriomots Is. & Ishigaki Is.]) sp.
2. Hind leg except tibia largely yellowish brown (femur sometimes with a dark brownish tinge; tarsus except base always yellowish brown); fore and mid legs entirely yellowish brown; stigma not marked and wing without a darkened region behind marginal cell; hairs on abdomen shorter and black (5 ♂, 2 ♀; Hokkaido, Honshu, Kyushu, and South-West Islands) *galloisi* SÉGUY, 1948
- Hind leg largely dark brownish to blackish (tarsus entirely so); fore and mid tarsal segments 2-5 distinctly darkened; stigma, area above stigma, a band from stigma to base of 4th posterior cell, etc., darkened; hairs on abdomen longer and chiefly pale

(11 ♂; South-West Islands [Iriomote Is. & Ishigaki Is.].....) *sakishimanus*

Rachicerus galloisi SÉGUY

Rachicerus galloisi SÉGUY, 1948, *Notes d'Ent. Chinoise, Musée Heude*, 12: 154. Type-locality: Chūzenji, Honshu, Japan.

An addition to the description by NAGATOMI (1970) is given below, based on new material (1 ♂ from Hokkaido and 2 ♂, 1 ♀ from Iriomote Is.).

Male. Head: palpus often yellowish brown; pile on proboscis and palpus often pale; width of front at broadest point 1.1 times distance from antenna to median ocellus and 1.3-1.4 times width of front at median ocellus which is 2.2 times width of ocellar triangle; antenna is 2+14-18 segmented and its total length is 3.7-4.2 times distance from antenna to median ocellus; in antenna, segment 1, 1.0-1.3 times as wide as long, longest ones of lower processes 2.0-2.2 times as long as width of segment 2 (of antenna), and last segment of flagellum 1.3-2.0 times as long as wide (based on 3 additional specimens from Hokkaido and Iriomote Is.).

Thorax: propleura often pale brownish or yellowish brown.

Legs: hind femur very often entirely yellowish brown; hairs on ventral surfaces of mid and hind femora erect, dense, and rather brush-like; relative length of segments (excluding coxa and trochanter) of fore leg 183 (177-191): 180 (176-186): 100: 29 (27-32): 20 (18-23): 14 (14): 25 (23-27), of mid leg 203 (200-209): 197 (191-209): 90 (86-92): 33 (32-36): 22 (20-23): 16 (14-18): 25 (23-27), of hind leg 248 (241-259): 264 (245-300): 109 (105-114): 42 (40-45): 25 (23-27): 17 (16-18): 28 (24-32) and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 42 (40-45): 31 (28-32): 22 (20-23): 17 (16-18): 14 (14) (tarsal segment 1, 0.2, segment 2, 0.4, segment 3, 0.5-0.6 times as wide as long) (based on 3 additional specimens).

Length: body (without antenna) 6.2-7.5 mm; wing 5.4-6.4; fore basitarsus 0.8-0.9 (based on 2 additional specimens from Iriomote Is.).

Female. Head: width of front at broadest point 0.9 times distance from antenna to median ocellus and 1.2 times width of front at median ocellus which is 2.0 times width of ocellar triangle; antenna is 2+15-16 segmented and its total length is 2.4 times distance from antenna to median ocellus; in antenna, segment 1 as wide as long, longest ones of lower processes 0.8 times as long as width of segment 2 (of antenna), and last segment of flagellum 1.3 times as long as wide (based on 1 additional specimen from Iriomote Is.).

Legs: hind femur often entirely yellowish brown; relative length of segments of fore leg 159-163-100-28-19-13-22, of mid leg 181-184-94-28-19-13-19, of hind leg 228-238-109-38-22-13-22 and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 38-28-22-16-13 (tarsal segment 1, 0.2, segment 2, 0.4, segment 3, 0.6 times as wide as long) (based in 1 specimen from Iriomote; the difference between the value of the specimen from Iriomote and that from Kyushu [see NAGATOMI, 1970: 463] may fall within the individual variation).

Abdomen: pile on ovipositor partly or wholly pale yellowish.

Length: body (without antenna and ovipositor) 7.1 mm; wing 7.9; fore basitarsus 1.1 (based on 1 specimen from Iriomote Is.).

Distribution: Japan (Hokkaido, Honshu, Kyushu, and South-West Islands).

Specimens examined: *Hokkaido* (new record): 1 ♂, Toikanpetsu, 14. viii. 1965, K. KUSIGEMATI. *South-West Islands* (new record): 1 ♂, 1 ♀, Kozadake, Iriomote Is., 1. v. 1976, A. NAGATOMI; 1 ♂, Komi (in forest), Iriomote Is., 2. v. 1976, NAGATOMI.

Rachicerus sakishimanus sp. nov. (Figs. 9-11)

This species runs to couplet 38 of the key by NAGATOMI (1970:428) and appears to be most closely related to *robustus* FREY from the Philippines but may be separated from the latter by the coloration of leg. In *robustus* "[Leg] nebst Hüften ganz schwarz, nur die vorderen Kniee und Tarsen rotgelb."

This species may easily be distinguished from *galloisi* from Japan (Hokkaido, Honshu, Kyushu, and South-West Islands) as shown in the key.

Male. Head: shining black; palpus and proboscis yellowish brown; lower processes of antennal flagellum dark brownish to blackish but those (except apices) of joints 1-2 (sometimes 1-3 or 1-4) and often that of last 1 (or several) joint yellowish brown to brownish, as well as antennal segment 2; area above antenna, occiput except cerebrale, cheek, and face with pale gray pollen which is whitish in certain lights; front with 1-4 pairs of longitudinal grooves, of which 1-2 run opposite sides of ocellar triangle; shining incision at eye not shallow; ocellar triangle, vertex, occiput and cheek pale pilose and palpus chiefly so; antennal segments 1-2 and proboscis with chiefly black hairs; width of front at broadest point 1.0-1.1 times distance from antenna to median ocellus and 1.5-1.6 times width of front at median ocellus which is 1.9-2.1 times width of ocellar triangle; antenna is 2+19-30 segmented and its total length is 4.3-5.6 times distance from antenna to median ocellus; in antenna, segment 1, 1.3-1.8 times as wide as long, longest ones of lower processes 1.8-2.5 times as long as width of segment 2 (of antenna), and last segment of flagellum 1.6-2.1 times as long as wide; structural characters are based on 10 specimens.

Thorax: brownish to dark brownish with following pale brownish or yellowish brown parts: humeral callus, scutellum, pro-, upper and anterior borders of meso-, postero-upper parts of sterno-, and upper half of pteropleura; mesonotum with more or less darker regions as follows: lateral part separated by transverse suture and 3 longitudinal stripes of which median one is narrow (these stripes are connected with one another before scutellum); meta-, lower part of ptero- (between mid and hind coxae), hypopleura, and postscutellum pale gray pollinose; mesonotum and scutellum pale pilose; pro-, antero-lower and postero-upper parts of meso-, and metapleura (except posterior part) with chiefly pale hairs; halter pale brownish and with knob more or less whitish.

Legs: pale brownish to yellowish brown, but (1) fore and mid tarsal segments 2-5 and (2) hind legs dark brownish to blackish; in (1) ventral surfaces pale gray pollinose and in (2) knee and apex of tibia pale brownish to yellowish brown and often coxa and femur almost wholly or partly brownish; coxa and femur with pale (or chiefly pale on the former) hairs which become dense and white on the ventral surface of the latter; hairs on ventral surfaces of mid and hind femora and tibiae brush-like; relative length of segments (excluding coxa and trochanter) of fore leg 176(168-188):

169 (158-180) : 100 : 31 (28-33) : 20 (19-24) : 14 (13-16) : 24 (19-28), of mid leg 201 (187-212) : 188 (174-200) : 91 (87-96) : 32 (28-36) : 22 (19-24) : 14 (12-17) : 25 (22-30), of hind leg 251 (235-268) : 263 (245-284) : 120 (112-128) : 44 (40-48) : 25 (22-28) : 16 (15-20) : 25 (22-28) and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 39 (35-48) : 31 (27-36) : 21 (19-27) : 16 (13-18) : 14 (12-16) (tarsal segment 1, 0.15-0.2, segment 2, 0.3-0.45, segment 3, 0.4-0.7 times as wide as long) (based on 10 specimens).

Wing : membrane tinged with brown ; stigma, area above stigma (tip of costal- and apical portion of subcostal cell), a band from stigma to base of 4th posterior cell, an elongate region just behind basal section of Rs, and borders of m-cu crossvein darkened ; marginal cell (including stigma) paler at basal portion and at apex ; thickening of costa becoming very narrow beyond end of R₅.

Abdomen : dark brownish to blackish with following pale brownish or yellowish brown parts : base of venter before posterior row of sensory pits, and often posterior borders of sterna 2-3 (or those of sterna 2-4) ; tergum 2 especially area before anterior row of sensory pits, genitalia, and often tergum 3 also largely or partly brownish ; abdomen with comparatively long pale (or chiefly pale) pile which becomes black on sterna 4-7 (or 5-7), terga 4-8 (or 5-8 or 5-7), and often genitalia (anterior part of segment 2 bare).

Length : body (without antenna) 6.6-10.5 mm ; wing 6.0-8.6 ; fore basitarsus 0.8-1.2. Female. Unknown.

Distribution : South-West Islands (Yaeyama Islands).

Holotype : ♂, Komi, Iriomote Is., 3. viii. 1978, A. NAGATOMI.

Paratypes 1 ♂, between Yonehara & Yoshihara, Ishigaki Is., 11. viii. 1965, A. TANAKA ; 2 ♂, Komi, Iriomote Is., 6-8. vi. 1977, NAGATOMI ; 2 ♂, Komi, 3-5. viii. 1978, NAGATOMI ; 5 ♂, Komi, 20-21. vii. 1980, NAGATOMI.

Holotype in Kyushu University, Fukuoka ; paratypes in Kagoshima University, Kagoshima, U. S. National Museum, Washington, D. C., and British Museum (Natural History), London.

Rachicerus sp. (Figs. 12 & 13)

The specimens (♀) described below are very different in coloration from *sakishimanus* (♂), but is suspected to be identical with the latter, because they were always found together.

This species runs to couplet 11 of the key by NAGATOMI (1970 : 422) and appears to be most closely related to *opulentus* NAGATOMI from Malay but may be distinguished from the latter in which last 6-7 joints (not only last joint) of antennal flagellum yellowish brown or reddish brown and concolorous with lower processes, base (not middle) of marginal cell darkened, and apical part of wing not darkened, and pile on abdomen yellowish brown (not chiefly black).

Female. Head : shining black ; palpus, proboscis, antennal segments 1-2, in antennal flagellum lower processes, last joint and often joint 1 or 1-2 yellowish brown or reddish brown ; area above antenna, occiput except cerebrale, cheek, and face with pale gray pollen which is whitish in certain lights ; front with 1-3 pairs of longitudinal

grooves, of which 1-2 run opposite sides of ocellar triangle; antennal segments 1-2 with black hairs; palpus, proboscis, ocellar triangle, vertex, occiput and cheek with pale pile which often becomes chiefly black on the former four; shining incision at eye not so shallow; width of front at broadest point 1.0-1.1 times distance from antenna to median ocellus and 1.4 times width of front at median ocellus which is 1.6-2.0 times width of ocellar triangle; antenna is 2+21-24 segmented and its total length is 3.4-3.8 times distance from antenna to median ocellus; in antenna, segment 1, 1.3-1.7 times as wide as long, longest ones of lower processes 1.0-1.1 times as long as width of segment 2 (of antenna), and last segment of flagellum 1.0-1.4 times as long as wide; structural characters are based on 4 specimens.

Thorax: yellowish brown but narrow area before posterior spiracle shining black; mesonotum, scutellum, pro- and metapleura with pale pile which often becomes black on metapleura, humeral and posterior calli, posterior border of scutellum, etc.; halter yellowish (its base yellowish brown).

Legs: yellowish brown; coxa and femur with pale pile which sometimes becomes black at apex of hind coxa; hairs on ventral surfaces of mid femur and tibia and hind tibia are not brush-like, although those on hind femur may be rather brush-like; relative length of segments (excluding coxa and trochanter) of fore leg 173 (165-178): 169 (165-174): 100: 32 (31-33): 20 (18-22): 14 (13-15): 24 (22-27), of mid leg 203 (192-211): 191 (188-193): 95 (92-100): 33 (31-35): 20 (19-22): 14 (13-15): 25 (22-29), of hind leg 261 (250-267): 276 (269-285): 121 (115-133): 43 (38-46): 24 (23-26): 16 (15-19): 25 (23-27) and in hind leg viewed from the side relative width of femur, tibia, and tarsal segments 1-3, 36 (32-38): 30 (29-31): 20 (19-22): 15 (15-16): 15 (14-15) (tarsal segment 1, 0.15-0.2, segment 2, 0.3-0.4, segment 3, 0.6-0.7 times as wide as long) (based on 4 specimens).

Wing: membrane faintly tinged with brown but apical part of wing (distad from a line through base of R_4 and apex of discal cell), stigma (middle part of marginal cell), area above stigma, a band from stigma to apex of 2nd basal cell, etc. darkened; thickening of costa becoming very narrow beyond end of R_5 .

Abdomen: yellowish brown; segment 8 shining black; lateral borders of terga 2-5 and posterior margins of terga 2-4 more or less darkened; segments 6-7 and 9, and a band (except middle) at tergum 2 just behind anterior row of sensory pits often darkened; abdomen above and below black haired but ovipositor (segments 6-9) and sometimes segment 5 pale pilose.

Individual variation: in one specimen on hand, front (except ocellar triangle), cerebrale (except area behind ocellar triangle) and face yellowish brown and in another specimen palpus and proboscis dark brownish.

Length: body (without antenna and ovipositor) 6.1-8.4 mm; wing 7.3-8.3; fore basitarsus 1.0-1.1.

Distribution: South-West Islands (Yaeyama Is.).

Specimens examined: 1 ♀, Mt. Omoto, Ishigaki Is., 17. vii. 1980, A. NAGATOMI; 3 ♀, Komi, Iriomote Is., 20-21. vii. 1980, NAGATOMI.

ACKNOWLEDGEMENTS

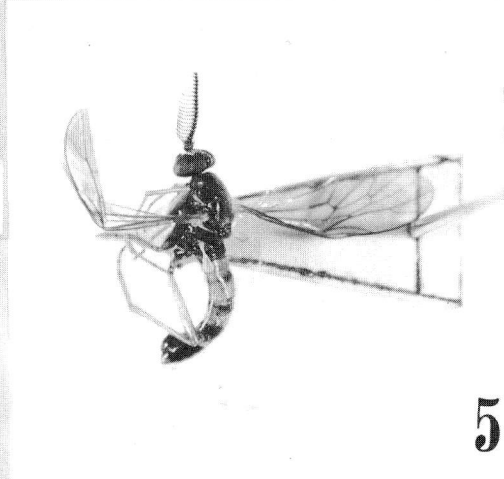
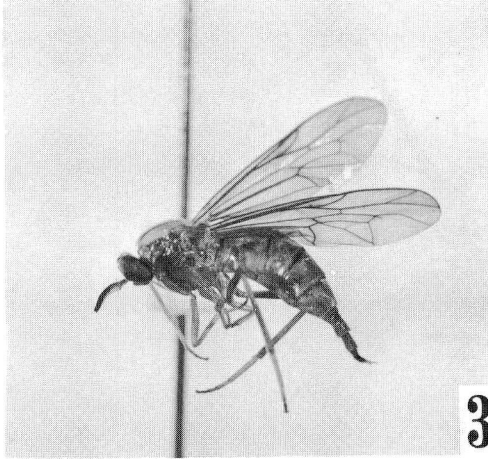
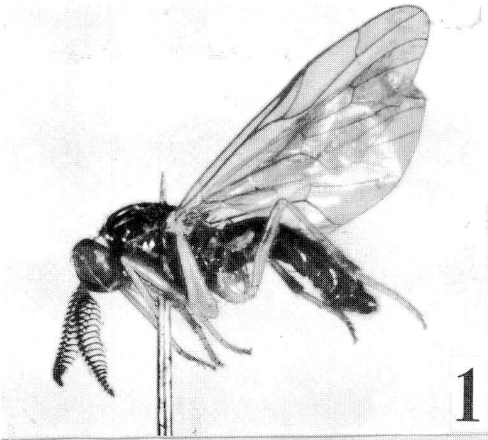
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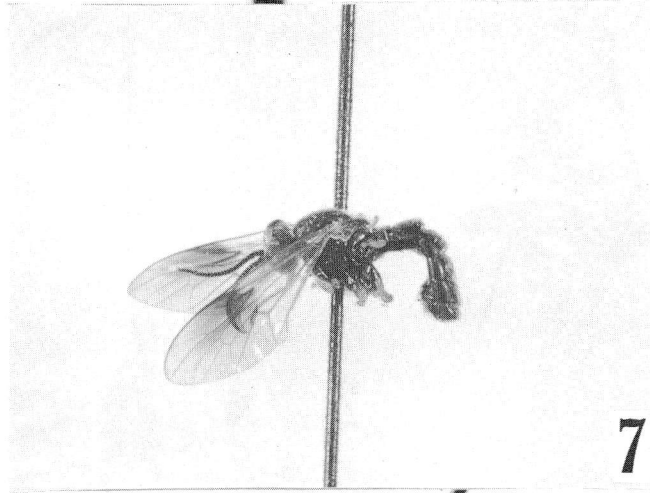
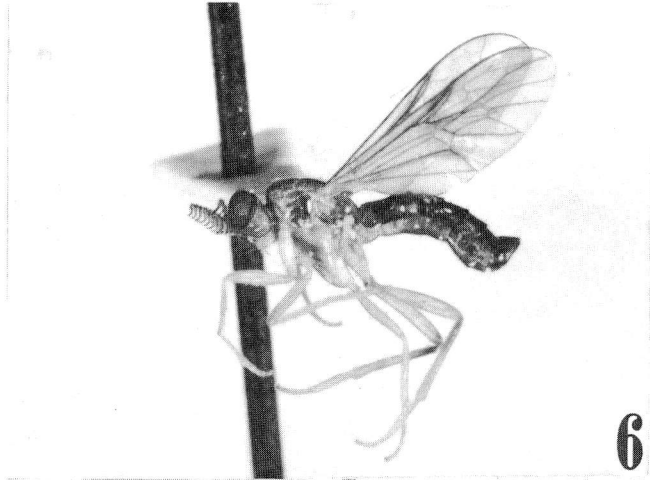
REFERENCES

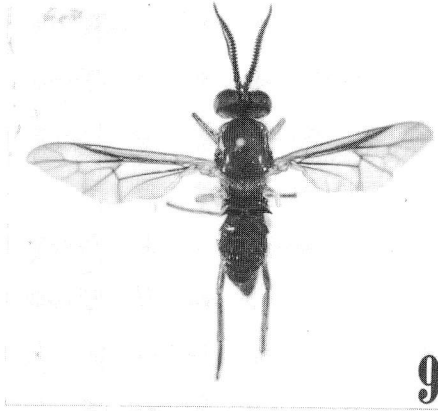
- The literature quoted in NAGATOMI (1970) is omitted.
- HENNIG, W., 1938, Die Gattung *Rhachicerus* Walker und ihre Verwandten im Baltischen Bernstein (Dipt.). *Zool. Anz.*, Band 123, pp. 33-41.
- _____, 1967, Die sogenannten "niederen Brachycera" im Baltischen Bernstein (Diptera: Fam. Xylophagidae, Xylomyidae, Rhagionidae, Tabanidae). *Stuttgart. Beitr. Naturkunde*, Nr. 174, pp. 1-51.
- NAGATOMI, A., 1970, Rachiceridae (Diptera) from the Oriental and Palaeartic regions. *Pac. Insects*, Vol. 12, pp. 417-466.
- _____, (in press), Geographical distribution of the lower Brachycera (Diptera). *Pac. Insects*.
- _____, (in prep.), Male genitalia of the lower Brachycera (Diptera).
- NAGATOMI, A. and K. IWATA, 1976, Female terminalia of lower Brachycera (Diptera). I. *Beitr. Entomol.*, Band 26, pp. 5-47.

Explanations of Figures

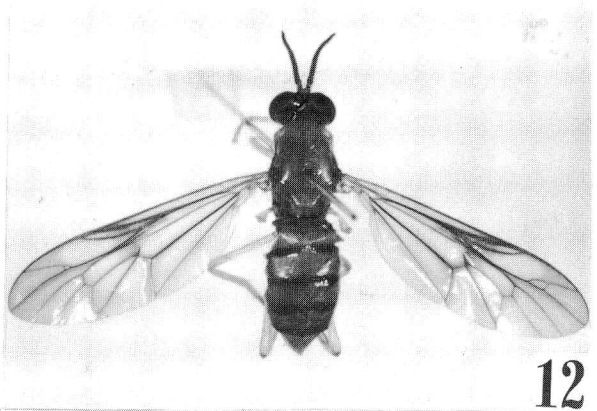
- Fig. 1. *Gymnorhachicerus pilosus* FREY, male, lateral view. Fig. 2 & 3. *Rachicerus samuelsoni* sp. nov., lateral view (2: male; 3: female). Fig. 4. *R. steffani* sp. nov., female, lateral view. Fig. 5. *R. lepidus* sp. nov., male, lateral view.
- Fig. 6. *Rachicerus amorusus* sp. nov., male, lateral view. Fig. 7. *R. anachoreticus* sp. nov., male, lateral view. Fig. 8. *R. quatei* sp. nov., male, lateral view.
- Fig. 9-11. *Rachicerus sakishimanus* sp. nov., male (9: dorsal view; 10: lateral view; 11: wing). Fig. 12 & 13. *R.* sp., female (12: dorsal view; 13: wing).



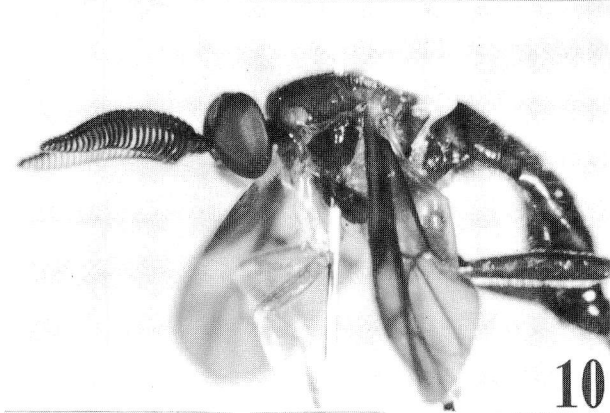




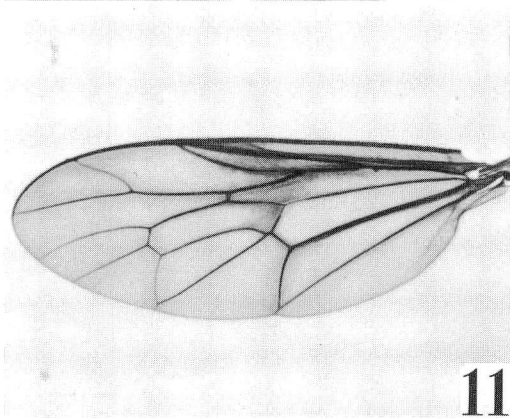
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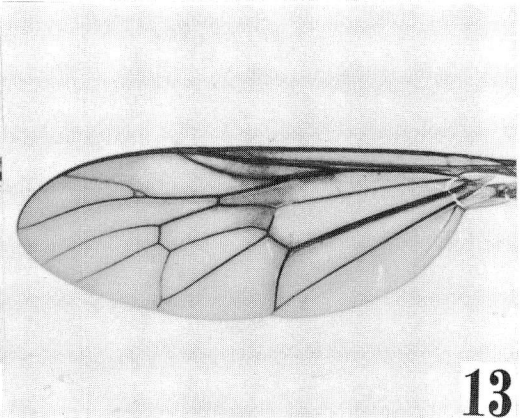
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